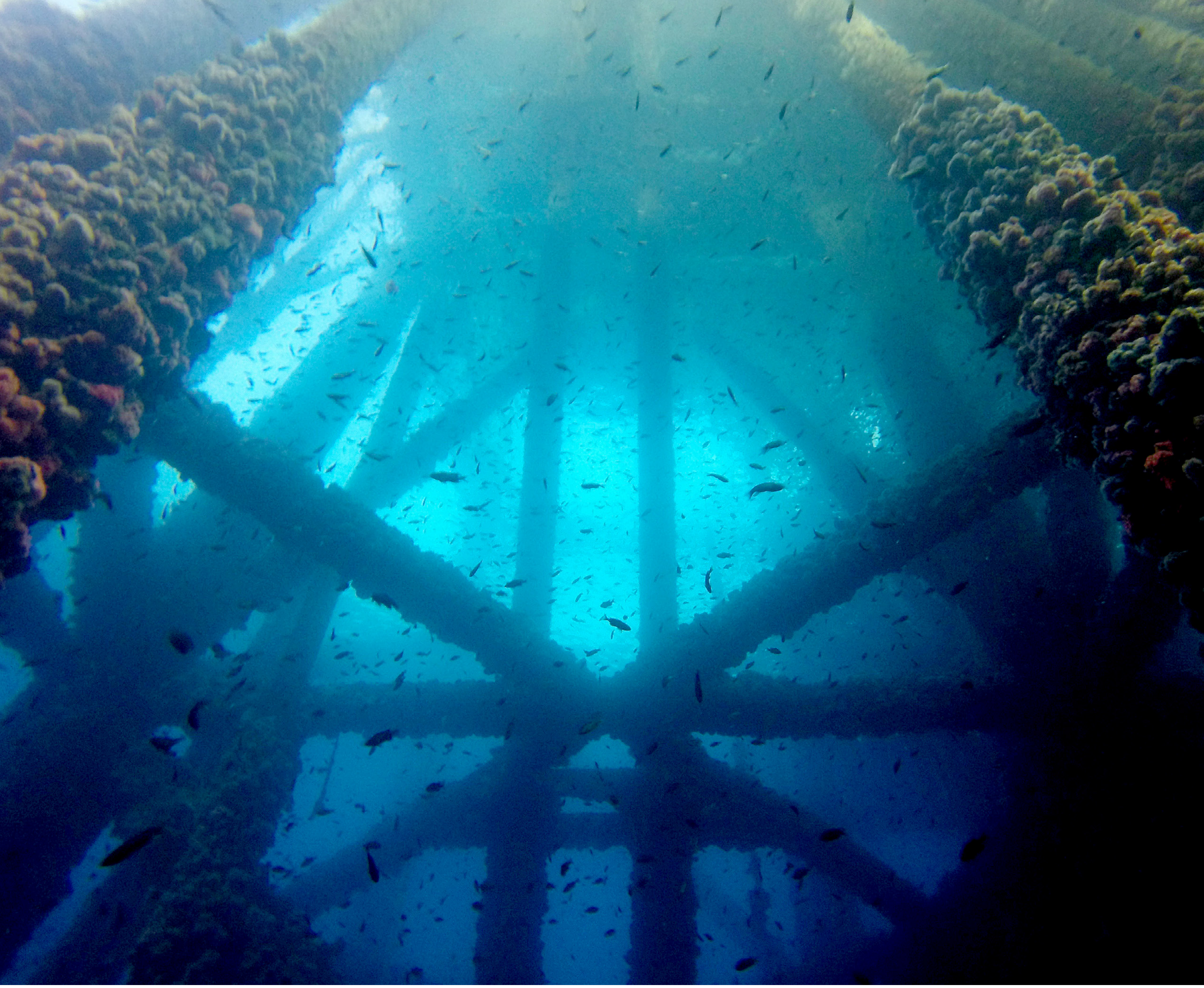

Draft Programmatic Environmental Impact Statement for **Oil and Gas Decommissioning Activities on the Pacific Outer Continental Shelf**

October 2022

Photography credit: Brandon Doheny

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Draft **Programmatic Environmental Impact Statement for Oil and Gas Decommissioning Activities on the Pacific Outer Continental Shelf**

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October 2022

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ACRONYMS AND ABBREVIATIONS

ACRONYMS

4H	Platforms Heidi, Hilda, Hazel, and Hope
ACHP	Advisory Council on Historic Preservation
AD	Anno Domini, meaning the number of years since the birth of Jesus Christ
AIS	automatic identification system
AML	above the mud line
AOA	Aquaculture Opportunity Area
AOC	area of concern
AOI	area of interest
AQRV	air quality–related value
ASD	azimuth stern drive
BBD	buoyancy bag device
BML	below the mud line
BOEM	Bureau of Ocean Energy Management
BOEMRE	Bureau of Ocean Energy Management, Regulation, and Enforcement
BP	Before Present
BSEE	Bureau of Safety and Environmental Enforcement
BTEX	benzene, toluene, ethylbenzene, and xylene
C	Celsius
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CAAQS	California Ambient Air Quality Standards
CalEPA	California Environmental Protection Agency
CARB	California Air Resources Board
CBC	Construction Battalion
CCC	California Coastal Commission
CD	consistency determination
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
CFR	*Code of Federal Regulations*
CH	critical habitat
CH_4	methane
CHSP	California Scenic Highway Project
CMP	Coastal Management Plan
CNEL	community noise equivalent level
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CO_3^{-2}	free carbonate ion concentration
COA	corresponding onshore area

CSC	conical-shaped charge(s)
CSI	chemical score index
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DB	derrick barge
DDEs	degradation products of the banned pesticide DDT
DDNP	diazodinitrophenol
DEEP	Decommissioning Emissions Estimation for Platforms
DLS	deep-water lowering system
DOD	U.S. Department of Defense
DOI	U.S. Department of the Interior
DP2	dynamic positioning
DPDV	dynamically positioned dive vessels
DPM	diesel particulate matter
DPS	distinct population segment
DWS	diamond wire cutting system
EA	environmental assessment
EEZ	exclusive economic zone
EFH	essential fish habitat
EIA	Energy Information Administration
EIS	Environmental Impact Statement
EMF	electromagnetic fields
EPA	U.S. Environmental Protection Agency
EPAct	Energy Policy Act of 2005
ERCA	Extended Range Cannon Artillery II
ERL	effects range low
ERM	effects range medium
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FAA	Federal Aviation Administration
FCMA	Magnuson Fishery Conservation and Management Act of 1976
FIP	federal implementation plan
FIRE	finance, insurance, and real estate services
FMP	Fishery Management Plan
FR	*Federal Register*
FSIV	fast supply intervention vessel
GHG	greenhouse gas
GIS	geographic information system
GOM	Gulf of Mexico
GPS	global positioning system
GWP	global warming potential

HAB	harmful algal bloom
HAER	Historic American Engineering Record
HAP	hazardous air pollutant
HAPC	habitat area of particular concern
HF	high-frequency
HFCs	hydrofluorocarbons
HLV	heavy lift vessel
HMX	homocyclonite
HNIW	hexanitrohexaazaisowurzitan
HSC	Harbor Safety Commission
HSTT	Hawaii–Southern California Training and Testing (U.S. Navy)
ICE	internal combustion engine
ID	inner diameter
IDWG	Interagency Decommissioning Working Group
IMO	International Maritime Organization
IPF	impact-producing factor
JWPCP	Los Angeles County Sanitation District Joint Water Pollution Control Plant
KOP	key observation point
LCA	landscape character area
LF	low-frequency
LGM	Last Glacial Maximum
LH	line handling
LSC	linear-shaped charge(s)
MARAD	Maritime Administration
MF	mid-frequency
MLLW	mean lower low water
MMPA	Marine Mammal Protection Act
MMS	Mineral Management Service
MOA	memorandum of agreement
MOU	memorandum of understanding
MPA	marine protected area
MPSV	multipurpose supply vessel
MRLA	Marine Resources Legacy Act (California)
MV	motor vessel
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NARP	National Artificial Reef Plan
NBVC	Naval Base Ventura County
NCMT	National City Marine Terminal
NCTC	Northern Chumash Tribal Council

NEP	National Estuary Program
NEPA	National Environmental Policy Act
NERR	national estuarine research reserve
NF_3	nitrogen trifluoride
NFEA	National Fishing Enhancement Act
NG	nitroglycerin
NGC	nitroglycol
NGO	non-governmental organization
NHPA	National Historic Preservation Act
NM	nitromethane
NMFS	National Marine Fisheries Service
NMS	national marine sanctuary
NMSA	National Marine Sanctuary Act
NMSP	National Marine Sanctuary Program
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOA	notice of availability
NOI	notice of intent
NORM	naturally occurring radioactive material
NOS	National Ocean Service
NO_x	nitrogen oxides
NP	national park
NPDES	National Pollutant Elimination System
NPS	National Park Service
NREL	National Renewable Energy Laboratory
NRHP	*National Register of Historic Places*
NTL	notice to lessees and operators
NTM	notice to mariners
NWCC	National Wind Coordinating Committee
NWR	national wildlife refuge
O&G	oil and gas
O_3	ozone
OCA	ocean character area
OCS	outer continental shelf
OCSD	Orange County Sanitation District
OCSLA	Outer Continental Shelf Lands Act
OD	outer diameter
ODMDS	ocean dredged material disposal sites
OOC	Offshore Operators Committee
OPA	Office of Public Affairs
OREP	Office of Renewable Energy Programs
ORSV	oil spill response vessel
OSHA	Occupational Safety and Health Administration
OSRO	oil spill removal organization
OSV	offshore support vessel

P&A	plug-and-abandonment
PAH	polynuclear/polycyclic aromatic hydrocarbon(s)
PARS	port access route study
PATON	Private Aid to Navigation
Pb	lead
PCBs	polychlorinated biphenyls
PEIS	Programmatic Environmental Impact Statement
PETN	pentaerythritol tetranitrate
PFCs	perfluorocarbons
PFMC	Pacific Fishery Management Council
PLEM	pipeline end manifold
PLET	pipeline end termination
PM	particulate matter
PM_{10}	particulate matter with diameters that are generally 10 μm and smaller
$PM_{2.5}$	particulate matter with diameters that are generally 2.5 μm and smaller
PMSR	Point Mugu Sea Range
POCS	Pacific Outer Continental Shelf
POCSR	Pacific Outer Continental Shelf Region
POLA	Port of Los Angeles
POLB	Port of Long Beach
POSD	Port of San Diego
POTW	publicly owned treatment work
PSD	prevention of significant deterioration
PSO	protected species observer
PSV	platform supply vessel
PTS	permanent threshold shift
PWSA	Ports and Waterways Safety Act
RDX	cyclonite
RHA	Rivers and Harbors Act
rms	root-mean-square
ROG	reactive organic gas(es)
ROI	region of influence
ROSV	remotely operated submersible vehicle
ROV	remotely operated vehicle
ROW	right(s) of way
RTR	rigs-to-reefs
SAPR	SAP report
SBCAPCD	Santa Barbara County Air Pollution Control District
SCA	seascape character area
SCAB	South Coast Air Basin
SCAQMD	South Coast Air Quality Management District
SCB	Southern California Bight
SCS	southern California steelhead
SEL	sound exposure level

SEL_{cum}	cumulative sound exposure level
SF_6	sulfur hexafluoride
SHPO	State Historic Preservation Office
SIP	state implementation plan
SNI	San Nicolas Island
SO_2	sulfur dioxide
SO_x	sulfur oxide
SPL	sound pressure level
SQO	sediment quality objectives
SSS	side-scan sonar
SSV	semi-submersible vessel
STEM	science, technology, engineering, and math
STLC	soluble threshold limit concentration
TAMT	Tenth Avenue Marine Terminal
TCP	traditional cultural property
TIP	tribal implementation plan
TNC	The Nature Conservancy
TNT	trinitrotoluene
TRPH	total recoverable petroleum hydrocarbon
TS	tug supply
TSS	traffic separation scheme
TTS	temporary threshold shift
ULSD	ultra-low-sulfur diesel
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
VCAPCD	Ventura County Air Pollution Control District
VSFB	Vandenberg Space Force Base
WA	wilderness area
WEA	wind energy area
WHO	World Health Organization
ZTV	zone of theoretical visibility

UNITS OF MEASUREMENT

ac	acre(s)
bbl	billion barrels
cm	centimeter(s)

dB	decibel(s)
dBA	A-weighted decibels
dBA CNEL	A-weighted decibel Community Noise Equivalent Level (total noise exposure per day)
dBA L_{dn}	A-weighted decibel equivalent day/night average sound level for a 24-hour period
dB re 1	particle velocity spectral density in decibels, a measure of underwater acoustics
dB reDNL	day-night average sound level
dB_{rms}	average loudness level in decibels
ft	foot/feet
ha	hectare(s)
hp	horsepower
hr	hour(s)
Hz	hertz
in.	inch(es)
kg	kilogram(s)
kHz	kilohertz
km	kilometer(s)
km^2	square kilometer(s)
km/h	kilometer(s) per hour
L	liter(s)
lb.	pound(s)
L_{dn}	day-night average sound level
L_{eq}	equivalent continuous sound level
m	meter(s)
mg	milligram
mgd	million gallons per day
Mg/L	milligram(s) per liter
Ml/L	milliliter(s) per liter
m/s	meter(s) per second
mi	mile(s)
mi^2	square mile(s)
MMT	million metric ton(s)
ms	millisecond(s)
MT	metric ton(s)
$MTCO_2e$	metric ton(s) CO_2 equivalent
µm	micrometer(s), or micron(s)
µPa	micro Pascal(s)
µPa/m	micro Pascal(s) per meter
µsec	microsecond(s)

nmi	nautical mile(s)
pH	potential of hydrogen, a measure of the acidity/baseness of water
ppm	parts per million
qt	quart
TEU	twenty-foot equivalent unit(s)
yd^3	cubic yard(s)
yr	year(s)

EXECUTIVE SUMMARY

ES.1 INTRODUCTION

The Bureau of Safety and Environmental Enforcement (BSEE) and Bureau of Ocean Energy Management (BOEM) propose to review and accept or reject decommissioning applications for the removal and disposal of oil and gas (O&G) platforms, associated pipelines, and other facilities offshore Southern California on the Pacific Outer Continental Shelf (POCS) as required by regulation and governing lease terms.

In accordance with the National Environmental Policy Act (NEPA) of 1969, as amended, BSEE and BOEM prepared this draft programmatic environmental impact statement (PEIS) to present the purpose and need for the proposed action, to describe the proposed action and reasonable alternatives to the proposed action, and to identify and evaluate the potential environmental impacts and socioeconomic considerations pertinent to the proposed action and alternatives (and typical mitigation recommendations, if appropriate), including the evaluation of potential cumulative impacts of the proposed action when combined with other past, present, and foreseeable future actions in the region.

ES.2 PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of the proposed action is to perform BSEE's delegated functions of oversight and enforcement of decommissioning obligations established by regulations and lease and right-of-way (ROW) terms for platforms, pipelines, and other facilities on the POCS in a manner that ensures safe and environmentally sound decommissioning activities and that complies with all applicable laws, regulations, and lease or permit terms and conditions. The need for the proposed action is to address infrastructure subject to applicable decommissioning requirements and to safely decommission it in accordance with the Outer Continental Shelf Lands Act (OCSLA) and other applicable laws. In addition, the proposed action would ensure that no O&G infrastructure would remain on the POCS seafloor that could interfere with navigation, commercial fisheries, future energy operations, or POCS users.

There are currently 23 O&G platforms on the POCS off the southern California coast. The first of these platforms was installed in 1967 and the last two in 1989, and all will eventually be subject to decommissioning. This PEIS will support future federal review of and action on decommissioning applications, and will provide a programmatic analysis to which future, site-specific NEPA analyses may tier, as permitted by NEPA's implementing regulations (43 CFR 46.140; 40 CFR 1501.11). This will allow future analyses to focus on site-specific issues and effects related to the removal activities.

ES.3 PROPOSED ACTION AND ALTERNATIVES

The proposed action evaluated in this draft PEIS is for BSEE to review and accept or reject decommissioning applications for the removal and disposal of O&G platforms, associated pipelines, and other facilities offshore southern California on the POCS as required by regulation and governing lease terms.

Four alternatives are evaluated in this draft PEIS: a Proposed Action, two action alternatives, and a No Action alternative. Each action alternative has a sub-alternative considering explosive severance for underwater portions of platforms (Table ES-1). Alternative 1, the Proposed Action, includes the review and approval by BSEE of applications for the complete removal of platforms, associated infrastructure, including pipelines and power cables, and other facilities from the POCS. Alternatives 2 and 3 differ from the Proposed Action in that each includes only partial rather than complete platform removal, and the abandonment-in-place (rather than complete removal) of pipelines. Alternative 2 considers only onshore jacket disposal. Alternative 3 includes a rigs-to-reefs (RTR) option for the disposal of the platform jacket. Under Alternative 4, the No Action alternative, BSEE would not approve any applications for platform, pipeline, or other facility decommissioning in the POCS region.

Decommissioning under any of the three action alternatives would involve three basic phases: (1) pre-severance; (2) severance; and (3) disposal. Decommissioning during the pre-severance phase would be similar among Alternatives 1–3. Pre-severance activities would include onsite mobilization of support vessels and barges, preparation of the target platform for severance, and the removal of conductors. Activities associated with the severance phase, however, would vary among Alternatives 1–3. Severance under Alternative 1 includes the complete removal of a platform's topside, conductors, the platform jacket to BML, and associated pipelines and power cables. Alternatives 2 and 3 would also include complete topside and conductor removal, but only partial removal of the platform jackets (the submerged portion to a depth of at least 26 m [85 ft]) and pipelines and cables could be abandoned in place.

During the disposal phase, Alternative 1 would use onshore disposal of platform topside, jacket, and pipeline materials. Alternative 2 would also use onshore disposal of platform topside and of the upper jacket materials, with the remaining jacket portions (below a depth of at least 85 ft [26 m]) and associated pipelines being abandoned in place. Material disposal under Alternative 3 would be the same as under Alternative 2, except that the upper portion of the platform jackets that have been removed to a minimum depth of 85 ft (26 m) below the sea surface would be used for artificial reef creation. Thus, Alternative 1 would employ the greatest amount of onshore disposal and Alternative 3 the least, while Alternatives 2 and 3 would leave portions of platform jackets abandoned in place.

Under the No Action Alternative (Alternative 4) there would be no federal action on decommissioning applications. Following lease termination all wells would have been permanently plugged (30 CFR 250.1710) and pipelines decommissioned (30 CFR 250.1750–1754). Pipeline decommissioning would have been accomplished by complete removal or by abandonment-in-place; in either case, the pipelines would have been pigged (passing through a tool designed for cleaning or purging) and flushed prior to final removal or abandonment. The platforms and any remaining associated pipelines would be maintained by the platform owners (with oversight from BSEE's inspection program) in compliance with ongoing regulatory and statutory requirements for managing platforms and pipelines to maintain safety (e.g., lighting for aircraft and navigation safety in the vicinity of the platforms) and protect the environment. While the eventual removal of the platforms would realistically be required at some point in the future, Alternative 4 serves as a baseline against which the environmental effects of the action alternatives are compared in the current analysis.

Implementation of any of the action alternatives may be accomplished through several methods. For example, several cutting methods (e.g., mechanical, hydraulic, explosive) are available for severance of topside and jacket structures. In addition, several options are available regarding the types and sizes of surface vessels that could be employed for platform removal and disposal transport. While each action alternative includes these options for severance and transport, the magnitude and duration of resulting impacts will differ among the alternatives. These alternatives are designed to describe the potential range of impacts as a result of the decommissioning activities that could occur. Prior to decommissioning a facility will undergo a subsequent EIS and consultations, which will have precise alternatives that may differ from these but not differ in the types of activities or the degree/range of impacts.

TABLE ES-1 Alternatives and Associated Decommissioning Activities

Alternatives	Activities
Alternative 1 — Proposed Action: Review and Approve or Deny Decommissioning Applications for Complete Removal of Platforms Employing Non-explosive Severance, Removal of Associated Pipelines and Other Facilities and Obstructions; Onshore Disposal. **Sub-Alternative 1a**. Same as Alternative 1, but with explosive severance of platform jackets.	• Complete removal of topside superstructure. • Complete jacket removal to at least 4.5 m (15 ft) below the mudline (BML). • Cleaning and complete removal of associated pipelines. • Complete removal of other facilities from seafloor. • Clear seafloor of O&G-related obstructions.[a] • Transport of removed infrastructure to onshore locations for processing, recycling, and/or land disposal.
Alternative 2 — Review and Approve or Deny Decommissioning Applications for Partial Platform Removal Employing Non-explosive Severance; Removal of Accessible Facilities and Obstructions; Onshore Disposal; Abandonment-in-Place of Associated Pipelines. **Sub-Alternative 2a**. Same as Alternative 2, but with explosive severance of platform jackets.	• Complete removal of topside superstructure. • Partial jacket removal to at least 26 m (85 ft) below the waterline. • Abandon associated pipelines in place in accordance with regulatory standards (30 CFR 250.1751). • Transport of removed infrastructure to onshore locations for processing, recycling, and/or land disposal.

TABLE ES-1 (Cont.)

Alternatives	Activities
Alternative 3 — Review and Approve or Deny Decommissioning Applications for Partial Platform Removal Employing Non-explosive Severance with Upper Jackets Placed in an Artificial Reef; Removal of Accessible Facilities and Obstructions with Onshore Disposal; and Abandonment-in-Place of Associated Pipelines. **Sub-Alternative 3a**. Same as Alternative 3, but with explosive severance of platform jackets.	• Complete removal of topside superstructure. • Partial jacket removal to at least 26 m (85 ft) below the waterline. • Abandon associated pipelines in place in accordance with regulatory standards (30 CFR 250.1751). • Transport of removed topside infrastructure to onshore locations for processing, recycling, and/or land disposal. • Place the upper platform jacket as an artificial reef at an approved location away from the site.
Alternative 4 — No Action: No Review of, or Decision on, Decommissioning Applications.	• No review of, or decision on, decommissioning applications.

[a] Obstructions mean structures, equipment, or objects that were used in oil, gas, or sulfur operations or marine growth that, if left in place, would hinder other users of the POCS. Obstructions may include, but are not limited to, shell mounds, wellheads, casing stubs, mud line suspensions, well protection devices, subsea trees, jumper assemblies, umbilicals, manifolds, termination skids, production and pipeline risers, platforms, templates, pilings, pipelines, pipeline valves, and power cables (30 CFR 250.1700(b)).

ES.4 AFFECTED ENVIRONMENT

Figure ES-1 shows the project area and the platforms in federal and state waters. The geographic scope of the affected environment includes the project area and the surrounding area, to the extent that potential effects from the proposed action could extend beyond the project area.

The following environmental resources, socioeconomic conditions, and sociocultural conditions are present on the POCS and onshore areas have been identified, and could potentially be affected by activities under the Proposed Action or alternatives:

- Air Quality: Potential impacts on regional air quality from emissions of criteria pollutants from mobile sources such as tugboats and crew and supply vessels, and stationary sources such as diesel engines on barges and lift vehicles; contributions of greenhouse gas emissions.

- Acoustic Environment (Noise): Potential impacts from continuous or impulsive underwater or airborne noise on ecological receptors or coastal communities from noise sources on vessels and equipment.

- Water Quality: Potential impacts from turbidity and sedimentation from discharges and seafloor disturbance, and sanitary wastes, wastewaters, and trash from vessels and platforms.

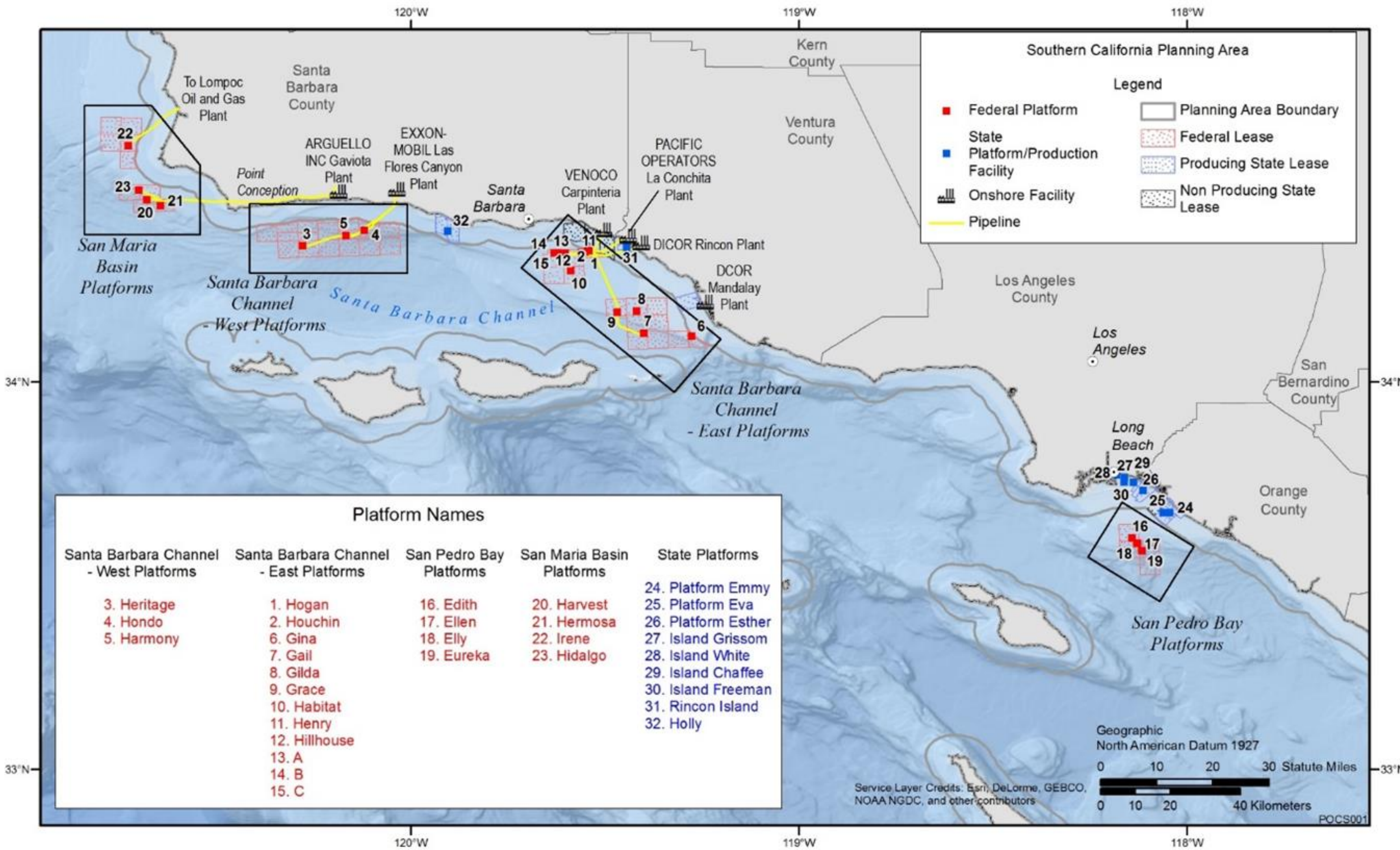

FIGURE ES-1 Locations of Current Lease Areas and Platforms Operating on the Southern California POCS Planning Area (Red symbols: platforms in federal waters; blue symbols: platforms in state waters).

- Marine Habitats and Invertebrates: Potential impacts from turbidity and sedimentation; disturbance of seafloor habitat from anchoring, removal of bottom-founded infrastructure (e.g., pipelines), and final site clearance; loss of platform-based habitat; sanitary and wastewater discharges and trash from vessels and platforms; impulsive noise impacts during explosive severance.

- Marine Fishes and Essential Fish Habitat (EFH): Potential impacts from noise and sediment resuspension; disturbance of seafloor habitat from anchoring, removal of bottom-founded infrastructure (e.g., pipelines), and final site clearance. Permanent loss of jacket- and pipeline-related hard-bottom habitat (including shell mounds); impulsive noise impacts during explosive severance.

- Sea Turtles: Potential impacts from vessel strikes, noise, entanglement in anchor or mooring lines and in trawls used for site clearance, and seafloor disturbance; permanent loss of jacket- and pipeline-related foraging habitat (including shell mounds); impulsive noise impacts during explosive severance.

- Marine and Coastal Birds: Potential impacts from the loss of topside perching structures and jacket-related foraging habitat for diving seabirds; platform and vessel lighting; harassment from continuous noise and decommissioning activities.

- Marine Mammals: Potential lethal or sublethal effects from vessel strikes, explosive removal methods, noise, turbidity, and bottom-disturbing activities; loss of topside-associated pinniped haul-out habitat; impulsive noise impacts during explosive severance.

- Commercial and Recreational Fisheries: Potential impacts from noise, turbidity and sedimentation, seafloor disturbance, space-use conflicts, and wastewater and trash from vessels and platforms.

- Areas of Special Concern: Potential impacts if air quality, water quality, or biological resources are affected as identified above.

- Archeological and Cultural Resources: Potential impacts on both submerged and land-based archaeological resources related to seafloor disturbance from anchoring and trawling, and from excavation of jacket pilings, pipelines, shell mounds, or other obstructions; loss of platforms potentially eligible as historic properties.

- Visual Resources: Potential impacts from lighting of platforms and work vessels; visual clutter from decommissioning vessels.

- Environmental Justice: Potential impacts if low income and minority populations are affected by noise, traffic, and emissions from vessels and trucks and during processing of removed materials at processing facilities.

- Socioeconomic Conditions: Potential impacts associated with decommissioning-related changes in employment, personal income, and local and state tax revenues; potential impacts on housing and to community and social services associated with changes in the work force.

- Shipping and Navigation: Potential impacts from space-use conflicts between work vessels and commercial shipping using designated shipping lanes and commercial ports.

ES.5 ENVIRONMENTAL CONSEQUENCES

Impact assessment involves identifying impact-producing factors (IPFs) associated with decommissioning activities and analyzing their effects on environmental resources. Identified IPFs potentially affecting biotic, physical, and sociocultural resources include noise, air emissions, turbidity and sedimentation, seafloor disturbance, lighting, vessel strikes, habitat loss, sanitary wastes/wastewater and trash and debris, visual intrusions, and space-use conflicts. Analysis of the IPFs considered a range of platform size, water depth, and location on the POCS, and accounted for activities involved in each phase of decommissioning, as well as the location, magnitude, and duration of the activities as they affect potential environmental impacts.

IPFs related to the potential use of explosive severance are related mainly to the impulsive underwater shockwave produced by detonations that can disturb, injure, or even kill fish, sea turtles, marine mammals, and other marine life, depending on the intensity of explosions and proximity of marine life. Explosive severance could be used to sever and section underwater portions of platforms, namely the platform legs, known as jackets, as well as for severing well conductors, and for BML severing of jackets and pilings. Explosive severance is an option under the action alternatives and is analyzed as a separate sub-alternative under each.

BSEE expects mitigation measures to be applied to future decommissioning work. The application of mitigation measures to the identified IPFs would reduce impacts to the extent practicable. Mitigation measures could include physical and engineered barriers, work practices, work timing, monitoring, and administrative measures for limiting impacts. Mitigation measures for explosive severance and other IPFs have been drawn from those in place in the Gulf of Mexico — where an extensive history of platform decommissioning has been compiled — as well as from international experience and from generally accepted good practice. BSEE will require specific mitigations in platform decommissioning applications. BSEE Notice to Lessees (NTL) No. 2020-P02, issued in August 2020, requires applicants to provide plans for protecting archaeological and sensitive biological features during removal operations, including mitigation measures to minimize impacts of removal. Specific mitigations for the potential impacts of explosive severance considered in Sub-alternatives 1a, 2a, and 3a for the protection of marine mammals and other marine life would be developed in consultation with the National Marine Fisheries Service. Table 4.1-3 of the main report presents typical mitigation measures for offshore decommissioning of O&G platforms and related structures.

Alternative 1 includes the complete removal of a platform's topside, conductors, and the platform jacket to BML, and associated pipelines and power cables. Alternatives 2 and 3 include only partial removal of the platform jackets (the submerged portion to a depth of at least 26 m

(85 ft) below the sea surface and pipeline abandonment-in-place. Therefore, there would be relatively less environmental disturbance under Alternatives 2 or 3 than under Alternative 1, which would include additional seafloor disturbance and habitat loss during complete jacket and pipeline removal.

With respect to material disposition, Alternative 1 would employ the greatest amount of onshore disposal and Alternative 3 the least. Alternatives 2 and 3 would leave portions of platform jackets abandoned in place. These differences in material disposition and disposal would have associated differences in habitat disturbance and other effects under Alternatives 1–3.

Under the No Action Alternative (Alternative 4) there would be no federal action on decommissioning applications. Thus, none of the impacts identified for Alternatives 1–3 would be expected under Alternative 4.

ES.5.1 Summary of Impacts on Resources

The PEIS evaluations characterized the anticipated type, intensity, geographic range, and duration of potential environmental effects associated with specific activities during decommissioning. Potential impact levels were assessed considering the duration, magnitude, and geographic scope of the impacts on a resource, as well as the degree to which potential impacts are avoidable or may be mitigated, and the ability of the affected resource to recover from an impact. With respect to the ability to recover, population-level impacts rather than impacts to individuals were evaluated for biota. For all the resources evaluated, four impact levels were considered: negligible, minor, moderate, and major.

Impacts on biological and physical resources are expected to be no more than minor, except for possible moderate impacts on marine mammals and fishes with swim bladders if explosive severance is used, and temporary moderate impacts on water quality and marine invertebrates and benthic habitat due to bottom disturbance during severance. A moderate impact is one in which the viability of the resource is not threatened—although some impacts may be irreversible—and the affected resource would recover completely if proper mitigation were applied once the IPF ceases. Impacts on sociocultural resources would be negligible to minor, except for possible major impacts on any platforms removed that are eligible as historic properties. In this instance, the resource would retain measurable effects indefinitely, even if remedial action is taken.

Table ES-2 presents a comparison of impacts on resources that could occur under each of the four alternatives.

ES.6 CUMULATIVE IMPACTS

Given the consistently small estimated potential impacts of decommissioning activities on resources in the POCS off southern California, incremental contributions to impacts from the proposed action are not expected to result in any noticeable or material cumulative effects on resources potentially impacted by the proposed action when added to past, current, and foreseeable future impacts on these resources from other sources.

TABLE ES-2 Summary Comparison of Potential Effects among Alternatives

Resource	**Alternative 1 Proposed Action:** Proposed Action: Review and Approve or Deny Decommissioning Applications for Complete Removal of Platforms Employing Non-explosive Severance; Removal of Associated Pipelines and other Facilities and Obstructions; Onshore Disposal. Sub-Alternative 1a. Same as Alternative 1, but with Explosive Severance of Platform Jackets.	**Alternative 2:** Review and Approve or Deny Decommissioning Applications for Partial Platform Removal Employing Non-explosive Severance; Removal of Accessible Facilities and Obstructions; Onshore Disposal; Abandonment-in-Place of Associated Pipelines. Sub-Alternative 2a. Same as Alternative 2, but with Explosive Severance of Platform Jackets.	**Alternative 3:** Review and Approve or Deny Decommissioning Applications for Partial Platform Removal Employing Non-explosive Severance with Upper Jackets Placed in an Artificial Reef; Removal of Accessible Facilities and Obstructions with Onshore Disposal; and Abandonment-in-Place of Associated Pipelines. Sub-Alternative 3a. Same as Alternative 3, but with Explosive Severance of Platform Jackets.	**Alternative 4 No Action:** No Review of, or Decision on, Decommissioning Applications.
Air Quality	Under Alternative 1, temporary and minor impacts on regional air quality from emissions of criteria pollutants from diesel engines on heavy equipment, barges, tugboats, and crew and supply vessels used in pre-severance, severance, and disposal phases of decommissioning. GHG emissions from vessels and equipment. Under Sub-alternative 1a, air emissions compared to Alternative 1 would be reduced, mainly through decreased barge time and no requirement for support equipment for cutting during jacket removal.	Similar to but less than Alternative 1 due to reduced emissions during severance and disposal phases resulting from only the partial removal of platform jackets. During pre-severance, emissions would be similar to those under Alternative 1. Under Sub-alternative 2a, air emissions would be reduced compared to Alternative 2 and Sub-alternative 1a, mainly through decreased barge time and no requirement for support equipment for cutting during jacket removal.	Similar to but less than Alternative 1 due to reduced emissions during severance and disposal phase resulting from jacket removal by reefing, and similar to Alternative 2. Emissions under Sub-alternative 3a would be less than under Alternative 3, and similar to levels under Sub-alternative 2a, as both have about the same number of explosive severances required.	Negligible impacts from vessels and helicopters used during periodic platform and pipeline inspection or maintenance.
Acoustic Environment (Noise)	Under Alternative 1, temporary and localized minor impacts from continuous or impulsive underwater or airborne noise on ecological receptors or coastal communities from noise sources on vessels and equipment used in pre-severance, severance, and disposal phases of decommissioning of platforms, pipelines, and power cables. Under Sub-alternative 1a, in the absence of mechanical jacket cutting there would be some reduction in continuous underwater noise, but replaced by impulsive underwater noise due to the use of explosives for jacket severance.	Under Alternative 2, similar to but less than Alternative 1 due to reduced duration for jacket removal and elimination of pipeline removal. Under Sub-alternative 2a, underwater noise would be similar to that under Sub-alternative 1a, but reduced due to no subseafloor jacket removal.	Under Alternative 3, similar to Alternative 2, with minor additional noise generation during rigs-to-reef jacket disposal. Explosive severance could be used for some reefing options. Under Sub-alternative 3a, underwater noise would be similar to that under Sub-alternative 2a.	Negligible impacts from vessels and helicopters used during periodic platform and pipeline inspection or maintenance.

TABLE ES-2 (Cont.)

Water quality	Under Alternative 1,negligible to temporary and localized minor impacts during pre-severance; during severance, temporary and minor impacts from vessel discharges, wastes from mechanical severance activities, and potential leaks from pipelines, equipment, or topside structures; and temporary and localized moderate impacts from bottom disturbance related to jacket severance, shell mound removal, pipeline and other facility removal, and seafloor clearance. Under Sub-alternative 1a, impacts on water quality would be similar to those under Alternative 1 except that impacts on water quality from vessel anchoring and discharges would be reduced due to reduced work schedules afforded by explosive severance.	Less than Alternative 1 due to smaller impacts from vessel discharges and elimination of nearly all water quality impacts associated with bottom disturbance that would occur under Alternative 1 with complete platform and pipeline removal; minor seafloor disturbance and associated turbidity from capping and burying pipeline ends. Under Sub-alternative 2a, impacts on water quality would be similar to those under Alternative 2, except that impacts on water quality from vessel anchoring and discharges would be reduced due to reduced work schedules afforded by explosive severance.	Under Alternative 3, impacts would be similar to those under Alternative 2, except some small impacts from vessel discharges during jacket transport for rigs-to-reef disposal. Under Sub-alternative 3a, impacts to water quality would be similar to those under Alternative 3, except that impacts on water quality from vessel anchoring and discharges would be reduced due to reduced work schedules afforded by explosive severance.	Negligible impacts from platform inspections, maintenance; pollution control measures would prevent impacts on water quality from platforms.
Marine Invertebrates and Benthic Habitat	Under Alternative 1, negligible to minor impacts during pre-severance, dependent on extent of vessel anchoring. During severance, localized temporary moderate impacts from noise, turbidity, and sedimentation. Permanent loss of jacket- and pipeline-related habitat (including shell mounds) would result in localized moderate impacts. Potential reduction in geographic spread of invasive species that may be colonizing platforms. Negligible impacts from disposal. Negligible impacts on threatened and endangered species. While potentially significant locally, the loss of platform- and pipeline-related hard bottom habitat is unlikely to result in significant, long-term changes in marine invertebrate communities of the POCS. Under Sub-alternative 1a, impacts would be similar to those under Alternative 1, except that explosive removal of the jacket would result in impulsive noise impacts that could kill, stun, or displace marine invertebrates in the immediate vicinity. Impacts from continuous noise from work vessels and from vessel anchoring and discharges would be reduced compared to Alternative 1 due to reduced work schedules afforded by explosive severance.	Impacts under Alternative 2 would be similar to those of Alternative 1 (overall moderate) but of lesser magnitude. Loss of hardbottom habitat would be limited largely to the upper portions of the platform jackets, and there would be greatly reduced disturbance of the seafloor and shell mounds. Remaining jacket infrastructure could continue to facilitate spread of some invasive species. There would be much less disturbance of seafloor habitat as pipelines would be abandoned in-place. Under Sub-alternative 2a impacts would be similar to those under Alternative 2, except that explosive severance could kill or stun benthic and pelagic invertebrates within, or displace them from, the area of the explosion, an impact that would not occur under Alternative 2. Such impacts would be reduced compared to Sub-alternative 1a due to the reduced level of jacket severance under Sub-alternative 2a.	Under Alternative 3, the impacts would be similar to those under Alternative 2 (overall moderate). However, with rigs-to-reef jacket disposal, localized positive impacts may be realized from the creation of new hardbottom habitat. Under Sub-alternative 3a, impacts would be similar to those under Sub-alternative 2a, and localized positive impacts may be realized from the creation of new hardbottom habitat through rigs-to-reef jacket disposal.	Negligible impacts. Platforms would continue serving as habitat supporting benthic communities.

TABLE ES-2 (Cont.)

Marine Fish and EFH	Under Alternative 1, overall, no more than moderate impacts. Negligible to minor impacts during pre-severance, dependent on extent of anchoring. During severance, localized temporary moderate impacts from noise and moderate impacts from sediment resuspension. Permanent loss of jacket- and pipeline-related hardbottom habitat (including shell mounds) would result in long-term but localized moderate impacts, which could be locally significant for some species. Negligible impacts from disposal. Negligible impacts on threatened and endangered species. While potentially significant locally, the loss of platform- and pipeline related hard bottom habitat is unlikely to result in significant, long-term changes in marine fish communities and productivity on the POCS. Negligible impacts on EFH and threatened and endangered species. Under Sub-alternative 1a, explosive severance of platform jackets would result in localized and temporary moderate impacts due to shock waves from impulsive noise that could kill, injure, or displace fish on the seafloor and in the water column in the vicinity of the explosion that would not occur under Alternative 1. However, the effects would be spatially limited, with the greatest effects within the vicinity of the platforms. Any fish mortality from explosive removal is not expected to result in population level impacts to fish communities in the POCS.	Similar to Alternative 1 (overall moderate), except impacts of lesser magnitude due to less habitat loss, less seafloor disturbance, and less associated decreases in fish productivity. Under Sub-alternative 2a, impacts would be similar to those under Alternative 2, except that the use of explosive severance methods could kill, injure, or displace fish on the seafloor and in the water column in the vicinity of the explosion, an impact that would not occur under Alternative 2. Such impacts would be reduced compared to Sub-alternative 1a due to reduced level of jacket severance that would be required under Sub-alternative 2a.	Similar to Alternative 2 (overall moderate), except localized positive impacts associated with increases in fish density and productivity could be realized in some areas from the creation of new hardbottom habitat from rigs-to-reef jacket disposal. Under Sub-alternative 3a, impacts would be similar to those under Sub-alternative 2a, except that localized positive impacts associated with new foraging habitat in some areas from the creation of new hardbottom habitat with rigs-to-reef jacket disposal.	Negligible impacts. Platforms would continue serving as artificial reefs supporting fish populations and communities.
Sea Turtles	Under Alternative 1, overall negligible to localized minor impacts. Negligible impacts during pre-severance, with potential minor impacts from vessel strikes. During severance, potential localized, temporary minor impacts noise, seafloor disturbance. The permanent loss of jacket- and pipeline-related foraging habitat (including shell mounds) would result in localized minor impacts. Negligible impacts from disposal. Under Sub-alternative 1a, impacts on sea turtles from explosive severance could range from non-injurious effects (e.g., acoustic annoyance; mild tactile detection or physical discomfort) to varying levels of injury (i.e., non-lethal and lethal injuries). Short-duration use of explosives and mitigation measures would limit the level of impact on sea turtles to minor.	Impacts under Alternative 2 would be similar to those under Alternative 1. Overall, most impacts would be negligible, except for vessel strikes that could be minor. Impacts associated with the loss of jacket-related foraging habitat would be of lesser magnitude than under Alternative 1. Under Sub-alternative 2a, impacts would be similar to those under Alternative 2, except that the use of explosive severance could result in injury and death from explosive shock waves, which would not occur under Alternative 2. Such risks would be reduced compared to Sub-alternative 1a due to fewer underwater severances required for partial removal of platform jackets.	Impacts would be similar to those under Alternative 2 (overall negligible to minor) except localized positive impacts associated with new foraging habitat in some areas from the creation of new hardbottom habitat. Impacts under Sub-alternative 3a would be similar to those under Sub-alternative 2a, except that localized positive impacts associated with new foraging habitat in some areas from the creation of new hardbottom habitat with rigs-to-reef jacket disposal.	Negligible impacts. Platforms and pipelines would continue serving as hardbottom foraging habitat.

TABLE ES-2 (Cont.)

Marine and Coastal Birds	Under Alternative 1, overall negligible to localized minor impacts. During severance, minor impacts from the loss of topside perching structures and jacket-related foraging habitat for diving seabirds, and harassment from continuous noise and decommissioning activities. Negligible impacts from disposal. Positive impacts would occur from elimination of lighting-related platform collisions by birds, especially during migration. Under Sub-alternative 1a, impacts from explosive severance are not anticipated to impact seabirds other than by possible harassment from explosive noise. Harassment from continuous noise and activities would be reduced compared to Alternative 1 due to reduced work schedules using explosive severance and reduction in non-explosive severance noise.	Under Alternative 2, impacts would be similar to those under Alternative 1, being overall negligible to localized minor. Under Sub-alternative 2a, the use of explosive severance could result in impacts to diving seabirds that would not occur under Alternative 2. However, harassment of marine and coastal birds from continuous noise and work activities under Sub-alternative 2a would be less than under Alternative 2 or Sub-alternative 1a due to shortened work schedules using explosive severance and reduction in non-explosive severance noise.	Impacts would be similar to those under Alternative 1. Positive impacts could be realized as a result of new foraging habitat being created in some areas following rigs-to-reef jacket disposal. Under Sub-alternative 3a, impacts would be similar to those under Sub-alternative 2a. Positive impacts could be realized as a result of new foraging habitat being created in some areas following rigs-to-reef jacket disposal.	Negligible impacts. Platform topsides would continue to provide perching and resting habitat, and diving seabirds would continue foraging around the jacket structures. Decreased potential for lighting-related bird-platforms collisions due to reduced platform lighting.
Marine Mammals	Under Alternative 1, temporary and localized minor impacts associated with potential for vessel strikes, noise disturbance, and loss of topside-associated pinniped haul-out habitat. Impacts from other activities would be negligible. Under Sub-alternative 1a, the use of explosives for jacket severance could result in disturbance, auditory injury, or non-auditory injury to marine mammals, including death to individuals, even with the implementation of mitigation measures, but would not be expected to result in population level effects. Thus, impacts could be up to moderate. Harassment from continuous noise would be reduced due to reduced work schedules using explosive severance and reduction in non-explosive severance noise.	Impacts would be similar to those under Alternative 1, but with reduced potential for vessel strikes due to smaller amount of support vessel traffic, and a reduced duration of noise impacts from mechanical cutting. Under Sub-alternative 2a, impacts would be similar to those under Sub-alternative 1a. Impacts under Sub-alternative 2a, however, would be less than under Alternative 2 or Sub-alternative 1a due to shortened work schedules using explosive severance.	Under Alternative 3, impacts would be similar to those under Alternative 2. Positive impacts could be realized as a result of new hardbottom habitat being created in some areas following rigs-to-reef jacket disposal.	No decommissioning-related impacts. A minor impact from vessel strikes would occur, but the potential for such strikes would be greatly reduced as vessel traffic to the platforms would be greatly reduced from current conditions.

TABLE ES-2 (Cont.)

Commercial and Recreational Fisheries	Decommissioning under Alternative 1 is anticipated to result in overall negligible impacts on commercial fishing from noise, turbidity and sedimentation, seafloor disturbance, space-use conflicts, and wastewater and trash from vessels and platforms. A possible minor benefit, as platform and pipeline removal would eliminate space-use conflicts and reduce potential for snagging loss of fishing gear. Negligible to minor impacts on recreational fishing due to reduction in fishing opportunities near existing platforms. Under Sub-alternative 1a, impacts on commercial and recreational fisheries would be reduced compared to Alternative 1, due to reduced work schedules, and thus, shorter disturbance times, potentially less anchoring, reduced abrasive cutting discharges, reduced vessel discharges, and reduced periods of space-use conflicts for vessels.	Impacts under Alternative 2 would be similar to those under Alternative 1, except that the remaining infrastructure (e.g., jackets and unburied pipelines) would continue to pose some potential for snagging loss. Recreational fishing opportunities would occur at the platform locations due to the remaining jacket structures and associated habitats and elimination of access restrictions that may have been previously present at the platforms. Under Sub-alternative 2a, impacts would be similar in nature but of reduced duration than under Sub-alternative 1a due to reduced work schedules and associated impacts from vessel noise, discharges, bottom disturbance, and space-use conflicts.	Impacts would be similar to those under Alternative 2 except for an additional benefit from increased recreational fishing opportunities at the rigs-to-reef jacket disposal site. Under Sub-alternative 3a, impacts to commercial and recreational fisheries would be similar to those under Sub-alternative 2a. Positive impacts to recreational fishing could be realized as a result of new hardbottom habitat being created in some areas following rigs-to-reef jacket disposal.	No decommissioning-related impacts. Potential for space-use conflicts and snagging loss of fishing gear would continue at current levels.
Areas of Special Concern	Negligible impacts under both Alternative 1 and Sub-alternative 1a.	Same as Alternative 1 and Sub-alternative 1a.	Same as Alternative 1 and Sub-alternative 1a.	Negligible impacts.
Archeological and Cultural Resources	Under Alternative 1, potential impacts to both submerged and land-based archaeological resources, including submerged precontact or historic archaeological sites, particularly shipwrecks, or built architectural resources would be minor; impacts to any platforms eligible as historic properties would be major and long-term. Since the seafloor disturbance footprint would be the same whether explosive or non-explosive severance is used for jacket removal, impacts on archaeological and cultural resources under Sub-alternative 1a would be the same as under Alternative 1.	Under Alternative 2, impacts would be similar to but less than Alternative 1, due to reduced seafloor disturbance from leaving lower jacket portions, as well as pipelines in place. Impacts under Sub-alternative 2a would be the same as Alternative 2.	Under Alternative 3, impacts would be similar to but less than Alternative 1 and similar to Alternative 2, with the slight possibility of additional disturbance of archaeological resources at the rigs-to-reef jacket disposal site. Impacts under Sub-alternative 3a would be the same as Alternative 3.	Negligible adverse impacts from maintenance activities, but continued impacts to the integrity of the cultural setting and integrity from the presence of the platforms and loss of positive impacts from platform removal to maritime and land-based traditional cultural properties.
Visual Resources	Impacts under both Alternative 1 and Sub-alternative 1a would be minor and short-term, associated with visual clutter by decommissioning vessels and work lighting at the platforms. The permanent removal of the platforms would restore the natural scenic quality of platform locations.	Similar impacts to those under Alternative 1 and Sub-alternative 1a. Impacts from vessel lighting and visual clutter would be reduced in duration under Sub-alternative 2a compared to Alternative 2.	Similar impacts to those under Alternative 2 and Sub-alternative 2a.	Negligible impacts.

TABLE ES-2 (Cont.)

Recreation and Tourism	Overall impacts under Alternative 1 and Sub-alternative 1a would be negligible during any of the three phases of decommissioning.	Similar impacts to those under Alternative 1 and Sub-alternative 1a.	Similar impacts to those under Alternative 2 and Sub-alternative 2a, except potential positive impacts associated with increased opportunities for diving and recreational fishing at the rigs-to-reef jacket disposal sites.	Negligible impacts.
Environmental Justice	Impacts on low income or minority populations under either Alternative 1 or Sub-alternative 1a will be assessed when individual decommissioning applications are received, and site-specific information is available to conduct a meaningful analysis.	Impacts under Alternative 2 and Sub-alternative 2a will be assessed when individual decommissioning applications are received, and site-specific information is available to conduct a meaningful analysis.	Impacts under Alternative 3 and Sub-alternative 3a will be assessed when individual decommissioning applications are received, and site-specific information is available to conduct a meaningful analysis.	Negligible impacts.
Socioeconomics	Under Alternative 1, there would be minor impacts associated with decommissioning-related employment, personal income, and local and state tax revenues. Negligible impacts to housing and to community and social services. Under Sub-alternative 1a, the use of explosive severance would shorten removal timeframes and lower the cost of decommissioning, producing fewer jobs and reducing income and tax revenues compared to Alternative 1.	Similar to Alternative 1, but of lower magnitude due to the smaller amount of platform infrastructure that would be removed and transported to port for disposal. Impacts under Sub-alternative 2a, would be similar to those under Sub-alternative 1a, resulting in decreases in decommissioning-related employment, personal income, and tax revenues.	Impacts associated with decommissioning-related employment, personal income, and tax revenues under Alternative 3 would be similar to those under Alternative 2. Impacts under Sub-alternative aa, would be similar to those under Sub-alternative 1a, with decreases in decommissioning-related employment, personal income, and local and tax revenues.	Negligible impacts.
Navigation and Shipping	There would be negligible adverse impacts to navigation and shipping under either Alternative 1 or Sub-alternative 1a. Positive impact from elimination of platform-vessel allision potential.	Impacts the same as under Alternative 1 and Sub-alternative 1a.	Impacts the same as under Alternative 1 and Sub-alternative 1a.	Under this alternative, the potential for platform-vessel allisions would remain.

1 INTRODUCTION

1.1 BACKGROUND

The Submerged Lands Act of 1953, as amended (43 U.S.C. 1301 et seq. [67 Stat. 29]) established Federal jurisdiction over submerged lands seaward of State boundaries. Through the Outer Continental Shelf Lands Act (OCSLA) of 1953, as amended (43 U.S.C. 1331 et seq.), Congress declared it the policy of the United States to make the outer Continental Shelf "available for expeditious and orderly development, subject to environmental safeguards, in a manner which is consistent with the maintenance of competition and other national needs"; 43 U.S.C. 1332(3), and directs the Secretary of the Interior to establish policies and procedures that expedite exploration, development, and production of Outer Continental Shelf (OCS) resources (e.g., oil and natural gas) in a safe and environmentally sound manner. The Secretary oversees the OCS oil and gas (O&G) program, and under OCSLA is required to balance orderly resource development with protection of the human, marine, and coastal environments while simultaneously ensuring that the public receives an equitable return for these resources. Under OCSLA (43 U.S.C. 1334(a)), the Secretary is granted the authority to prescribe rules providing for the "prevention of waste and conservation of natural resources" of the OCS.

The Secretary's responsibilities under OCSLA have been delegated largely to the Bureau of Ocean Energy Management (BOEM) and the Bureau of Safety and Environmental Enforcement (BSEE; together with BOEM, the Bureaus), and together, they are responsible for ensuring that resource exploration, development, and production activities carried out on the OCS are done in compliance with the requirements of OCSLA, its implementing regulations, and other applicable law. BOEM is responsible for the environmentally sound economic development of the nation's offshore resources. BSEE is responsible for safety and environmental oversight of OCS O&G operations, including decommissioning, through the permitting and inspection of such operations.

BOEM functions include OCS leasing, resource evaluation, review and administration of O&G exploration and development and production plans, renewable energy development, and environmental analysis and studies. BOEM develops the Five-Year OCS Oil and Natural Gas Leasing Program; oversees assessments of oil, natural gas, and other mineral resource potentials of the OCS; inventories hydrocarbon reserves; develops production projections; and conducts economic evaluations.

BSEE is responsible for enforcing safety and environmental regulations covering the exploration, development, and production of oil and natural gas and other resources on the OCS. BSEE functions include the development and enforcement of OCS safety and environmental regulations; issuance of permits for certain OCS exploration, development, and production activities, such as those related to drilling operations and pipelines; inspections and oversight of OCS O&G facilities and operations; oil spill preparedness; and review and oversight of decommissioning applications and activities. BSEE's implementing regulations are found in 30 CFR Chapter II.

The preparation of this draft Programmatic Environmental Impact Statement (PEIS) relates to BSEE's role in reviewing and accepting or rejecting applications for decommissioning O&G platforms in federal waters of the Pacific OCS (POCS) and fulfills BOEM's role in conducting environmental analysis and studies. This draft PEIS has been prepared in accordance with the Council on Environmental Quality (CEQ) regulations (40 CFR 1500–1508) and Department of the Interior (DOI) regulations (43 CFR part 46) implementing the National Environmental Policy Act (NEPA). This draft PEIS presents the purpose and need for the proposed action, describes the proposed action and reasonable alternatives to the proposed action, and identifies and evaluates the potential environmental impacts and socioeconomic considerations pertinent to the proposed action and alternatives, including estimates of greenhouse gas (GHG) emissions and evaluation of potential cumulative impacts of the proposed action when combined with other past, present, and foreseeable future actions in the region. This draft PEIS will aid in understanding and communicating any significant environmental impacts that may be associated with decommissioning and inform the decision-making process.

For the OCS O&G program, lessees and owners of operating rights seeking to decommission their facilities, pipelines, and other equipment or obstructions must do so in accordance with the governing regulations, principally located at 30 CFR part 250 Subpart Q, and lease terms and conditions. There are currently 23 O&G platforms on the POCS off the Southern California coast (Figure 1-1). The first of these platforms was installed in 1967, and the last two in 1989, and all will eventually be subject to decommissioning. Figure 1-2 depicts the typical structure of an offshore oil platform, such as those existing on the POCS. O&G lessees, owners of operating rights, and holders of rights-of-way (ROWs) must decommission all POCS wells, platforms, other facilities, and pipelines, and clear the seafloor of all obstructions, in compliance with the regulatory requirements. Lessees and owners of operating rights and holders of ROWs must apply for and obtain approval from the appropriate BSEE District Manager or Regional Supervisor before decommissioning wells, platforms, pipelines, and other facilities.

Decommissioning operations generally occur after lease expiration, when facilities are no longer useful for operations, or when ordered by BSEE consistent with applicable laws and regulations. Currently, eight O&G platforms on the POCS offshore of Southern California, near Point Conception and in the Santa Barbara Channel no longer produce O&G (Table 1-1). These platforms are located on terminated leases that no longer allow resumption of production. Seven of these platforms (Gail, Grace, Harvest, Hermosa, Hidalgo, Hogan, and Houchin) are shut-in,[1] pending a final decommissioning decision. In addition, Platform Habitat is currently in a state of preservation[2] and may proceed to decommissioning within the next 10 years. Well-plugging and conductor-removal operations on some of these platforms are underway, and platform and related facility and pipeline decommissioning are expected to occur this decade.

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1 To "shut-in" a well means to close off a well so it is no longer producing. A shut-in platform is one in which all the wells have been closed off and production is no longer occurring at the platform.

2 At these platforms, ongoing regulatory and statutory requirements for managing platforms following lease termination continue to apply, notably those for maintaining safety and protecting the environment on the OCS. Platform and pipeline maintenance would continue to take place, as would BSEE's inspection program (30 CFR 250.130–250.133).

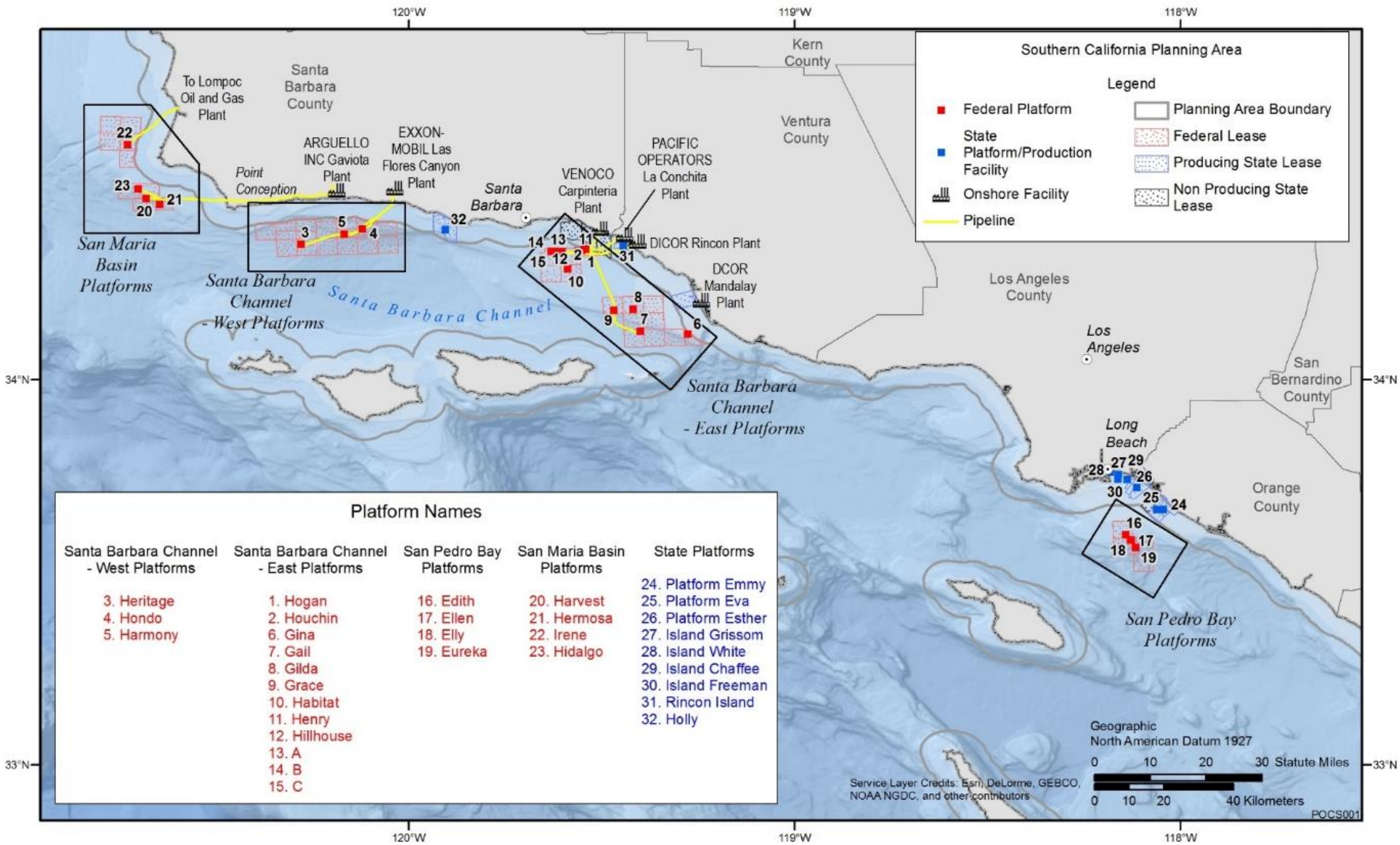

FIGURE 1-1 Locations of current leases and platforms on the POCS and platforms and production facilities in nearshore state waters adjacent to the federal OCS. Platforms in federal waters are shown and listed in red; those in state waters are indicated in blue.

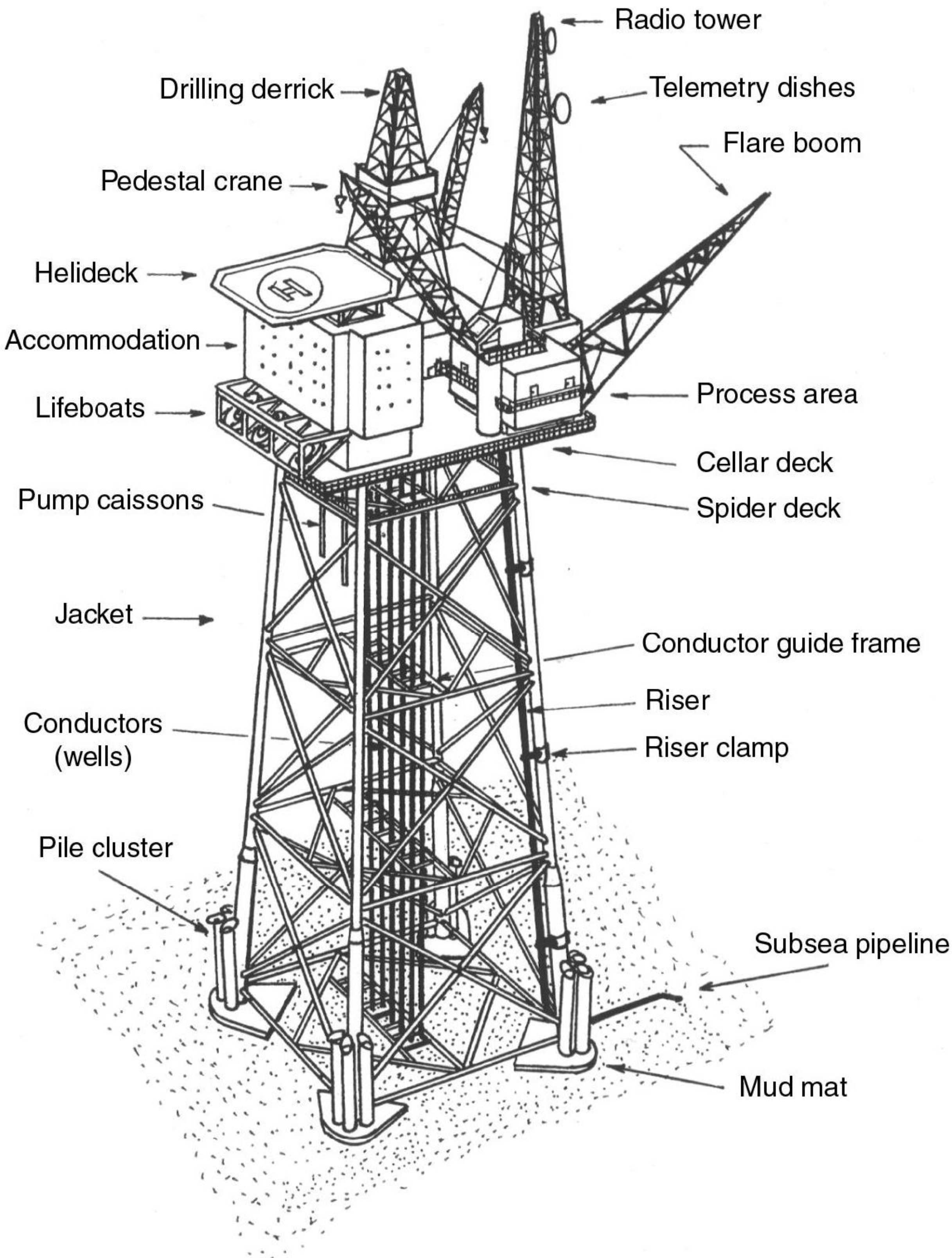

FIGURE 1-2 Typical offshore jacket structure designed for use in 350 ft. (107 m) of water. (Source: https://petrowiki.spe.org/Fixed_steel_and_concrete_gravity_base_structures)

1 **TABLE 1-1 Platforms on the Pacific Outer Continental Shelf**[a]

Platform	Date Installed	Location	Water Depth m (ft)	Distance from Shore km (mi)
Tranquillon Ridge Field				
Irene	8-7-1985	Santa Maria Basin	74 (242)	7.6 (4.7)
Point Arguello Field				
Harvest	6-12-1985	Santa Maria Basin	204 (675)	10.8 (6.7)
Hermosa	10-5-1985	Santa Maria Basin	184 (603)	10.9 (6.8)
Hidalgo	7-2-1986	Santa Maria Basin	131 (430)	9.5 (5.9)
Hondo Field				
Hondo	6-23-1976	Santa Barbara Channel West	257 (842)	8.2 (5.1)
Harmony	6-21-1989	Santa Barbara Channel West	365 (1,198)	10.3 (6.4)
Pescado Field				
Heritage	10-7-1989	Santa Barbara Channel West	328 (1,075)	13.2 (8.2)
Carpinteria Offshore				
Houchin	7-1-1968	Santa Barbara Channel East	50 (163)	6.6 (4.1)
Hogan	9-1-1967	Santa Barbara Channel East	47 (154)	6.0 (3.7)
Henry	8-31-1979	Santa Barbara Channel East	53 (173)	6.9 (4.3)
Dos Cuadras Field				
Hillhouse	11-26-1969	Santa Barbara Channel East	58 (190)	8.8 (5.5)
A	9-14-1968	Santa Barbara Channel East	57 (188)	9.3 (5.8)
B	11-8-1968	Santa Barbara Channel East	58 (190)	9.2 (5.7)
C	2-28-1977	Santa Barbara Channel East	59 (192)	9.2 (5.7)
Pitas Point Field				
Habitat	10-8-1981	Santa Barbara Channel East	88 (290)	12.6 (7.8)
Gilda	1-6-1981	Santa Barbara Channel East	62 (205)	14.2 (8.8)
Grace	7-30-1979	Santa Barbara Channel East	97 (318)	16.9 (10.5)
Sockeye Field				
Gail	4-5-1987	Santa Barbara Channel East	225 (739)	15.9 (9.9)
Hueneme Field				
Gina	12-11-1980	Santa Barbara Channel East	29 (95)	6.0 (3.7)
Beta Field				
Edith	1-12-1984	San Pedro Bay	49 (161)	13.7 (8.5)
Elly	3-12-1980	San Pedro Bay	78 (255)	13.8 (8.6)
Ellen	1-15-1980	San Pedro Bay	81 (265)	13.8 (8.6)
Eureka	7-8-1984	San Pedro Bay	213 (700)	14.5 (9.0)

2 [a] Platforms in red are located on terminated leases.

BSEE has received initial decommissioning applications for Platforms Gail, Grace, Harvest, Hermosa, and Hidalgo, but not for Platforms Hogan, Houchin, or Habitat. BSEE expects to receive decommissioning applications for those three platforms and associated pipelines and other facilities in the near term. It is currently unknown when decommissioning may be initiated for the remaining 14 platforms, though by regulation an initial platform removal application must be submitted for POCS facilities at least two years before production is projected to cease.

Consistent with the regulations implementing NEPA, this draft PEIS was prepared to inform future decisions on decommissioning applications for O&G pipelines, platforms, and other facilities offshore of Southern California on the POCS. Additional details regarding the decommissioning process can be found in “A Citizen’s Guide to Offshore Oil and Gas Decommissioning in Federal Waters off California” (IDWG 2019). This guide also identifies the various statutes and agencies involved in the decommissioning process.

BOEM is assisting BSEE in the preparation of this draft PEIS. This draft PEIS identifies the potential impacts that may result from approved decommissioning activities related to the removal or abandonment of O&G infrastructure (e.g., wellheads, caissons, casing strings, platforms, mooring devices, pipelines) on the POCS, and the subsequent salvage and site-clearance operations that may be employed during decommissioning.

1.2 PURPOSE AND NEED FOR THE PROPOSED ACTION

The proposed action evaluated in this PEIS is for BSEE to review and accept or reject decommissioning applications for the removal and disposal of O&G platforms, associated pipelines, and other facilities offshore Southern California on the Pacific OCS as required by regulation and governing lease terms. The purpose of the proposed action is to perform BSEE’s delegated functions of oversight and enforcement of decommissioning obligations established by regulations and lease or ROW terms for platforms, pipelines, and other facilities on the POCS in a manner that ensures safe and environmentally sound decommissioning activities and that complies with all applicable laws, regulations, and lease or permit terms or conditions. The need for the proposed action is to address infrastructure subject to applicable decommissioning requirements and to safely decommission it in accordance with OCSLA and other applicable laws. In addition, the proposed action would ensure that no O&G infrastructure would remain on the POCS seafloor that could interfere with navigation, commercial fisheries, future O&G operations, and other current or future POCS users. Alternatives to the proposed action evaluated in this PEIS involve the complete or partial removal of O&G-related infrastructure and were developed, in part, in consideration of preserving the habitat value provided by any remaining structures, as well as the fishing opportunities these habitats provide.

The need for the proposed action arises from the current and imminent ripening of decommissioning obligations imposed on lessees, operating rights holders, and ROW holders by regulation, lease, and ROW grant, and BSEE’s delegated responsibilities to oversee, enforce, and administer those legal obligations. The POCS is home to declining O&G production and aging infrastructure, and numerous terminated leases with facilities that are required by law to be decommissioned to established regulatory standards, subject to BSEE approval and oversight.

The first of the POCS platforms and their associated infrastructure were installed in September 1967 (Table 1-1). The reservoirs associated with the 43 originally active leases on the POCS have been in production from 26 to 48 years, and reservoir pressures and O&G production have been declining during this time. As a result of declining production and other economic factors, and the shut-in of the Plains All-American Pipeline in 2015, thirteen leases have recently been terminated, eight of which have facilities requiring decommissioning, and more may be expected in the future.

This PEIS will support future federal review of and action on decommissioning applications, and will provide a programmatic analysis to which future, site-specific NEPA analyses may tier, as permitted in NEPA's implementing regulations (43 CFR 46.140). This will allow future analyses to focus on site-specific issues and effects related to the removal activities.

1.3 COMPLIANCE WITH OTHER ENVIRONMENTAL LAWS

This PEIS does not approve any decommissioning activities. Accordingly, the preparation of this PEIS and the analysis contained therein does not require consultation or review under the Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), the National Historic Preservation Act (NHPA), the Magnuson-Stevens Fishery Conservation and Management Act, or the Coastal Zone Management Act. BSEE will review every individual decommissioning application as it is received, take into consideration the unique characteristics of each (e.g., location, environmental setting), determine whether existing NEPA analysis, consultations, or other compliance processes adequately address the proposed decommissioning activities and impacts, and will conduct additional site-specific analyses and regulatory consultations as appropriate prior to making a decision to approve any decommissioning activities.

1.4 REMOVAL FORECASTING

As a programmatic document, this EIS will analyze an estimated number of decommissioning and platform removal applications that may be submitted and reviewed annually. A platform operator's application to decommission a specific platform or number of platforms must address a number of complex factors and considerations such as (but not limited to):

- Removal procedures;
- Severance methods;
- Availability and use of decommissioning equipment and personnel (e.g., barges, lift cranes, divers);
- Schedule of decommissioning activities;
- Disposal options (e.g., onshore locations, reefing); and
- Plans to protect marine life, archaeological and biological features, and the environment, and mitigate or minimize impacts.

Because very few facilities on the POCS have previously been decommissioned, little historical data exists regarding platform decommissioning in the POCS. This lack of existing data requires the Bureaus to forecast potential decommissioning timing and intensity in this programmatic analysis, while reserving review of specific details for future site-specific decommissioning applications.

2 ALTERNATIVES, INCLUDING THE PROPOSED ACTION

2.1 INTRODUCTION

Four alternatives are evaluated in this draft PEIS: a Proposed Action, two action alternatives, and a No Action alternative. Alternative 1, the Proposed Action, includes the review and approval or denial by BSEE of applications for the complete removal of platforms, associated infrastructure, including pipelines and other facilities and obstructions from the POCS. Alternatives 2 and 3 differ from the Proposed Action in that each includes only partial rather than complete platform removal, and the abandonment in-place (rather than complete removal) of pipelines. Alternative 2 considers only onshore disposal of the removed infrastructure. Alternative 3 includes a rigs-to-reefs (RTR) option for the disposal of the severed portion of platform jackets. Under Alternative 4, the No Action alternative, BSEE would not approve any applications for platform, pipeline, or other facility decommissioning in the POCS Region. Well decommissioning[1] (plugging and abandonment) is separately reviewed and approved, so these activities are not included within the scope of this draft PEIS.

Implementation of any of the action alternatives may be accomplished through several methods. For example, several cutting methods (e.g., mechanical, hydraulic, explosive) are available for severance of topside and jacket structures. In addition, several options are available regarding the types and sizes of surface vessels that could be employed for platform removal and disposal transport. Each action alternative includes these options for severance and transport, and since the nature of impacts of any specific severance method and surface vessel option would be similar across the three action alternatives, although the magnitude and duration will differ among the alternatives. Therefore, the analysis of these impacts is addressed in detail only for the Proposed Action, while the magnitude and duration of impacts are compared in discussions of each action alternative. Similarly, contributing to an artificial reef is analyzed only under Alternative 3, as this is the only alternative incorporating this RTR option.

Regardless of alternative, the implementation of any of these severance, transport, and disposal options must be conducted in a manner that is safe, does not unreasonably interfere with other uses of the POCS, and does not cause undue or serious harm to the environment. Under each action alternative, decommissioning would occur in accordance with an approved decommissioning application and any associated plans, and in compliance with all pertinent federal and state agency permits and regulations.

[1] The plugging and abandonment of wells occur throughout the life of an O&G platform and are included in the environmental review for each drilling permit application. Hence, they would not be part of the decommissioning environmental review discussed here (IDWG 2019). The California State Lands Commission, BOEM, and BSEE convened the Interagency Decommissioning Working Group (IDWG) in 2016 to foster and facilitate interagency planning and coordination in advance of federal and state offshore O&G facility decommissioning projects.

This draft PEIS analyzes the potential impacts of decommissioning O&G platforms on the POCS (Table 1-1). Seven platforms (Gail, Grace, Harvest, Hermosa, Hidalgo, Hogan and Houchin) are currently shut-in[2] and pending a final decommissioning decision, and well-plugging operations on these platforms are underway. In addition, BSEE terminated the lease for Platform Habitat in 2016, and while this termination has been appealed, BSEE has informed the lessee of their obligation to move forward on decommissioning. BSEE has received initial decommissioning applications for Gail, Grace, Harvest, Hermosa, and Hidalgo, but not for Hogan, Houchin, or Habitat. Thus, decommissioning of these eight platforms is expected to occur in the reasonably foreseeable future. This PEIS is intended to provide a programmatic analytical framework to review current applications as well as additional applications that could be submitted during the reasonably applicable timeframe of this PEIS. It is currently unknown when decommissioning may be initiated for the 15 POCS platforms still in production, though by regulation an initial platform removal application must be submitted at least two years before production is projected to cease. If future applications should occur beyond the reasonably applicable timeframe of this PEIS, owing to changing environmental conditions, new sources of impacts, or other factors that would alter the conclusions of this PEIS, a supplemental PEIS might need to be prepared. All current and future decommissioning applications will undergo further site-specific environmental review, tiered from, and informed by the analyses in this PEIS or any future supplement.

2.2 PROPOSED ACTION AND ALTERNATIVES

2.2.1 Alternatives Development

NEPA and the CEQ regulations mandate the consideration of “reasonable alternatives” for the proposed action. Reasonable action alternatives are those that could be implemented to meet the purpose and need of the proposed action. Table 2-1 lists the four primary alternatives (including No Action) evaluated in this draft PEIS. Several additional alternatives were initially considered but dropped from further consideration (see Section 2.4).

Exploration, development, and production operations for the Pacific OCS O&G program require platforms and pipelines, as well as a variety of facilities,[3] to be placed on or connected to the seafloor. Lessees must remove all platforms and other facilities from their lease areas within one year of lease termination (30 CFR 250.1725), or when facilities are no longer useful for operations (30 CFR 250.1703).

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[2] To “shut-in” a well means to close off a well so it is no longer producing. A shut-in platform is one in which all the wells have been closed off and production is no longer occurring at the platform.

[3] Facility means any installation other than a pipeline used for oil, gas, or sulfur activities that is permanently or temporarily attached to the seabed on the OCS. Facilities include production and pipeline risers, templates, pilings, and any other facility or equipment that constitutes an obstruction such as jumper assemblies, termination skids, umbilicals, anchors, and mooring lines. See 30 CFR 250.1700(c).

TABLE 2-1 Alternatives and Associated Decommissioning Activities

Alternatives	Activities
Alternative 1 — Proposed Action: Review and Approve or Deny Decommissioning Applications for Complete Removal of Platforms Employing Non-explosive Severance, Removal of Associated Pipelines and other Facilities and Obstructions; Onshore Disposal. **Sub-Alternative 1a**. Same as Alternative 1, but with Explosive Severance of Platform Jackets.	• Complete removal of topside superstructure. • Complete jacket removal to at least 4.5 m (15 ft) BML. • Cleaning and complete removal of associated pipelines. • Complete removal of other facilities from seafloor. • Clear seafloor of O&G-related obstructions.[a] • Transport of removed infrastructure to onshore locations for processing, recycling, and/or land disposal.
Alternative 2 — Review and Approve or Deny Decommissioning Applications for Partial Platform Removal Employing Non-explosive Severance; Removal of Accessible Facilities and Obstructions; Onshore Disposal; Abandonment-in-Place of Associated Pipelines. **Sub-Alternative 2a**. Same as Alternative 2, but with Explosive Severance of Platform Jackets.	• Complete removal of topside superstructure. • Partial jacket removal to at least 26 m (85 ft) below the waterline. • Abandon associated pipelines in place in accordance with regulatory standards (30 CFR 250.1751). • Transport of removed infrastructure to onshore locations for processing, recycling, and/or land disposal.
Alternative 3 — Review and Approve or Deny Decommissioning Applications for Partial Platform Removal Employing Non-explosive Severance with Upper Jackets Placed in an Artificial Reef; Removal of Accessible Facilities and Obstructions with Onshore Disposal; and Abandonment-in-Place of Associated Pipelines. **Sub-Alternative 3a**. Same as Alternative 3, but with Explosive Severance of Platform Jackets.	• Complete removal of topside superstructure. • Partial jacket removal to at least 26 m (85 ft) below the waterline. • Abandon in place in accordance with regulatory standards (30 CFR 250.1751). • Transport of removed topside infrastructure to onshore locations for processing, recycling, and/or land disposal. • Place the upper platform jacket as an artificial reef at an approved location away from the site.
Alternative 4 — No Action: No Review of, or Decision on, Decommissioning Applications.	No review of, or decision on, decommissioning applications.

[a] Obstructions mean structures, equipment, or objects that were used in oil, gas, or sulfur operations or marine growth that, if left in place, would hinder other users of the OCS. Obstructions may include, but are not limited to, shell mounds, wellheads, casing stubs, mud line suspensions, well protection devices, subsea trees, jumper assemblies, umbilicals, manifolds, termination skids, production and pipeline risers, platforms, templates, pilings, pipelines, pipeline valves, and power cables. 30 CFR 250.1700(b).

2.2.2 Alternative 1 — Proposed Action: Review and Approve or Deny Decommissioning Applications for Complete Removal of Platforms Employing Non-explosive Severance; Removal of Associated Pipelines and other Facilities and Obstructions; Onshore Disposal

The Proposed Action is to review and approve or deny decommissioning applications for (1) the complete removal of platforms and other facilities, (2) the complete removal of associated pipelines, (3) clearing of obstructions created during past lease or right-of-way operations from the seafloor, and (4) the transport of all decommissioned infrastructure to onshore facilities for processing, recycling/reuse, and/or land disposal. Under this alternative, all platforms, pipelines, and other facilities, and their related components (e.g., platform jacket footings) would be removed to at least 4.6 m (15 ft) BML (30 CFR 250.1716(a) and 250.1728(a)). In addition, in some cases, state agencies may require removal of infrastructure in state waters or of onshore processing facilities that received the O&G produced at the platform. Complete discussion of any such state actions is outside the scope of this PEIS.

For the purposes of this PEIS, it is assumed that, following application approval, decommissioning under the Proposed Action would follow a three-phased approach, as is typically followed for platform decommissioning in the Gulf of Mexico (GOM). The first phase ("pre-severance") includes the onsite mobilization of lift and support vessels, specialized lifting equipment, and the load barges necessary to receive the salvaged structure. Activities would also include those needed to prepare the target platform for severance, including asbestos and chemical and hazardous waste removal; flushing of tanks, vessels, and lines; equipment shutdown; topside cutting/bracing; and sediment jetting of jacket legs.

Under Alternative 1, once the pre-severance activities are completed, the next phase ("severance") would be initiated. Specialized contractors would deploy nonexplosive (e.g., mechanical or diamond wire) cutting tools to conduct required seabed (below the mud line — BML) and water column (above the mud line — AML) severances. In addition, commercial divers outfitted with cutting torches (i.e., arc or gas) may also be employed for AML severance. Both BML and AML severance would require cutting the platform infrastructure into sections that can be safely lifted within the capabilities of the selected heavy-lifting vessels and transported within the capacity of the selected cargo barges.

Under Alternative 1a, explosive severance would be used for the removal of underwater portions of platform jackets. Explosive severance could be used for both BML or AML severance, with either internal or external placement of explosives on target structures. In all other respects, Alterative 1a would be the same as Alternative 1. Appendix A presents a description of the various types of explosive and non-explosive severance methods.

Both the pre-severance and severance phases would include a variety of activities to support the severance of the platforms. For example, lifting pad eyes may need to be installed on sections to be severed, pipes would need be cut and capped to prevent any residual fluid release, electrical lines would need be severed, and temporary lighting and power would be required. These tasks would require a significant number of personnel including crane operators, inspectors for cranes and welds, electricians, scaffolding crew, engineers, project managers, catering crew, welders, crews for boats, helicopter pilots, safety representatives and other operations personnel.

Pipeline removal (see Sections 2.3.4 and 2.3.5) could occur during either phase, in compliance with regulations in Subpart Q governing pipeline decommissioning/removal requirements at 30 CFR 250.1750–250.1754.

The final phase of decommissioning consists of the lifting and loading of the severed infrastructure onto barges and would be implemented concurrently with the severance phase.

Once loaded onto the barges, these materials would be transported to land-based facilities for processing, salvage (e.g., reuse, scrapping), and/or land disposal in licensed disposal sites (see Section 2.3.7.1). It is likely that the onshore disposal of portions of removed materials (those weighing less than 50 tons) will occur at the Ports of Los Angeles and Long Beach. Structures weighing more than 50 tons, which are too large for ports in California, may be disposed at facilities in the GOM, or at facilities outside the United States. Onshore disposal is outside of BSEE's authority; however, plans for disposal or salvage are required as part of facility removal applications. Following complete platform and pipeline removal, trawling and/or sonar work would be conducted in support of final site clearance and verification (see Section 2.3.6, per the requirements at 30 CFR 250.1740–250.1743).

2.2.3 Alternative 2 — Review and Approve or Deny Decommissioning Applications for Partial Platform Removal Employing Non-explosive Severance; Removal of Accessible Facilities and Obstructions; Onshore Disposal; Abandonment-in-Place of Associated Pipelines

Under Alternative 2, topside platform removal would occur in a manner similar to that under the Proposed Action (Alternative 1). However, under this alternative only the upper portion (AML) of the platform jacket would be removed, using non-explosive severance, to a depth that is at least 26 m (85 ft) below the sea surface, consistent with U.S. Coast Guard (USCG) navigational requirements for the remaining platform structures. Jackets could be severed as far down as the seafloor, but platforms would be considered partially removed, since BML structures would remain. Also, in contrast to the Proposed Action, under this alternative the associated pipelines would be abandoned in place rather than removed. The pipelines would be pigged, flushed of contaminants, filled with seawater, sealed, and then left in place on the seafloor with their ends buried, consistent with BSEE regulations at 30 CFR 250.1750–250.1751. In addition, other facilities and obstructions rendered inaccessible due to the presence of any remaining jacket portions, including shell mounds, would remain in place. Compared to Alternative 1, this alternative maintains some of the fish and invertebrate habitat that is present on remaining platform jackets and along the undisturbed seafloor where the pipelines would be abandoned in place.

Under Alternative 2a, explosive severance would be used for the partial removal of underwater portions of platform jackets. In all other respects, Alterative 2a would be the same as Alternative 2.

2.2.4 Alternative 3 — Review and Approve or Deny Decommissioning Applications for Partial Platform Removal Employing Non-explosive Severance with Upper Jackets Placed in an Artificial Reef; Removal of Accessible Facilities and Obstructions with Onshore Disposal; and Abandonment-in-Place of Associated Pipelines

Under Alternative 3, topside platform infrastructure would be severed and transported to onshore processing facilities for subsequent processing, recycling, and/or land disposal (similar to Alternatives 1 and 2). Platform jackets would be severed AML using non-explosive methods to a depth of at least 26 m (85 ft) below the sea surface, and possibly down to the seafloor. In contrast to Alternative 2, the severed jacket portions would be used for artificial reef formation rather than disposed of onshore. The severed jacket portions will either (1) be placed on the seafloor adjacent to the remaining AML or BML jacket structure, (2) be toppled in place adjacent to remaining jacket, or (3) be towed to and placed at existing reef sites or reef planning areas offshore of southern California (BSEE 2022). The reuse of jacket structures as artificial reef material requires BSEE approval and would be managed by a variety of federal and state agencies (see Section 2.3.7.2). All USCG navigational requirements would need to be met at the artificial reef location by the operator, and California would need to acquire a permit from the U.S. Army Corps of Engineers (USACE) and accept title and liabilities for the reefed structure (BSEE 2022). Compared to Alternative 1, Alternative 3 (like Alternative 2) would maintain some of the fish and invertebrate habitat that would be present on any remaining portions of the jacket and along the undisturbed seafloor where the pipelines would be abandoned in place. Compared to Alternative 2, this alternative would support a greater amount of habitat by contributing to the formation of an artificial reef.

Under Alternative 3a, explosive severance would be used for the partial removal of underwater portions of platform jackets. In all other respects, Alterative 3a would be the same as Alternative 3.

2.2.5 Alternative 4 — No Action: No Review of, or Decision on, Decommissioning Applications

Under the No Action Alternative, BSEE would take no action on decommissioning applications. Ongoing regulatory and statutory requirements for managing platforms following lease termination would continue to apply, notably those for maintaining safety and protecting the environment on the OCS. This would include emptying platform tanks, equipment, and piping of all liquids, and emptying and flushing pipelines in anticipation of decommissioning. Regulations and lease or grant terms requiring decommissioning of facilities on expired leases and ROWs would not be satisfied. Platform and pipeline maintenance would continue to take place, as would BSEE’s inspection program (30 CFR 250.130–250.133), although existing law would not permit the platforms to persist in the environment indefinitely. This No Action alternative is employed to comply with the NEPA regulations and to provide a baseline against which to compare the potential effects of the action alternatives. While this alternative would not meet the purpose and need of the Proposed Action, or the legal obligations of the lessees or other liable parties and BSEE, it helps in understanding the potential impacts of the Proposed Action and the other action alternatives.

2.2.6 Routine Inspection and Maintenance Operations Common to All Alternatives

Under each of the alternatives, including No Action, routine activities associated with the inspection and maintenance of platform infrastructure and pipelines would continue, pending completion of decommissioning. These activities do not require a BSEE permit authorization and would continue to occur pursuant to applicable BSEE regulations (e.g., pipeline inspections [30 CFR 250.1005]; well control inspections [30 CFR 250.739]).

Supply vessel traffic and helicopter flights would continue conveying decommissioning workers and BSEE inspectors under each alternative. However, under Alternative 4, both the number and frequency of vessel traffic and helicopter flights would be greatly reduced compared to the levels that occurred during past normal O&G operations.

2.3 DECOMMISSIONING ACTIVITIES

2.3.1 Conductor Removal

Conductor removal would be completed as part of pre-severance during decommissioning under all three action alternatives, if not previously completed. Removal would involve conductor cutting 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. Vessels such as the 67.1-m (220-ft), dynamically positioned, *Harvey Challenger*, or the 68.6-m (225-ft) *Adele Elise*, would be loaded using platform cranes to transport materials to shore in regularly scheduled trips. Crews and equipment would be shuttled to platforms using a crew boat, such as the 36.6-m (120-ft) M/V *Jackie C*. Removing conductors from platforms Hidalgo, Harvest, and Hermosa in this manner would require 167 days overall. Conductor material transport would require 90 trips total, with round trips from platforms to Long Beach, with a stop at Port Hueneme (BOEM 2020.) Removing conductors from platform Grace would take about 120 days and removing conductors at the deeper platform Gail would take about 240 days (BOEM 2021).

As of April 2020, POCS 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). Table 2-2 presents the number of conductors at each platform and total material weight for disposal. A portion of these conductors could be removed prior to platform decommissioning, including those mentioned in the previous paragraphs.

TABLE 2-2 Platform Conductor, Topside, Jacket, and Piling Estimated Material Volumes

Platform	Conductor Materials Weight (tons)	Number of Conductors	Topside Weight (tons)	Topside Modules Count	Jacket Weight (tons)	Jacket Sections Count	Pile Removal Weight (tons)
A	1,343	55	1,357	4	1,500	3	584
B	1,439	57	1,357	4	1,500	3	590
C	1,354	37	1,357	4	1,500	3	597
Edith	380	29	4,134	12	3,454	5	603
Ellen	6,300	64	5,300	12	3,200	5	832
Elly	-	-	8,000	10	3,300	5	956
Eureka	12,185	60	4,700	10	19,000	22	2,198
Gail	7,519	29	7,693	8	18,300	22	2,320
Gilda	3,190	63	3,792	6	3,220	4	768
Gina	373	12	447	2	434	1	178
Grace	4,006	38	3,800	6	3,090	5	1,039
Habitat	2,063	21	3,514	6	2,550	4	849
Harmony	15,280	43	9,839	13	42,900	48	4,530
Harvest	5,050	25	9,024	10	16,633	20	2,120
Henry	845	24	1,371	4	1,311	2	283
Heritage	12,900	49	9,826	13	32,420	38	4,065
Hermosa	3,050	16	7,830	8	17,000	20	1,893
Hidalgo	2,310	14	8,100	9	10,950	14	1,340
Hillhouse	1,893	50	1,200	4	1,500	3	394
Hogan	1,410	39	2,259	8	1,263	4	429
Hondo	5,885	28	8,450	13	12,200	15	1,744
Houchin	1,370	36	2,591	9	1,486	4	407
Irene	1,800	29	2,500	5	3,100	4	760

Source: InterAct PMTI (2020).

2.3.2 Deck/Topside Removal

Under each of the three action alternatives, platform severance would begin with the removal of the topside infrastructure. This infrastructure could include cranes, electrical equipment, crew housing, offices, drilling equipment and other infrastructure and equipment. Some of the topside structures may be modular in nature and may be removed as units. Table 2-2 presents estimated topside weights and topside module counts for the 23 POCS platforms. The weight of topsides of the POCS platforms ranges from about 447 tons (Platform Gina) to over 9,800 tons (Platforms Harmony and Heritage). Topsides assembled as modules range in number from two (Gina) to 13 (Heritage and Hondo) (Table 2-2), and between 5–20 lifts were needed to install them on the jackets (InterAct PMTI 2020). The largest lift of a modular structure during installation of the POCS platforms was about 2,000 tons (InterAct PMTI 2020).

Topside removal can be staged in a number of ways. For example:

- In reverse order of module installation, which is a common decommissioning method;
- As large pieces, which requires detailed cutting plans to ensure structural integrity;
- As small pieces, which takes longer due to the number of required cuts and lifts, but requires less lift capacity;
- In groups of modules, which involves fewer lifts, but may require additional strengthening or bracing; or
- As a single lift, which requires a large specialty vessel.

Reverse installation of platform modules would be the preferred method from a cost and practicality standpoint (InterAct PMTI 2020). While it is only applicable to modular platforms, most POCS platforms are of modular construction. Non-modular platforms, or portions thereof, would likely be removed in small (less than 50 tons) and large (greater than 50 tons) pieces, depending on the available lifting equipment and vessel sizes. With respect to a single lift, there are very few vessels in the world capable of lifting entire topsides of more than 5,000 tons, and for some of these their use is limited to the calm waters of the Asia Pacific and thus would be unsuitable for use on the POCS (Offshore Engineer 2020). Conversely, removing topsides as small pieces, rather than as modules, would be more costly and time-consuming, and would have increased air emissions, making it potentially politically unacceptable (InterAct PMTI 2020). Alternatively, derrick barges, such as *DB Thor* with a revolving lift capacity of 1,760 tons, would be sufficient for most installed modules. These towed barges can fit through the Panama Canal for the transport of removed modules to GOM scrap facilities. Derrick barges may use a dynamic positioning system to hold them in place or may be anchored to the seafloor during lifts (Appendix A). However, as of 2020, the maximum available lift capacity on the West Coast was about 500 tons (InterAct PMTI 2020).

2.3.3 Jacket Removal

Decommissioning regulations for platforms require removal of jackets to 4.6 m (15 ft) BML. The size and weight of the jacket are typically a function of the water depth in which a platform is located. Table 2-2 presents estimated jacket weights and pile removal weights for the 23 POCS platforms. Jacket weights for the platforms, which are located in water depths ranging from 29 to 365 m (95 to 1,198 ft) (Table 1-1), range from about 434 tons (Gina) to about 42,900 tons (Harmony) and pile removal weights range from 178 tons (Gina) to 4,530 tons (Harmony) (InterAct PMTI 2020). Figure 2-1 shows the Platform Harmony jacket as it is readied for installation. A variety of methods, such as single lift, flotation, reverse installation, and piece-large through to piece-small removal are available for jacket removal (see Appendix A). In general, jacket removal occurs in sections rather than removal with a single lift. Jacket sectioning would occur underwater, with sections raised to the surface after being severed, possibly using a large crane. Table 2-2 presents likely jacket section counts for the platforms. Recovery of deep-water platforms may employ barge-mounted winches in lieu of derrick or crane barges for heavy lifts (InterAct PMTI 2020).

For the complete platform removal under Alternative 1, the platform legs would be externally dredged BML and initially cut into smaller pieces using either mechanical or explosive-based methods. Explosive and non-explosive severance methods are described in Appendix A. Jackets could be further sectioned as needed using a combination of mechanical tools for the structural legs and shears for cross members and bracing. Tool manipulation could be aided by remotely operated vehicle (ROV) and /or diver intervention as needed and dependent on water depth.

FIGURE 2-1 Platform Harmony Jacket Being Readied for Installation (Photo credit: ExxonMobil).

Piles used to secure jacket legs to the seafloor would require excavation to facilitate their removal. Internal pile excavation would likely be used for tubular steel foundation piles. Such piles would need to have the soil/sediment plugs remaining inside the piles removed to a depth of typically 6.1 m (20 ft) to accommodate the 4.6-m (15-ft) sub-seafloor severance depth of the pile. Internal pile excavation would be accomplished by jetting out the soil plug with pressurized water and a jetting nozzle to disperse the soil out of the top of the jacket leg and into the ocean. Only small amounts of soil require removal in this procedure, ranging from 3 to 26 m^3 (4 to 34 yd^3) (OOC 2021).

External pile excavation would be required if internal jetting is not feasible. In such cases, seabed sediment would be removed in a sloped excavation to prevent caving. Jetting equipment used for internal jetting, hand jetting, or small suction dredges may be used for sediment removal, and much larger quantities of sediment would be displaced than with internal excavation. A conical excavation needed to facilitate a 4.6-m (15-ft) BML severance would have a radius of approximately 18.3 m (60 ft) and displace an estimated 2,135 m^3 (2,793 yd^3) of sediment, which would be dispersed in the immediate area of the excavation (OOC 2021). Excavated material would be cast aside onto the adjacent seafloor. Turbidity plumes of suspended sediment would be produced and would eventually deposit on the seafloor after being carried by local currents.

A major consideration of jacket removal is marine growth on the jacket surfaces. The effects of decaying marine growth at land-based processing facilities can be mitigated by removing the growth from the jackets shortly before jacket removal. Divers or ROVs with cleaning tools would remove marine growth from the top 30 m (100 ft) of subsea platform jackets where growth is heaviest (InterAct 2020).

2.3.4 Pipeline Removal

BSEE requirements for pipeline decommissioning are outlined in 30 CFR 250.1750–250.1754. These regulations detail the criteria for complete pipeline removal as well as for abandonment-in-place. Under the Proposed Action, pipelines would be removed completely per the requirements in 30 CFR 250.1752, which require the pipelines to be pigged (a tool designed for cleaning or purging a pipeline)[4] and flushed prior to removal. A jetting barge and crane would jet and remove the pipeline.

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4 Pipeline pigging refers to the practice of using devices or implements known as 'pigs' to perform various cleaning, clearing, maintenance, inspection, dimensioning, process, and pipeline testing operations on new and existing pipelines. The pig is usually cylindrical or spherical to aid movement and efficient cleaning. As the pig moves through a pipeline, it can remove and possibly detect any build-ups within the pipe.

Under Alternatives 2 and 3, all pipelines associated with a platform would be decommissioned in place.[5] The pipeline decommissioning regulations (30 CFR 250.1750–250.1754) for abandonment-in-place require the following:

- Pig the line, unless determined impractical;
- Flush and fill the pipeline with seawater;
- Disconnect the pipeline from the platform;
- Cut and plug each end of the pipeline;
- Bury each end of the pipeline at least 0.9 m (3 ft) below the seafloor or leave on the seafloor surface, but covered with protective concrete mats;
- Remove all pipeline valves and fittings that could unduly interfere with other uses; and
- Submit a written report summarizing operations and mitigation measures.

Pipelines are of various types carrying various liquids and gases and connect platforms with onshore facilities and in some cases, with other platforms. Up to six different types of pipelines in diameters ranging from 10 to 30 cm (4 to 12 in.) may originate from a single platform. Pipeline types include gas, oil, water, and oil/water mixtures of various composition. Lengths range from 0.8 km (0.5 mi) to 24.6 km (15.3 mi). Figures 2-2a through 2-2d show pipeline and cable routes, which may share the same right-of-way for large portions. The figures also show locations of platforms and pipelines within state and federal POCS blocks. Table 2-3 presents pipeline origins, type counts, offshore and onshore termini, and lengths.

Pipeline excavation may be required if pipelines are fully or partially buried and if the work vessel pulling/lifting capacity would be exceeded or if pipeline integrity would not withstand the pulling forces. Burial depths of 1–2 ft can occasionally be overcome without need for excavation, while depths greater than 0.6 m (2 ft) would be more likely to require excavation. In addition, some abandonment operations, such as tie-in disconnection and installing caps and anchoring pipeline ends might require local excavation to access work points. Hand-jetting by divers would be used where accessible, and ROV-facilitated excavation would be used at greater depths (OOC 2021).

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[5] A pipeline may be decommissioned in place when a lessee, owner of operating rights, or ROW holder submits an application to the BSEE Regional Supervisor, and the Regional Supervisor determines that the pipeline does not constitute a hazard (obstruction) to navigation and commercial fishing operations, unduly interfere with other uses of the OCS, or have adverse environmental effects (30 CFR 250.1750–1751).

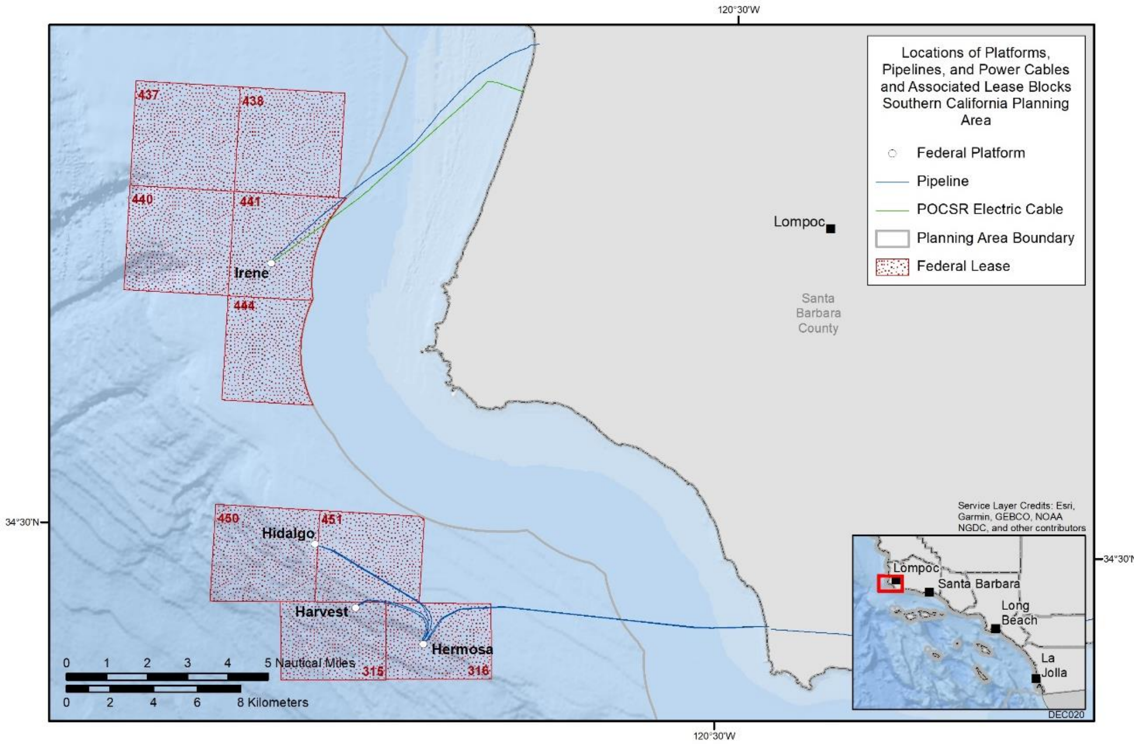

FIGURE 2-2a Locations of platforms, pipeline, and power cables and associated lease blocks in the Santa Maria Basin.

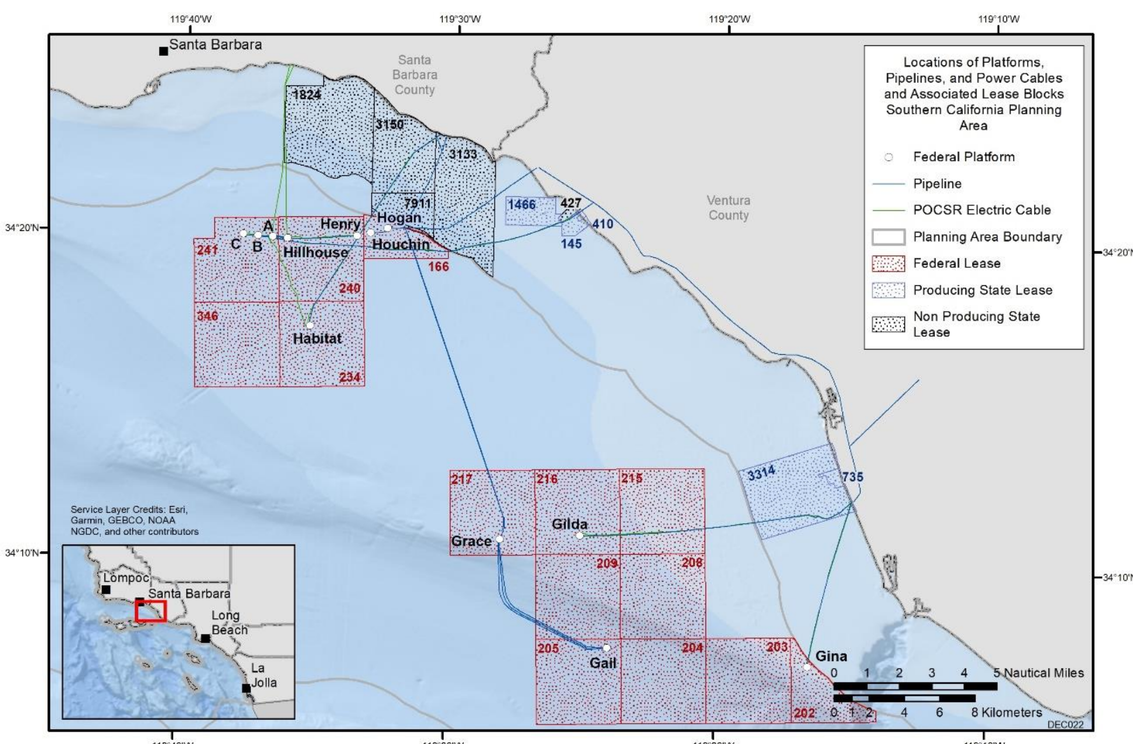

FIGURE 2-2b Locations of platforms, pipeline, and power cables and associated lease blocks in the East Santa Barbara Channel.

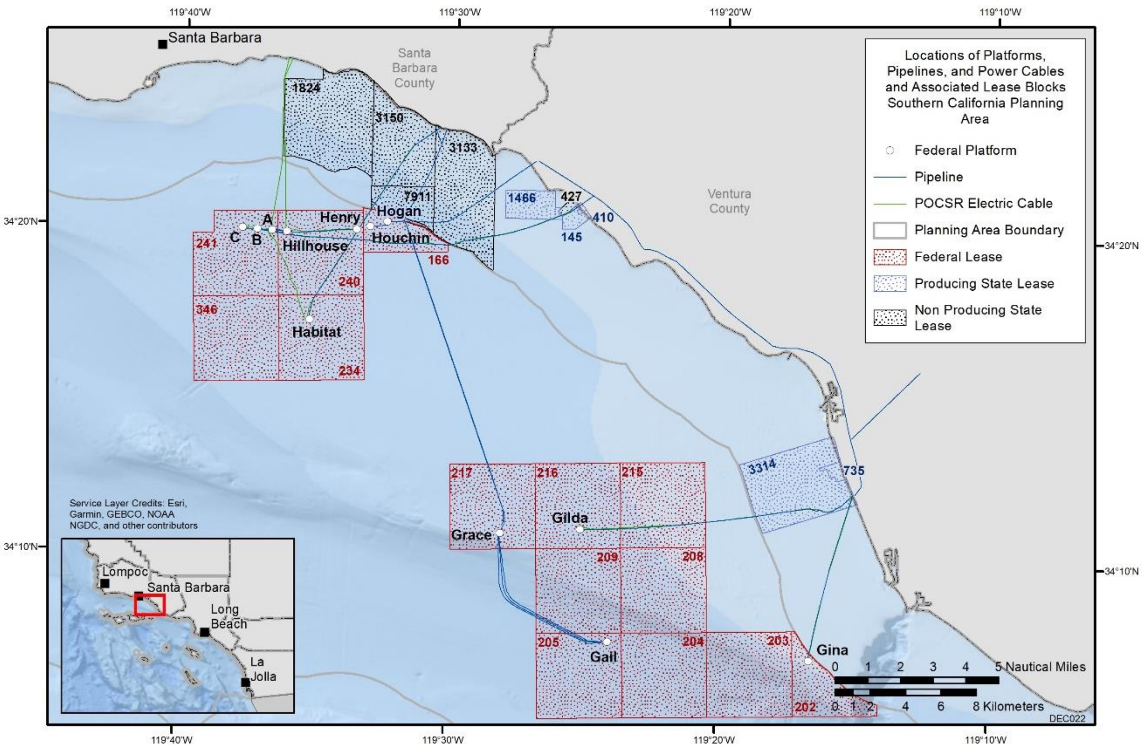

FIGURE 2-2c Locations of platforms, pipeline, and power cables and associated federal lease blocks in the West Santa Barbara Channel.

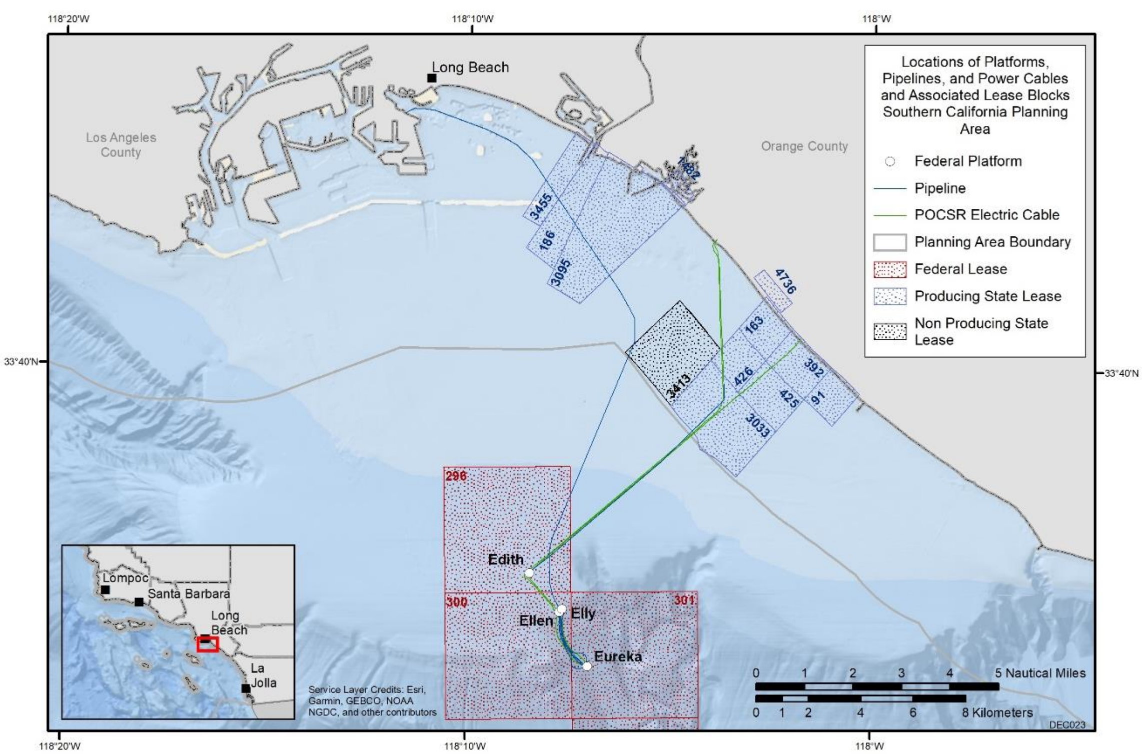

FIGURE 2-2d Locations of platforms, pipeline, and power cables and associated federal lease blocks in the San Pedro Bay.

TABLE 2-3 Pipeline Origin, Count, Terminus, and Length

Platform Origin	Platform Terminus (no. of pipelines in the ROW)	Length km (mi.)	Onshore Facility (no. of pipelines in the ROW)	Length km (mi.)
A	B (3)	1.3 (0.8)	Rincon (via subsea tie-in) (3)	18.0 (11.2)
B	A (5) (subsea tie-in for 3 lines)	0.8 (0.5)	—[a]	—
C	B (3)	0.8 (0.5)	—	—
Edith	Eva (1)	10.6 (6.6)	—	—
Edith	Ellen/Elly (1)	1.8 (1.1)	—	—
Ellen/Elly	—	—	San Pedro (1)	24.4 (15.2)
Eureka	Ellen/Elly (5)	2.6 (1.6)	—	—
Gail	Grace (3)	10.1 (6.3)	—	—
Gilda	—	—	Mandalay (3)	15.8 (9.8)
Gina	—	—	Mandalay (2)	9.7 (6.0)
Grace	—	—	Carpinteria (2)	24.6 (15.3)
Habitat	—	—	Carpinteria (1)	13.4 (8.3)
Harmony	Hondo (1)	4.7 (2.9)	Las Flores Canyon (2)	15.6 (9.7)
Harvest	Hermosa (2)	4.7 (2.9)	—	—
Henry	Hillhouse (3)	3.9 (2.4)	—	—
Heritage	Harmony (2)	10.9 (6.8)	—	—
Hermosa	—	—	Gaviota (2)	16.7 (10.4)
Hidalgo	Hermosa (2)	7.7 (4.8)	—	—
Hillhouse	A (4)	0.8 (0.5)	—	—
Hogan	—	—	La Conchita (4)	9.2 (5.7)
Hondo	Harmony (1)	4.7 (2.9)	Las Flores Canyon (1)	11.1 (6.9)
Houchin	Hogan (4)	1.1 (0.7)	—	—
Irene	—	—	Orcutt (3)	16.1 (10.0)

Source: InterAct PMTI (2020).

[a] A dash indicates not applicable.

2.3.5 Power Cable Removal

BSEE general decommissioning requirements outlined in 30 CFR 250.1703 require operators to clear the seafloor of all obstructions created by their lease and pipeline right-of-way operations. Obstructions under these regulations may include power cables. Under Alternative 1, the associated power cables would be completely removed in any case. Under Alternatives 2 and 3, power cables would be removed if determined to be an obstruction hindering other users of the POCS. If not determined to be obstructions, power cables may be decommissioned in place. Similar to pipelines abandoned in place under these alternatives, the power cables would be disconnected from their associated platforms and onshore power sources, and on the OCS the cut ends buried at least 0.9 m (3 ft) below the seafloor.

Removal of power cables is discussed here in some detail because of the relatively large spatial seafloor footprint they present, similar to pipelines, compared to other obstructions, which would lie close to platforms. Figures 2-2a through 2-2d show the routes of power cables onshore facilities to platforms. Table 2-4 presents information on power cables serving O&G platforms on the POCS. Cables range in length from 483 m (1,584 ft) (Gina to shore) to 31,868 m (104,554 ft) (Heritage to shore). Combined lengths are given for both cables when two are listed.

TABLE 2-4 Power Cable Origin, Terminus, Length, and Water Depth

Platform of Cable Origin	Cable Terminus	Length m (ft)	Water Depth m (ft)
A	B	805 (2,640)	57–61 (188–200)
B	C	805 (2,640)	61–59 (200–193)
C	Shore	8,050 (26,400)	59–0 (193–0)
Edith	Shore	11,265 (36,960)	46–0 (150–0)
Ellen	NA[a]	NA	NA
Elly	NA	NA	NA
Eureka	Ellen (2)	4,662 (15,297)	213–81 (700–265)
Gail	NA	NA	NA
Gilda	Shore	11,265 (36,960)	62–0 (205–0)
Gina	Shore	483 (1,584)	27–0 (90–0)
Grace	NA	NA	NA
Habitat	P/FA	5,900 (19,356)	89–57 (292–188)
Harmony	Shore (2)	18,186 (59,664)	366-0 (1200–0)
Harvest	NA	NA	NA
Henry	Hillhouse	4,023 (13,200)	52–58 (170–189)
Heritage	Harmony	11,909 (39,072)	328–366 (1075–1200)
Heritage	Shore	31,868 (104,554)	328–0 (1075–0)
Hermosa	NA	NA	NA
Hidalgo	NA	NA	NA
Hillhouse	Shore	5,472 (17,952)	58–0 (189–0)
Hogan	Shore	1,448 (4,752)	46–0 (150–0)
Hondo	Harmony (2)	14,484 (47,520)	257–366 (842–1200)
Houchin	Hogan	1,158 (3,800)	54–46 (176–150)
Irene	Shore	4,506 (14,784)	74–0 (242–0)

Source: InterAct PMTI (2020).

[a] NA: not applicable.

Operators with decommissioning projects traversing state waters would coordinate with federal entities that have authority in state waters, including USACE and USCG, and with state and local agencies, such as air pollution control districts and city and county planning departments. In cases where power cables are routed to shore and cables are decommissioned in place, cables could be removed shoreward of the tidal boundary. Cable decommissioning operations would operate 24 hours per day. Use of ROVs to cut and pull cables onto cargo barges would be the most cost-effective method of removal (InterAct PMTI 2020).

2.3.6 Seafloor Clearing/Site Clearance Verification

Seafloor clearing involves the removal of obstructions and debris on the seafloor surrounding decommissioned platforms, other facilities, wells, and pipelines, and site clearance verification involves inspection and verification that the seafloor is free of obstructions that could interfere with other ocean uses, including commercial fishing or naval operations. Site clearance operations typically consist of inspections, post-decommissioning clean-up, and verification.

Pre-decommissioning surveys employing side-scan sonar would be conducted at platforms to identify and locate pipelines, power cables, and other equipment to be removed. After platforms are removed, ROVs would be used to remove obstructions and debris on the seafloor (other than shell mounds), requiring an estimated seven days in waters depths less than 91 m (300 ft), and 14 days for deeper waters (InterAct PMTI 2020). Shell mounds would undergo comprehensive characterization, including through vibracore and grab sampling, collection of geotechnical data, and conducting of biological surveys. Once characterized, shell mounds would be excavated, if appropriate and feasible, loaded onto barges, and transported to shore for landfill disposal.

The BSEE regulations for Site Clearance are found at 30 CFR250.1703 and 250.1740–250.1743. The survey clearance area must include 100% of the appropriate grid area listed in 30 CFR 250.1741(a) (e.g., for platforms this is an area with a 402-m (1320-ft) radius surrounding the center of the platform location), and include the following:

- In water depths less than 91 m (300 ft), a trawl must be dragged in a grid-like pattern over the site;

- In water depths greater than 91 m (300 ft), either:
  - Drag a trawl over the site or;
  - Scan across the site using sonar equipment or;
  - Use another method approved by the BSEE Regional Supervisor.

The regulations provide for alternative site clearance verification methods in deeper waters (30 CFR 250.1740–250.1743). These alternative methods for site clearance verification include:

- Sonar, which must cover 100% of the appropriate grid area and use a sonar signal with a frequency of at least 500 kHz;

- A diver to visually inspect 100% of the appropriate grid area and use a search pattern of concentric circles or parallel lines spaced no more than 3 m (10 ft) apart; and/or

- A remotely operated vehicle (ROV) with a camera that must record videotape over 100% of the appropriate grid area and use a search pattern of concentric circles or parallel lines spaced no more than 3 m (10 ft) apart.

2.3.7 Disposal

There are four options for the disposal of equipment and infrastructure associated with a decommissioned platform:

- Reuse of equipment such as generators, drilling rigs, cranes compressors, and lighting fixtures;

- Scrap and recycle of uncontaminated metal and other materials;
- Dispose of unusable/unsalvageable materials in designated landfills; and
- Disposal of uncontaminated upper jacket portions via contributing to an artificial reef.

The first three of these would be used under Alternatives 1, 2, and 3 and are analyzed in the PEIS in the discussion of each alternative. Jacket disposal by contributing to an artificial reef would only be used under Alternative 3 and is analyzed in the PEIS in the discussion of that alternative.

2.3.7.1 Land Disposal

For land disposal, all topside and jacket infrastructure pieces weighing less than 50 tons would be taken to the Port of Los Angeles for transport to onshore processing facilities. Larger pieces each greater than 50 tons would be barged through the Panama Canal to handling facilities in the GOM which are designed for such materials. These processing facilities handle up to 150 platforms per year from the GOM and are equipped to handle hazardous waste such as naturally occurring radioactive material (NORM), asbestos, and other non-recyclable materials that might be associated with some of the decommissioned materials.

While it is anticipated that U.S. facilities would receive the bulk of steel removed from the decommissioned POCS platforms, international disposal options may be available. However, assessing viability of these options is beyond the scope of this PEIS.

2.3.7.2 Rigs-to-Reefs

BSEE regulations also allow the reuse of obsolete O&G platform jackets as artificial reef material (i.e., Rigs-to-Reef) (30 CFR 250.1730). BSEE, through its Rigs-to-Reef Program (BSEE 2022) may grant a departure from the requirement to remove a platform or other facility under certain conditions, provided that:

- The structure becomes part of a formal state artificial reef program that complies with the National Artificial Reef Plan;
- The responsible state agency acquires a permit from the USACE and accepts title and liability for the structure placed in an artificial reef once removal/placement operations are concluded;
- The lessee or operator satisfies any USCG navigational requirements for the structure; and
- The artificial reef placement proposal complies with all applicable laws, including BSEE engineering and environmental review standards.

In 2010, California passed AB 2503, California Marine Resources Legacy Act (MRLA), which allows for the consideration for Rigs-to-Reef of decommissioned offshore O&G structures, if specified criteria are met, including a finding that conversion of the remaining structure(s) to an artificial reef would provide a net benefit to the marine environment as compared to full removal of the structure(s). If such criteria are met, AB 2503 authorizes the State of California to take title to the remaining decommissioned offshore O&G structures that will serve as the artificial reef. MRLA establishes a state policy to allow, on a case-by-case basis the partial decommissioning of offshore O&G platforms. It provides a process for operators to apply to the state for partial platform removal (Bull and Love 2019).

There are numerous challenges to disposal via contributing to an artificial reef, which would occur only under Alternative 3, including but not limited to:

- To date there has been no use of this disposal method for OCS platforms offshore California, so the process is largely untested;

- Multiple agencies would be involved, including the California Ocean Protection Council for determination that the artificial reef would provide a net environmental benefit, the California State Lands Commission for determination of the cost-savings, and the California Department of Fish and Wildlife (CDFW) for taking on the management of the artificial reef;

- The willingness of the State of California to take on the liability associated with the POCS platform materials placed in an artificial reef, as well as assuming the cost of managing such a reef, with a cost share approaching as much as 80%.

Three general methods are identified in the BSEE Rigs-to-Reef Program (BSEE 2022), and these are used worldwide for removing and placing a retired structure as an artificial reef. However, only partial removal is currently permitted in California under the 2010 MRLA. The three Rigs-to-Reef methods are:

1. *Tow-and-Place:* Involves severing the structure from the sea floor and then towing it to an approved site for deployment;

2. *Topple-in-Place:* Also detaches the structure from the seabed, but rather than towing it to another location, the detached structure is toppled onto its side at the platform location; and

3. *Partial Removal:* The jacket structure is severed to a permitted navigational depth of 25.6 m (85 ft) or greater and placed on the sea floor next to the base of the remaining structure or towed elsewhere for deployment.

Any jacket structure remaining AML under Alternative 2 would continue to provide hardbottom habitat for marine biota, much in a manner similar to that provided by an artificial reef. However, Alternative 2 is not considered a Rigs-to-Reef alternative because none of the

AML-severed jacket portion is placed on the seafloor for artificial reef formation (as would occur under each of the three rigs-to-reef methods), but rather undergoes onshore land disposal.

There are engineering and environmental standards for converting a platform to a permanent artificial reef. Platform size, complexity, structural integrity, and location are key considerations affecting artificial reef placement potential. Complex, stable, durable, and clean platforms are generally candidates for placement in artificial reefs, while platforms toppled due to structural failure generally are not (BSEE 2022).

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER EVALUATION

The Energy Policy Act of 2005 (EPAct) gives BOEM jurisdiction over projects that make alternate use of existing oil and natural gas platforms in Federal waters, in addition to jurisdiction over renewable energy projects. The Department of the Interior (DOI) has promulgated regulations governing this jurisdiction; these regulations can be found at 30 CFR part 585, *Renewable Energy and Alternate Uses of Existing Facilities on the Outer Continental Shelf*.

Two alternatives related to alternate platform use were considered but eliminated from further evaluation in this PEIS. The basis for their consideration was in response to public comments received during PEIS scoping which called for reuse of the O&G platforms for renewable energy (e.g., wind energy) production or for the conversion of one or more platforms to offshore research stations. BSEE and BOEM considered these two possible alternatives and determined that projects to implement these alternatives were not reasonably foreseeable and so uncertain that it is not possible to develop an activity description sufficient to allow for an adequate NEPA evaluation. Thus, BSEE and BOEM did not carry these alternatives forward for analysis in this PEIS. Rights of Use and Easement for alternate use of a facility on the OCS are under the authority of BOEM; should BOEM receive an application for alternative use in lieu of decommissioning of any structure in the future, an independent, project-specific environmental analysis would be conducted at that time.

2.4.1 Conversion of Platforms to Renewable Energy Production

BOEM has an OCS Renewable Energy Program (https://www.boem.gov/renewable-energy/renewable-energy-program-overview), which is currently leasing areas of the OCS for wind development. To date, BOEM has designated two wind areas on the California POCS for leasing consideration:

- The Morro Bay Wind Energy Area (WEA), located approximately 32.2 km (20 mi) offshore the central California coastline between Monterey and Morro Bay, and approximately 240,898 acres (ac) (376 mi^2) in size; and

- The Humboldt WEA, located offshore of Northern California, about 33.8 km (21 mi) west of Eureka, approximately 132,368 ac (206 mi^2) in size.

Except for the Morro Bay WEA, there are currently no designated leasing areas in the Southern California OCS Planning Area, where existing OCS O&G facilities are located.

The conversion of the O&G platforms to support wind energy production (either as platforms for individual turbines, or as substations that could support a nearby offshore wind farm) was initially considered, but was determined to not be reasonably foreseeable for various reasons:

- Given the age of the platforms (from 32 to 54 years in age), their long-term durability to support wind turbines and wind energy development, as well as the potential for structural failure, is highly uncertain;

- Only five of the POCS platforms (Harvest, Hermosa, Irene, Hidalgo, and Harmony) are located in areas with average annual wind speeds that could support marketable wind energy production (Figure 2-3);

- The modifications needed to convert existing platforms for wind energy use would vary considerably among the platforms. It is not possible at this time to identify the nature, number, or magnitude of any modifications that could be needed on the POCS platforms to support wind energy production;

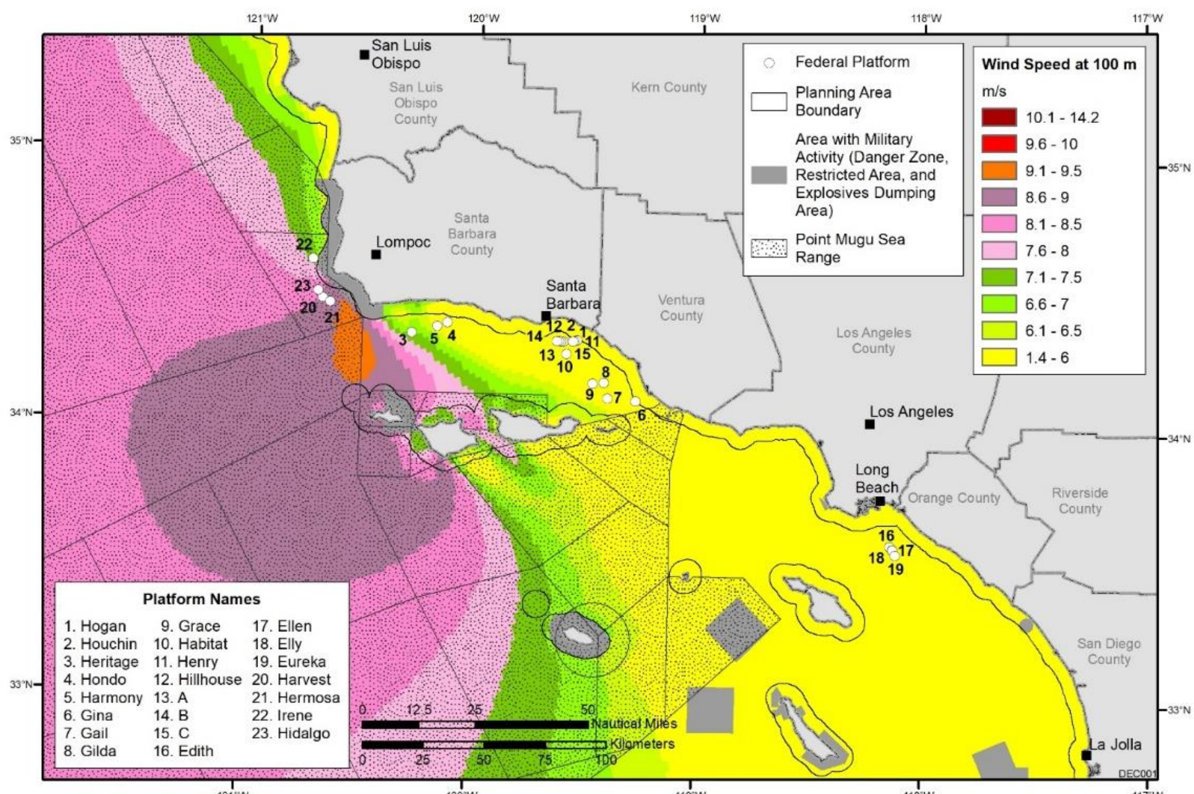

FIGURE 2-3 Wind speeds on the Southern California POCS (NREL 2021). Areas with speeds less than 6 m/s are generally considered not viable for commercial wind energy development (EIA 2021).

- Because only a single wind turbine could be placed on any one platform, wind farm size based solely on the existing platforms would be very limited and likely not economically viable, unless the converted platform is part of a larger windfarm. There are currently no known plans for commercial scale windfarms near any of the platform areas;

- A number of military use areas (e.g., Pt. Mugu Sea Range) exist in the Southern California OCS Planning Area and adjacent coastal areas (Figure 2-3), and any development of offshore wind farms would need to avoid conflicts with Department of Defense (DOD) training activities, especially with those involving flight training; and

- To date, no industry interest exists for purchasing platforms and converting them for wind energy production.

Thus, this potential alternative is not reasonably foreseeable and considered highly unlikely.

2.4.2 Conversion of Platforms to Offshore Research Centers

Potential alternate uses of existing O&G platforms in Federal waters (30 CFR part 585) may include several uses other than renewable energy production. These alternate uses may include, but are not limited to:

- Research
- Education
- Recreation
- Support for offshore operations and facilities
- Telecommunication facilities
- Offshore aquaculture

The conversion of one or more of the POCS platforms to research centers was also brought up during scoping. Platform conversion to research centers was determined to not be reasonably foreseeable for several reasons:

- Given the age of the platforms (ranging from 32 to 54 years in age), the long-term durability of the platforms to support an offshore research center is highly uncertain. Related to this uncertainty is the safety risk to researchers using such a research center from potential structural failure of the aging infrastructure.

- The modifications that would be needed to convert an existing platform designed for O&G extraction to a research center would likely be extensive (e.g., docking facilities for research vessels, analytical biology and chemistry laboratories), and depend strongly on research focus. Any such modifications would be costly and likely result in a facility less than optimal for use as a research center given the basic design constraints of the existing structures.

- A partner, or consortium of partners, from industry, academia, non-governmental organizations (NGOs), and state and federal science groups (e.g., National Science Foundation, U.S. Geologic Survey, U.S. Environmental Protection Agency) would likely be needed to support not only platform conversion but also daily operations and assume liability for staff and equipment. The willingness of such organizations to fund not only the conversion to research but also the day-to-day operations and maintenance of such a research platform is currently unknown.

Thus, this potential alternative is not reasonably foreseeable and considered highly unlikely.

2.5 SUMMARY OF IMPACTS ANTICIPATED FROM THE PROPOSED ACTION AND ALTERNATIVES

To determine which aspects of the environment could be affected by platform decommissioning, a review was conducted to identify the environmental resources and the socioeconomic and sociocultural (including environmental justice) conditions present on the OCS and at onshore areas that would provide support to the decommissioning areas (e.g., vessel docks, onshore material receiving facilities). Sources of information for this review included previously prepared assessments of O&G-related activities on the POCS platforms (e.g., BSEE and BOEM 2016; BOEMRE 2010), the open scientific literature, NGOs, and agency reports (Argonne 2019). Based on this review, a number of resources and conditions were identified for assessment in this PEIS as they may be affected by activities that could be permitted under the Proposed Action or alternatives. The resources and socioeconomic conditions evaluated in this PEIS are:

- Air Quality;
- Water Quality;
- Marine Invertebrate Resources (including special status species);
- Marine Fish (including special status species) and Essential Fish Habitat;
- Sea Turtles;
- Marine Birds (including special status species);
- Marine Mammals (including special status species);
- Commercial and Recreational Fisheries;
- Areas of Concern (such as marine sanctuaries);
- Archeological Resources;
- Visual Resources;
- Recreation and Tourism;
- Environmental Justice;
- Socioeconomics; and
- Navigation and Shipping.

Anticipated impacts to these resources and conditions from the Proposed Action and alternatives are summarize in Table 4.3-1.

Neither geologic resources nor seismicity are anticipated to be affected by the decommissioning activities that could be permitted under the Proposed Action, and thus are not evaluated in this PEIS.

3 AFFECTED ENVIRONMENT

3.1 INTRODUCTION

The Proposed Action would apply to platform decommissioning activities on 31 active leases in federal waters of the Pacific Outer Continental Shelf (POCS) (BOEM 2022). For this Programmatic Environmental Impact Statement (PEIS), the 31 leases where the decommissioning activities may be carried out represent the project area for the Proposed Action (Figure 1-1). The affected environment described within this chapter includes the project area and those additional areas outside of the project area where the direct or indirect effects of the proposed action may occur.

3.2 AIR QUALITY

This section describes the air quality of the Southern California Planning Area and its four adjacent coastal counties (Santa Barbara, Ventura, Los Angeles, and Orange counties)[1], the California and National Ambient Air Quality Standards (NAAQS) for these areas, the natural and anthropogenic sources of pollutant emissions on the planning area and adjacent coastal counties, and the regulatory controls on POCS activities affecting air quality.

3.2.1 Dispersion of Air Pollutant Emissions

Offshore of Southern California, winds are predominantly from the northwest near Point Arguello and predominantly from the west in the Santa Barbara and Santa Monica Basins (BOEM 2019). Wind patterns are altered by topography and coastline orientation, which leads to local and diurnal sea/land breeze circulation when prevailing winds are weakened. For example, southeasterly winds occur as often as westerly winds in Santa Barbara, and southerly winds as often as northwesterly winds in Long Beach. In contrast, westerly winds predominate around the Los Angeles International Airport more than 50% of the time, and southwesterly winds account for about 40% of the time in Santa Monica. This means that air emissions from offshore O&G activities can be transported to inland populated areas along with winds.

In particular, the South Coast Air Basin (SCAB), which includes Los Angeles, is susceptible to severe air pollution episodes due to considerable emission sources in combination with certain climatic and topographic features. The greatest emission sources in greater Los Angeles, an area encompassing 17 million residents, are cars and trucks, owing in part to

[1] The South Coast Air Basin (SCAB) is within the South Coast Air Quality Management District (SCAQMD) jurisdiction. This Basin includes all of Orange County and the non-desert areas of Los Angeles, Riverside, and San Bernardino counties along with the Riverside County portion of the Salton Sea Air Basin (SSAB), which is primarily the Coachella Valley Planning Area. For this analysis, air emissions associated with decommissioning activities are compared with total air emissions from coastal counties to assess the relative importance of their emissions. Air emissions from San Bernardino and Riverside counties are not included because these counties are located some distance and downwind of emission sources from the OCS and the coastal counties and thus are not likely to contribute emissions to the areas impacted by OCS activities.

continuous efforts by the SCAQMD to reduce emissions from stationary sources, among which, the twin ports of Los Angeles and Long Beach are the single largest in Southern California. As is true for much of California, the SCAB is situated near the eastern edge of the North Pacific High,[2] which causes the widespread sinking of air currents over the region that produce a subsidence temperature inversion aloft. These extremely stable atmospheric conditions that acts as a lid that limits vertical mixing are aggravated by topographic features, specifically, that the area opens to the Pacific and is rimmed on three sides by mountains: San Gabriel Mountains, San Bernardino National Forest, and San Jacinto Mountains. Along with strong sunlight, cool sea breezes that sweep inland from the ocean from late morning to sunset are unable to flush the substantial amounts of basin-wide air emissions out of the basin and thus, the basin has frequently been plagued by photochemical smog or other pollution episodes.

3.2.2 Ambient Air Quality Standards

Under the Clean Air Act (CAA), the U.S. Environmental Protection Agency (EPA) has established the NAAQS for certain pollutants considered harmful to public health and the environment (*Federal Register* 1971). The EPA has set NAAQS for six principal pollutants (known as “criteria” pollutants): ozone (O_3); particulate matter (PM) with an aerodynamic diameter of 10 microns (µm) or less and 2.5 µm or less (PM_{10} and $PM_{2.5}$, respectively); carbon monoxide (CO); nitrogen dioxide (NO_2); sulfur dioxide (SO_2); and lead (Pb) (EPA 2021a). Collectively, the levels of these criteria pollutants are indicators of the overall quality of the ambient air.

The CAA established two types of NAAQS: (1) primary standards (also referred to as “health effects standards”) to provide public health protection, including protecting the health of sensitive populations such as asthmatics, children, and the elderly; and (2) secondary standards (referred to as the “quality of life standards”) to provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. Many of the NAAQS standards address both short- and long-term exposures (e.g., 1-hr, 8-hr, 24-hr, and annual).

The California Air Resources Board (CARB), the clean air agency of the State of California, has established separate ambient air quality standards (California Ambient Air Quality Standards [CAAQS]) (CARB 2022a). The CAAQS include the same six criteria pollutants as in the NAAQS, but in contrast with the NAAQS they also include standards for visibility-reducing particles, sulfates, hydrogen sulfide, and vinyl chloride. In general, the CAAQS are the same as or more stringent than the NAAQS, except for 1-hr NO_2 and 1-hr SO_2 standards.

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2 The North Pacific High is a semi-permanent, high-pressure system situated in the northeastern portion of the Pacific Ocean (i.e., west of California). It plays an important role in seasonal climatic variations (WRCC 2022). This pressure center moves northward in the summer, holding storm tracks well to the north. As a result, California receives little or no precipitation from this source during that period. In the winter this system retreats southward, permitting storm centers to swing into and across California, which bring widespread, moderate precipitation to the state.

3.2.3 Area Designations

The EPA assigns area designations based on how the air quality of an area compares to the NAAQS. Areas with air quality that is as good as or better than NAAQS are designated as "attainment areas" while areas in which air quality is worse than NAAQS are designated as "nonattainment areas." Areas that previously were nonattainment areas but where air quality has improved to meet the NAAQS are redesignated "maintenance areas," and any area that cannot be classified based on available information as meeting or not meeting the NAAQS for any pollutant is defined as an "unclassifiable area." These area designations impose Federal regulations on pollutant emissions and the time periods in which the area must again attain the standard, depending on the severity of the regional air quality problem. The CARB similarly designates areas based on the CAAQS.

Based on the most recent available monitoring data, a summary of the attainment status for the six criteria pollutants in Santa Barbara, Ventura, Los Angeles, and Orange counties is presented in Table 3.2-1. These counties are designated as either attainment or unclassifiable areas for all NAAQS criteria pollutants, except: Ventura County is a nonattainment area for O_3; Los Angeles County is a nonattainment area for O_3 and parts of Los Angeles County are nonattainment areas for $PM_{2.5}$ and lead; and Orange County is in nonattainment for both O_3 and $PM_{2.5}$ standards (CARB 2020; EPA 2021b). Based on the CAAQS, all four counties are designated as nonattainment areas for O_3 and PM_{10}, and Orange County and part of Los Angeles County are nonattainment areas for $PM_{2.5}$ (CARB 2020). All four counties are in attainment or unclassifiable areas for other CAAQS criteria pollutants.

TABLE 3.2-1 Summary of State and Federal Attainment Designation Status[a] for Criteria Pollutants in Santa Barbara, Ventura, Los Angeles, and Orange Counties

	O_3		PM_{10}		$PM_{2.5}$		CO		NO_2		SO_2		Pb	
County	State	Fed.	State	Fed.	State	Fed.	State	Fed.	State	Fed.	State	Fed.	State	Fed.
Santa Barbara	N	A/U	N	U	U	A/U	A	A/U	A	A/U	A	A/U	A	A/U
Ventura	N	N	N	U	A	A/U	A	A/U	A	A/U	A	A/U	A	A/U
Los Angeles	N	N	N	A/U	NP	NP	A	A/U	A	A/U	A	A/U	A	NP
Orange	N	N	N	A	N	N	A	A/U	A	A/U	A	A/U	A	A/U

[a] A = attainment; N = nonattainment; NP = nonattainment in part of the county; and U = unclassifiable. Nonattainment is highlighted in gray.

Sources: CARB (2020); EPA (2021b).

3.2.4 Prevention of Significant Deterioration

The Prevention of Significant Deterioration (PSD) regulations (40 CFR 52.21), which are designed to limit degradation of air quality in attainment areas, apply to a major new source or modification of an existing major source within an attainment area or an unclassifiable area.

While the NAAQS (and CAAQS) place upper limits on the levels of air pollution, PSD limits the total increase in ambient pollution levels above the established baseline levels for SO_2, NO_2, PM_{10}, and $PM_{2.5}$. The allowable increase is smallest in Class I areas, such as national parks (NPs) and wilderness areas (WAs). The rest of the country is subject to larger Class II increments. The maximum allowable PSD increments for Class I and Class II areas are available at https://www.epa.gov/sites/default/files/2017-10/documents/2017-vt-table-2.pdf.

Major (large) new and modified stationary sources must meet the requirements for the areas in which they are located and the areas they affect. For example, a source located in a Class II area in close proximity to a Class I area would need to meet the more stringent Class I increment in the Class I area and meet the Class II increment elsewhere, in addition to any other applicable requirements. Aside from capping increases in criteria pollutant concentrations below the levels set by the NAAQS, the PSD program mandates stringent control technology requirements for new and modified major sources. The CAA requires Federal land managers to evaluate whether proposed projects will have an adverse impact on air quality-related values in Class I areas, including visibility. There are several Federal Class I areas in California adjacent to the O&G platforms in the project area, including the Cucamonga, San Gabriel, and San Rafael WAs within 62 mi (100 km), and Agua Tibia, Domeland, San Gorgonio, San Jacinto, and Ventana WAs and Joshua Tree NP within 124 mi (200 km).

3.2.5 Air Emissions

The annual average emissions of criteria pollutants and reactive organic gases (ROG) from anthropogenic sources projected by CARB for 2021[3] (using 2012 emissions data as a baseline) for each of the four counties along the Southern California Planning Area are presented in Table 3.2-2 (CARB 2018). These include emissions from all anthropogenic sources both in the inland and OCS air basin. Note that the CARB estimates only include emissions from O&G activities on platforms in Santa Barbara and Ventura counties; reported emissions in 2021 for four platforms (Edith, Ellen, Elly, and Eureka) are thus used for Los Angeles County.

For year 2021, total emissions for Los Angeles County, the most populous county in California, are projected to account for about two-thirds of the total annual emissions of all criteria pollutants and ROG (which play a major role in the generation of photochemical oxidants in the atmosphere) for the four counties. Los Angeles County accounts for 57% of the NO_x and 71% of the SO_x projected annual average emissions from the four counties (CARB 2018). Orange County accounts for 13–22% of the four-county total for six pollutants except for SO_x, for which the county accounts for about 7% of the four-county total. Santa Barbara and Ventura counties are generally similar, accounting for 6–20% for any one of the criteria pollutants and ROG.

[3] Over the last 10 years, four-county emission totals for all pollutants tended to decline except PM_{10}, irrespective of the pandemic.

TABLE 3.2-2 Projected[a] 2021 Total Annual Average Emissions of Criteria Pollutants and Reactive Organic Gases, by County and by Source Category (tons per day)[b,c]

County or Source	ROG	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$
By county						
Santa Barbara	27.92	73.08	72.74	2.47	14.67	3.93
Ventura	30.56	90.57	33.54	1.63	18.37	6.06
Los Angeles	224.70	829.43	207.44	13.35	103.93	42.20
Orange	74.10	288.23	48.88	1.31	24.37	10.31
Four-county total	357.27	1,281.31	362.60	18.75	161.35	62.50
By source category						
Fuel Combustion	10.95	54.52	41.13	6.31	6.69	5.80
Waste Disposal	9.94	1.48	2.45	0.65	0.41	0.27
Cleaning & Surface Coatings	49.22	0.07	0.04	0.00	1.77	1.71
Petroleum Production & Marketing	25.63	5.68	1.19	2.31	1.77	1.56
Industrial Processes	10.51	1.05	0.67	0.68	18.46	7.64
Solvent Evaporation	101.39	0.00	0.00	0.00	0.02	0.02
Miscellaneous Processes	12.95	67.70	13.54	0.53	104.37	30.29
On-road Motor Vehicles	63.55	476.23	109.64	1.48	20.51	8.82
Other Mobile Sources	73.13	674.58	193.95	6.78	7.35	6.40
Four-county total	357.27	1,281.31	362.60	18.75	161.35	62.50

[a] Actual reported emissions in 2021 are included for four platforms (Edith, Ellen, Elly, and Eureka) off the Los Angeles County (https://xappprod.aqmd.gov/find//facility/AQMDsearch?facilityID=143741 and https://xappprod.aqmd.gov/find//facility/AQMDsearch?facilityID=166073).

[b] Includes emissions only from O&G activities on platforms in Santa Barbara and Ventura counties.

[c] Lead emissions are not available in the emissions inventories.

Source: CARB (2018).

In the 2012 baseline year, Santa Barbara County accounted for about 39% of the four-county total of SO_x, due in large part to the large number of oceangoing vessels burning high-sulfur-content fuel oil visiting its ports. As a result of California’s oceangoing vessel fuel regulation (California Code of Regulations 2009), Santa Barbara County accounted for 13% of four-county total SO_x emissions in 2021. Compared to the 2012 baseline year, it is estimated that the four-county total emissions decreased in 2019 for all pollutants except PM_{10}, with decreases ranging from 5% for $PM_{2.5}$ to 40% for SO_x and an increase of about 6% for PM_{10}.

Emissions from other mobile sources (including off-road equipment and vehicles, aircraft, trains, boats, and vessels) and on-road motor vehicles are the largest and second-largest contributors, respectively, to four-county total emissions of CO and NO_x. Emissions from miscellaneous processes (including residential fuel combustion, cooking, construction and demolition, road and wind-blown dusts, etc.) and on-road motor vehicles are the largest and second-largest contributors, respectively, to both PM_{10} and $PM_{2.5}$. Other mobile sources account for about 36% of the total emissions of SO_x, followed by fuel combustion (about 34%). Solvent evaporation is the largest contributor to total ROG emissions and other mobile sources are second-largest contributor.

The estimated four-county OCS total emissions for ROG, CO, PM_{10}, and $PM_{2.5}$ for 2021 are minor contributors (up to 2.6%) to four-county total emissions (Table 3.2-3) (CARB 2018). However, NO_x and SO_x emissions are significant contributors, accounting for 30% and 16% of the four-county total emissions, respectively. In Santa Barbara and Ventura counties, which have lower emissions levels compared to Los Angeles and Orange counties, OCS emissions for NO_x and SO_x contribute a considerable portion of county total emissions, about 55–83% and 44–57%, respectively.

TABLE 3.2-3 2021 Projected Offshore Continental Shelf Annual-Average Emissions of Criteria Pollutants and Reactive Organic Gases, by County and by Source Category (tons per day)[a]

County	ROG	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$
Santa Barbara	4.60 (16.5%)[b]	5.13 (7.0%)	60.18 (82.7%)	1.41 (57.3%)	0.66 (4.5%)	0.61 (15.5%)
Ventura	1.43 (4.7%)	3.17 (3.5%)	18.32 (54.6%)	0.72 (44.4%)	0.32 (1.7%)	0.30 (4.9%)
Los Angeles	1.80 (0.8%)	5.71 (0.7%)	21.94 (10.6%)	0.55 (4.1%)	0.65 (0.6%)	0.60 (1.4%)
Orange	0.48 (0.6%)	1.10 (0.4%)	7.13 (14.6%)	0.29 (22.4%)	0.14 (0.6%)	0.13 (1.2%)
Four-county total	8.31 (2.3%)	15.11 (1.2%)	107.57 (29.7%)	2.98 (15.9%)	1.76 (1.1%)	1.63 (2.6%)

[a] Emissions from O&G activities on platforms in Santa Barbara and Ventura counties only are included.

[b] A percentage of its respective county or four-county total emission for a pollutant of interest.

Source: CARB (2018).

In 2021, among source categories, oceangoing vessels and commercial harbor craft are the largest and second-largest contributors to four-county total OCS emissions for all criteria pollutants and ROG, accounting for about 49–89% and 10–40%, respectively. O&G production and aircraft are minor contributors to total OCS emissions (CARB 2018). Compared to the 2012 baseline year, four-county OCS total emissions in 2021 are projected to decrease by 79% for SO_x, 53% for PM_{10}, and 55% for $PM_{2.5}$ and to increase by 36% for ROG, 7% for CO, and 13% for NO_x.

Diesel engines emit a complex mixture of pollutants, including very small carbon particles, or “soot” (also called black carbon) coated with numerous organic compounds, known as diesel particulate matter (DPM) (CARB 2022b). Diesel exhaust contains over 40 cancer-causing substances, most of which are readily adsorbed onto the soot particles. In 1998, California identified DPM as a toxic air contaminant based on its cancer-causing potential. Major sources of diesel emissions, such as ships, trains, and trucks operate in and around ports, rail yards, and heavily traveled roadways (CARB 2022b), which are often located near highly populated areas. Thus, DPM levels are mainly an urban problem, with large numbers of people exposed to higher DPM concentrations, resulting in greater health consequences compared to rural areas. In addition, DPM can affect the environment, including visibility degradation and climate change (CARB 2022b).

Diesel black carbon, which is a major component of soot and the most solar energy-absorbing component of DPM, is the second largest contributor to climate change after CO_2. Statewide DPM ambient concentrations tend to decrease due to CARB's regulations of diesel engines and fuels (CARB 2022b). Since 1990, DPM levels decreased by 68% as of 2012 and are anticipated to continue declining as additional controls are adopted and the number of new technology diesel vehicles increases.

In general, greenhouse gas (GHG) emissions data are not available at the county level. In California, the total statewide gross[4] GHG emissions in 2019 (the most recent information available) were estimated to be about 418 million metric tons (MMT) carbon dioxide equivalent (CO_2e)[5] (CARB 2021), which was about 6.4% of the total GHG emissions of about 6,558 MMT CO_2e in 2019 for the United States (EPA 2021c). Since the peak level in 2004, California's GHG emissions have generally followed a decreasing trend. About 83% of the California total GHG emissions are CO_2, followed by CH_4 (9%), high-global warming potential GHG6 (5%), and N_2O (3%). By sector, transportation is the single largest source of GHG emissions (about 40%) in California, followed by industrial sources (21%) and electricity production (14%) (CARB 2021).

3.2.6 Regulatory Controls on OCS Activities Affecting Air Quality

The EPA has authority for CAA compliance of air quality on the POCS as granted under 42 U.S.C. 7401 et seq., "The Clean Air Act," as amended by Public Law 101-549. On September 4, 1992, the EPA Administrator promulgated regulations (*Federal Register* 1992) to control air pollution from POCS sources to attain and maintain federal and state air quality standards and to comply with PSD requirements.

EPA delegated authority over offshore facilities to the local air districts under their individual regulatory programs as if the facility were located onshore. Within the Southern California Planning Area, the air districts of the corresponding onshore area (COA) have authority over the OCS O&G platforms (Table 3.2-4).

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4 Excluding GHG emissions removed due to forestry and other land uses.

5 A measure to compare the emissions from various GHGs on the basis of the global warming potential (GWP), defined as the ratio of heat trapped by one unit mass of the GHG to that of one unit mass of CO_2 over a specific time period. For example, GWP is 25 for CH_4, 298 for N_2O, and 22,800 for SF_6. Accordingly, CO_2e emissions are estimated by multiplying the mass of a gas by the GWP.

6 Fluorinated GHGs, including sulfur hexafluoride (SF_6), nitrogen trifluoride (NF_3), perfluorocarbons (PFCs), and hydrofluorocarbons (HFCs).

TABLE 3.2-4 POCS Platforms and Associated Air Pollution Control Districts

Air Pollution Control District	Assigned POCS Platforms[a]
Santa Barbara County Air Pollution Control District (SBCAPCD)	Irene, Hidalgo, Harvest, Hermosa, Heritage, Harmony, Hondo, A, B, C, Hillhouse, Henry, Habitat, Houchin, Hogan
Ventura County Air Pollution Control District (VCAPCD)	Grace, Gilda, Gail, Gina
South Coast Air Quality Management District (SCAQMD)	Edith, Ellen, Elly, Eureka

[a] See Figure 1-1 for platform locations.

In 1990, Congress established a program under the Clean Air Act, known as Title V, to reduce air pollution. A Title V Operating Permit, which applies to stationary sources with air emissions over major source thresholds (e.g., 100 tons per year), consolidates all applicable air quality regulatory requirements into a single, legally enforceable document ("Title V Operating permit"). These permits are designed to improve compliance by clarifying what air quality regulations apply to a facility. Currently, 21 platforms[7] on the OCS have Title V Operating Permits, and two platforms, Habitat off Santa Barbara and Edith off Long Beach, have local (non-Title V) permits (SBCAPCD 2022; SCAQMD 2021; VCAPCD 2022).

Emission sources associated with O&G activities at offshore platforms include combustion units, marine traffic, and fugitive sources (SBCAPCD 2022; SCAQMD 2021; VCAPCD 2022). Emission sources vary from platform to platform, depending upon whether the platform is grid or non-grid powered. Among platforms in federal waters, three platforms under the Santa Barbara County Air Pollution Control District (SBCAPCD) (Harvest, Hermosa, and Hidalgo), two platforms under the Ventura County Air Pollution Control District (VCAPCD) (Grace and Gail), and four platforms (Edith, Ellen, Elly, and Eureka) under the South Coast Air Quality Management District (SCAQMD) are non-grid-powered platforms that generate primary power using turbine generators burning either produced gas or diesel fuel. All other platforms are powered by the electric grid provided through a subsea cable from shore.

In general, other combustion sources include gas turbine engines used to drive the sales gas compressors, diesel-fired pedestal cranes, production and drilling rig emergency generators, fire emergency water pumps, and/or high/low pressure flares. Marine traffic includes crew boats and helicopters for transportation of platform personnel, supply boats for transportation of equipment, fuel, and supplies to and from the platform, and emergency response boats. Solvent usage for cleaning/degreasing, leaks from valves, flanges, other appurtenances, and pump and compressor seals, tanks/vessels/sumps/separators, and pigging equipment, belong to the category of fugitive sources.

7 Three platforms (Ellen, Elly, and Eureka) are operated by Beta Offshore. Platform Ellen is a production platform connected by a walkway to Platform Elly, a processing platform for both Ellen and Eureka. These three platforms have one Title V permit.

In general, at non-grid-powered platforms, emissions from turbine generators are highest for criteria pollutants, followed by supply boats and combustion engines. Fugitive components are a primary source of ROG, followed by turbine generators. Other combustion sources such as engines, flares, and turbine compressors are minor emission sources for criteria pollutants. At grid-powered platforms, supply boats and combustion engines are primary and secondary emission sources for criteria pollutants, respectively, while fugitive components dominate in total ROG emissions.

The SBCAPCD, VCAPCD, and SCAQMD regulate emissions from offshore platforms, with Permits to Operate that define permitted emissions from specified equipment and service vessels. For example, the VCAPCD requires all crude oil and produced water be contained in closed-top tanks equipped with vapor recovery. Ultra-low-sulfur diesel (ULSD) with a sulfur content of 15 ppm or less was applied to both on-road and off-road engines in California from 2006 (CARB 2014). Thus, diesel fuel used by all internal combustion engines (e.g., emergency diesel generators and supply boats) associated with O&G activities at platforms in federal waters should be ULSD as well.

3.3 ACOUSTIC ENVIRONMENT

This chapter describes the acoustic environment of the Southern California Planning Area and its four adjacent coastal counties (Santa Barbara, Ventura, Los Angeles, and Orange). The following sections briefly discuss airborne and underwater sound, sound propagation, ambient noises, anthropogenic noises, climate effects on the underwater acoustic environment, and regulatory controls. Separate discussions cover the similarities and differences of underwater and airborne noise.

3.3.1 Sound Fundamentals

3.3.1.1 Underwater Sound

Light does not travel far in the ocean due to its absorption and scattering. Even in the clearest water, most light is absorbed within a few hundred meters, and visual communication among marine species is very limited in water, especially in deep or murky water, and/or at night. Accordingly, auditory capabilities have evolved to overcome this limitation of visual communication for many marine animals. Sound, which is mostly used by marine animals for such basic activities as finding food or a mate, navigating, and communicating, plays a crucial role in their survival in the marine environment. The same advantages of sound in water have led humans to deliberately introduce sound into the ocean for many valuable purposes, such as communication (e.g., submarine-to-submarine), feeding (e.g., fish-finding sonar), and navigation (e.g., depth finders and geological and geophysical surveys for minerals) (Hatch and Wright 2007). However, some sounds, such as the noise generated by ships and by offshore industrial activities, including O&G activities, are introduced into the ocean as a byproduct.

Any pressure variation that the human ear can detect is considered sound, and noise is defined as unwanted sound. Sound is described in terms of amplitude (perceived as loudness) and frequency (perceived as pitch). The ear can detect pressure fluctuations changing over seven orders of magnitude. The ear has a protective mechanism in that it responds logarithmically, rather than lineally. To deal with these two realities (wide range of pressure fluctuations and the response of the ear), sound pressure levels[8] are typically expressed as a logarithmic ratio of the measured value to a reference pressure, called a decibel (dB). By convention, the reference pressures are 1 micropascal (μPa) for underwater sound and 20 μPa for airborne sound, which corresponds to the average person's threshold of hearing at 1,000 hertz (Hz).[9] Accordingly, sound intensity in dB in water is not directly comparable to that in dB in air.[10]

There are primarily three ways to characterize the intensity of a sound signal (URI 2021). The "zero-to-peak pressure," or "peak pressure," denotes the range between zero and the greatest pressure of the signal, while "peak-to-peak pressure" denotes the range between negative and positive extremes of the signal. The "root-mean-square (rms) pressure" is the square root of the average of the square of the pressures of the sound signal over a given duration. Due to the sensitivity of marine animals to sound intensity, the rms pressure is most widely used to characterize underwater sound waves.

Underwater dB is used to indicate decibels computed using root-mean-square pressure, unless otherwise indicated. However, for impulsive sounds, rms pressure is not appropriate to use because it can vary considerably depending on the duration over which the signal is averaged. In this case, peak pressure of impulsive sound, which could be associated with the risk of causing physical damage in auditory systems of marine animals, is more appropriately used (Coles et al. 1968). Unless otherwise noted, source levels of underwater sounds are typically expressed in the notation "dB re 1 μPa-m," which is defined as the pressure level that would be measured at a reference distance of 1 m from a source. In addition, zero-to- peak and peak-to-peak sound pressure levels are denoted as $dB_{0\text{-}p}$ and $dB_{p\text{-}p}$ re 1 μPa-m, respectively. The received levels (estimated at the receptor locations) are presented as "dB re 1 μPa" at a given location (e.g., 5 km [3 mi]).

Most animals, including humans, terrestrial and marine mammals, reptiles (e.g., sea turtles), fishes, and invertebrates (e.g., lobster and octopus) have varying sensitivity to sounds of different frequencies (URI 2021), i.e., not all hear equally at all frequencies. Accordingly,

8 There are two primary but different metrics for sound measurements: sound pressure level (SPL) and sound exposure level (SEL). SPL is the root mean square of the sound pressure over a given interval of time, given as dB re 1 μPa for underwater sound. In contrast, SEL is the total noise energy from a single event and is the integration of all the acoustic energy contained within the event. SEL takes into account both the intensity and the duration of a noise event, given as dB re 1 $\mu Pa^2 \cdot s$ for underwater sound. In consequence, SEL is similar to SPL in that total sound energy is integrated over the measurement period, but instead of averaged over the entire measurement period, a reference duration of 1 s is used.

9 Hertz is the scientific unit of frequency, equal to one cycle per second. The general range of hearing in humans sound frequencies from approximately 20 Hz to 20,000 Hz.

10 Sound intensity in dB in water is not comparable to that in air due to the difference in reference standards as well as the differences in the sound speeds and the densities between the two. For the same pressure, higher density and higher sound speed both give a lower intensity. The difference in reference standards and the differences in sound speeds and densities cause about 26 dB and 35.5 dB, respectively. To compare noise levels in water to those in air, 61.5 dB should be subtracted from the noise levels in water to account for these two differences

species-specific frequency weighting that quantitatively account for these differing sensitivities can be applied, particularly when considering impacts on animal's hearing.

3.3.1.2 Airborne Sound

Sound pressure levels in air are measured by using the logarithmic decibel (dB) scale. A-weighting (denoted by dBA) (Acoustical Society of America 1983, 1985) is widely used to account for human sensitivity to frequencies of sound (i.e., less sensitive to lower and higher frequencies and most sensitive to sounds between 1 and 5 kilohertz [kHz]), which correlates well with a human's subjective reaction to sound. Several sound descriptors have been developed to account for variations of sound with time. The equivalent continuous sound level (L_{eq}) is a sound level that, if it were continuous during a specific time period, would contain the same total energy as a time-varying sound. In addition, human responses to noise differ depending on the time of the day (e.g., higher sensitivity to noise during nighttime hours because of lower background noise levels). The day-night average sound level (L_{dn}, or DNL)[11] is a single dBA value calculated from hourly L_{eq} over a 24-hour period, with the addition of 10 dBA to sound levels from 10 p.m. to 7 a.m. to account for the greater sensitivity of most people to nighttime noise. Generally, a 3-dBA change over existing noise levels is considered a "just noticeable" difference; a 10-dBA increase is subjectively perceived as a doubling in loudness and almost always causes an adverse community response (NWCC 2002).

3.3.2 Sound Propagation

3.3.2.1 Underwater Sound Propagation

Understanding the impact of sound on a receptor requires a basic understanding of how sound propagates from its source. Underwater sound spreads out in space, is reflected, refracted, and absorbed. Sound propagates with different geometries under water, especially in relatively shallow nearshore environments. Vertical gradients of temperature, pressure, and salinity in the water as well as wave and current actions can also be expected to constrain or distort sound propagation geometries. Several important factors affecting sound propagation in water include spreading loss, absorption loss, scattering loss, and boundary effects of the ocean surface and the bottom (Malme 1995).

Among these, spreading loss, which does not depend on frequency, is the major contributor to sound attenuation. As propagation of sound continues, its energy is distributed over an ever-larger surface area. Spherical and cylindrical spreading are two simple approximations used to describe the sound levels associated with sound propagations away from a source. In spherical propagation, sound from a source at mid-depth in the ocean (i.e., far from the sea surface or sea bottom) propagates in all directions with a 6-dB drop per doubling of

[11] Only California requires the use of Community Noise Equivalent Level (CNEL), which is almost the same as DNL except the addition of 5 dB to noise levels in the evening between 7 p.m. to 10 p.m. There is usually little difference between CNEL and DNL, so they can be used interchangeably for most purposes.

distance from the source. In cylindrical spreading, sound propagates uniformly over the surface of a cylinder, with sound radiating horizontally away from the source, and sound levels dropping 3 dB per doubling of distance. The surface of the water and the ocean floor are effective boundaries to sound propagation, acting either as sound reflective or absorptive surfaces. Consequently, some underwater sound originating as a point source will initially propagate spherically over some distance until the sound pressure wave reaches these boundary layers; thereafter, the sound will propagate cylindrically. Therefore, some sound levels tend to diminish rapidly near the source (spherical propagation) but slowly with increasing distances (cylindrical propagation).

Directionality refers to the direction in which the signal is projected. Many underwater noises are generally considered omnidirectional (e.g., construction, dredging, explosives). However, geophysical surveys, such as seismic air-gun arrays, are focused downward, while some geological surveys are fanned. Although air-gun arrays are designed to direct a high proportion of the sound energy downward, some portion of the sound pulses can propagate horizontally in the water depending on array geometry and aspect relative to the long axis of the array (Greene and Moore 1995). In any case, sound attenuation of directional sound with distance is lower than the spreading loss for omnidirectional sources discussed above.

As sound travels some sound energy is absorbed by the medium, such as air or water (absorption losses), which represents conversion of acoustic energy to heat energy. Absorption losses depend strongly on frequency, becoming greater with increasing frequencies, and vary linearly with increasing distance, and are given as dB/km. Sound scattering is affected by bubbles, suspended particles, organisms, or other floating materials. Like absorption losses, scattering losses vary linearly with distance, and are given as dB/km.

Whenever sound hits the ocean surface or seafloor, it is reflected, scattered, and absorbed and mostly loses a portion of its sound energy. Hard materials (like rocks) will reflect or scatter more sound energy, while soft materials (like mud) will absorb more sound energy. Accordingly, the seafloor plays a significant role in sound propagation, particularly in shallow waters.

Typically, a high-frequency sound cannot travel as far as a low-frequency sound in water because higher frequencies are absorbed more quickly. An exception is the rapid attenuation of low frequencies in shallow waters (Malme 1995). Shallow water acts as a waveguide bounded on the top by the air and on the bottom by the ocean bottom. The depth of the water represents the thickness of the waveguide. Sound at long wavelengths (low frequencies) does not fit in the waveguide and is attenuated rapidly by the effects of interference at the boundaries.

3.3.2.2 Airborne Sound Propagation

Airborne sound propagation is almost the same as underwater sound propagation. The only difference is that airborne sound encounters only one boundary, the earth’s surface. Except with an elevated source, most noise sources are located on or near the surface, which leads to hemi-spherical spreading. However, airborne sound propagation does not alter its spreading mode.

Among many attenuation factors, meteorological effects associated with vertical profiles of wind and temperature play the biggest role in sound propagation, especially over long distances. Because of surface friction, wind speed increases with height, which acts to bend the path of sound, "focusing" it on the downwind side and making a "shadow" on the upwind side of the source ("wind gradient effects"). On a clear night, temperature increases with height due to radiative cooling of surface air; called the "nocturnal temperature inversion." Another type of inversion occurs when cold air underlies warmer air during the passage of a cold front or inversions of a cooler onshore sea/lake breeze. Such temperature inversions may focus sound on the ground surface ("temperature gradient effects"), with effects exerted uniformly in all directions from the noise source. During clear nights, both wind and temperature gradient effects occur frequently, allowing noise to bend toward the ground and potentially affect the neighboring communities and/or habitat with relatively lower background levels.

3.3.3 Ambient Noise

Ambient noise is typical or persistent environmental background noise lacking a single source or point. In the ocean, there are numerous sources of ambient noise, both natural and anthropogenic, which are variable with respect to season, time of day, location, and noise characteristics (e.g., frequency). Natural sources include wind and waves, seismic noise from volcanic and tectonic activity, precipitation, marine biological activities, and sea ice (Greene 1995) while anthropogenic sources include transportation, dredging and construction, O&G drilling and production, geophysical surveys, sonar, explosions, and scientific studies (Greene and Moore 1995). Ambient noise can hamper basic activities of marine animals or specific human activities, depending on noise levels and frequency distributions. As the ambient noise level increases, sounds from a specific source disappear below the ambient level and become undetectable due to loss of prominence of the signal at shorter ranges. In particular, anthropogenic sound could have effects on marine life, including behavior changes, masking, hearing loss, and strandings.

For most of the world oceans, shipping and seismic exploration noise dominate the low-frequency portion of the spectrum (Hildebrand 2009). In particular, noise generated by shipping has increased as the number of ships on the high seas has increased. Along the west coast of North America, long-term monitoring data suggest an average increase of about 3 dB per decade in low-frequency ambient noise (Andrew et al. 2002; McDonald et al. 2006, 2008).

Various activities and processes, both natural and anthropogenic, combine to form the sound profile within the ocean. Except for sounds generated by some marine animals using active acoustics, most ambient noise is broadband (composed of a spectrum of numerous frequencies without a differentiating pitch). Virtually the entire frequency spectrum is represented by ambient noise sources.

In the frequency range of 20–500 Hz, distant shipping is the primary source of ambient noise (URI 2021). Spray and bubbles associated with breaking waves are the major contributions to ambient noise in the 500–100,000 Hz range. At frequencies greater than 100,000 Hz, "thermal noise" caused by the random motion of water molecules is the primary source.

Sources of ambient noise in the Southern California Planning Area include wind and wave activity, including surf noise along coastlines; precipitation noise from rain and hail; lightning; biological noise from marine mammals, fishes, and crustaceans; and shipping traffic (Greene 1995). Several of these sources may contribute significantly to the total ambient noise at any one place and time, although ambient noise levels above 500 Hz are usually dominated by wind and wave noise. Consequently, ambient noise levels at a given frequency and location may vary widely on a daily basis. A wider range of ambient noise levels occurs in water depths less than 200 m (shallow water) than in deeper water. Ambient noise levels in shallow waters are directly related to wind speed and indirectly to sea state[12] (Wille and Geyer 1984).

3.3.4 Anthropogenic Noise

Various types of manmade underwater and/or airborne noises occur in the ocean and coastal areas. Anthropogenic noise sources include transportation, dredging and construction, O&G drilling and production, geophysical surveys, sonar, explosions, and scientific studies. Noise levels from most human activities are greatest at relatively low frequencies (<500 Hz).

Transportation-related noise sources include aircraft (both helicopters and fixed-wing aircraft), small and large vessels (related to fishing, commercial traffic, recreation, and support and supply ships) and shipping traffic, including large commercial vessels and supertankers. In shallow water, shipping traffic located more than 10 km (6 mi) away from a receiver generally contributes only to background noise. However, in deep water, low-frequency components of traffic noise up to 4,000 km (2,485 mi) away may contribute to background noise levels (Greene 1995).

For a wide array of structure and well decommissioning targets in all water depths, nonexplosive cutting tools (e.g., abrasive cutters, mechanical cutters, diver cutters, diamond wire cutters, or other nonexplosive cutters) would be used (MMS 2005). Use of these tools would generate noise from cutting activities underwater, and/or support equipment above the water, such as a typical small diesel generator if required. In-water sound source levels from nonexplosive cutting tools associated with jacket removals are not available, so those from conductor removals are presented in the following, assuming that the noise levels are similar between non-explosive jacket and conductor removals. The continuous mechanical noise that the abrasive cutting tool generates is at source levels of 147 dB (BOEM 2020) and 147–189 dB re 1 μPa-m (BOEM 2021) and falls within the 500–8,000 Hz frequency bands, with most of the energy at 1,000 Hz. For conductor severance using hydraulically actuated, crushed tungsten carbide-tipped knives, source levels are about 163–166 dB re 1 μPa-m, with frequencies ranging from 50 to 5,000 Hz peaking at about 1,000 Hz (Fowler et al. 2022).

Underwater explosions in open waters are the strongest point sources of anthropogenic noise in the sea. Sources of explosions include both military testing and non-military activities, such as offshore structure removals. An underwater explosion of a material such as

[12] Sea state is an index of wave action, related to wind speed. Sea states vary from “0,” which represents calm conditions, to “9,” which represents hurricane conditions.

trinitrotoluene (TNT) starts with an extremely rapid chemical reaction that creates hot gases (URI 2021). The pressure at the gas-water interface causes the water to move outward at speeds greater than the speed of sound in seawater. This produces rapid onset pulses (shock waves) followed by a succession of oscillating low-frequency bubble pulses if the explosion occurs sufficiently deep from the surface (Staal 1985). In an explosive shock wave the extreme overpressure and rapid decrease to below ambient pressure can cause injuries if the pressures exceed the dynamic range of tissues (URI 2021).

Table 3.3-1 summarizes source levels and frequencies for some underwater sounds generated by human activities.

TABLE 3.3-1 Source Levels and Frequencies for Some Manmade Underwater Sounds

Activity	Sources	Source Level (dB re 1 μPa-m)[a]	Frequency Range (Hz)[b]
Transportation	Aircraft (fixed-wing and helicopters)	156–175	45–7,070
	Small vessels (boats, ships)	145–170	37–6,300
	Large vessels (commercial vessels, supertankers)	169–198	6.8–428
	Tug and barge (2,250 hp), 18 km/h	171	45–7,070
Dredging and construction	Dredging	172–185	45–890
	Pile-driving	228	Broadband (peak at 100–500 Hz)
O&G drilling/production	Drilling from vessels	154–191	10–10,000
	Offshore O&G production	Low	50–500
Geophysical surveys	Air-guns	216–259[c]	<120
Sonars	Military search sonars	230+	2,000–57,000
Explosions	Offshore demolition (structure removals)	267-279[c] (based on charge weights)	Peak at 6–21 Hz

[a] Root-mean-square pressure level unless otherwise noted.

[b] Frequency range represents the lowest and highest frequencies over which the estimated source level data (reported either for dominant tones or center frequency of the 1/3 octave bands) are available.

[c] Zero-to-peak pressure level.

Sources: Adapted from Greene and Moore (1995), except Madsen et al. (2006) and Thomsen et al. (2006) for pile-driving.

Noise sources during decommissioning include: (1) derrick barges equipped with large diesel-powered generators that supply electricity to a range of equipment on the derrick barge, including cranes, welders, and other equipment; (2) crew, supply and dive boats; (3) tugboats; and (4) other barges, such as lay barges for pipeline removal, crane barges for shell mounds removal, a lift barge for removal of jacket sections, and other equipment, such as compressors, welders, and generators.

3.3.5 Climate Change Effects on Noise

Potential impacts of climate change on the acoustic environment are relatively minor. Since the sound attenuation rate depends on seawater acidity, increasing ocean acidification resulting from rising anthropogenic CO_2 emissions could result in decreased sound absorption (Hester et al. 2008). Reported increases in ambient low-frequency noise are attributable largely to an overall increase in human activities (such as shipping) that are unrelated to climate change (Andrew et al. 2002). Due to the combined effects of decreased absorption and anticipated increases in overall human activities, ambient noise levels will increase considerably within the auditory range of 10–10,000 Hz, which are critical for environmental, biota, military, and economic interests (Hester et al. 2008). Sound absorptivity in seawater varies by frequency along with change in acidity, so there will also be changes in frequency spectrum distributions at receiver locations associated with climate change.

3.3.6 Noise Regulations

3.3.6.1 Underwater Sound

There are few standards that specifically address noise in underwater environments. Nevertheless, Federal and State agencies that oversee activities in offshore areas can establish effective noise controls as stipulations to leases or permits needed for such activities. For example, NOAA’s National Marine Fisheries Service (NMFS) has finalized its *Technical Guidance for Assessing the Effects of Anthropogenic Noise on Marine Mammal Hearing* in July of 2016 and revised in April of 2018 (NOAA 2018, 2021a). These in-water acoustic thresholds are intended to be protective of marine mammals (Table 3.3-2).

TABLE 3.3-2 National Marine Fisheries Service In-Water Acoustic Thresholds

Threshold Sound Levels for Onset of a Permanent Threshold Shift (PTS)[a]

Level A: Hearing Groups	Impulsive	Non-Impulsive
Low-FrequencyCetaceans	Peak: 219 dB SEL_{cum}: 183 dB	SEL_{cum}: 199 dB
Mid-FrequencyCetaceans	Peak: 230 dB SEL_{cum}: 185 dB	SEL_{cum}: 198 dB
High-FrequencyCetaceans	Peak: 202 dB SEL_{cum}: 155 dB	SEL_{cum}: 173 dB
Phocid Pinnipeds	Peak: 218 dB SEL_{cum}: 185 dB	SEL_{cum}: 201 dB
Otariid Pinnipeds	Peak: 232 dB SEL_{cum}: 203 dB	SEL_{cum}: 219 dB

Threshold Sound Levels for Onset of a Temporary Threshold Shift (TTS)

Criterion	Criterion Definition	Thresholds
Level B[b]	Behavioral disruption for impulsive noise (e.g.,impact pile driving)	160 dB_{rms}
Level B[b]	Behavioral disruption for continuous noise (e.g.,vibratory pile driving, drilling)	120 dB_{rms}[c]

[a] Dual metric thresholds for impulsive sounds: NMFS species using whichever results in the largest isopleth for calculating the onset of PTS. If a non-impulsive sound has the potential of exceeding the peak sound pressure level thresholds associated with impulsive sounds, these thresholds are recommended for consideration.

[b] All decibels referenced to 1 micro-pascal (re: 1 µPa). Note all thresholds are based off root-mean-square (rms) levels.

[c] The 120 dB threshold may be slightly adjusted if background noise levels are at or above this level.

Source: NOAA (2018, 2021a).

3.3.6.2 Airborne Sound

Many local noise ordinances are qualitative, such as prohibiting excessive noise or noise that results in a public nuisance. Because of the subjective nature of such ordinances, they are often difficult to enforce. However, some states, counties, and cities have established quantitative noise-level regulations. For example, Santa Barbara County specifies environmental noise limits with a single value of 65 dBA CNEL (County of Santa Barbara 2021), while the City of Ventura bases noise limits on the land use of the property receiving the noise and by time of day (City of Ventura 2021).

The State of California requires each municipality and county to have a *Noise Element of the General Plan*, a substantial noise database and blueprint for making land use decisions in that jurisdiction (GOPR 2017). State land use compatibility criteria for the community noise environment in L_{dn} or CNEL are used.

The EPA has a noise guideline that recommends an L_{dn} of 55 dBA, which is sufficient to protect the public from the effect of broadband environmental noise in typical outdoor and residential areas (EPA 1974). These levels are not regulatory goals but are "intentionally conservative to protect the most sensitive portion of the American population" with "an additional margin of safety." The EPA guideline recommends an L_{eq}(24-hr) of 70 dBA or less over a 40-year period to protect the general population against hearing loss from non-impulsive noise.

The NOAA's NMFS (NOAA 2021a) identifies in-air acoustic thresholds for the protection of marine mammal hearing (Table 3.3-3).

TABLE 3.3-3 National Marine Fisheries Service Current In-air Acoustic Thresholds

Criterion	Criterion Definition	Threshold[a]
Level A	Permanent threshold shift (PTS) (injury) conservatively based on temporary threshold shift(TTS)	None established
Level B	Behavioral disruption for harbor seals	90 dB_{rms}
Level B	Behavioral disruption for non-harbor seal pinnipeds	100 dB_{rms}

[a] All decibels referenced to 20 micropascal (re: 20 μPa). Note all thresholds are based off root-mean-square (rms) levels.

Source: NOAA (2021a).

3.4 WATER QUALITY

The affected environment for water quality is presented in the following sections. Discussions summarize the regulatory framework, physical oceanography, existing water quality conditions, and various sources of point and non-point inputs to the Southern California Bight (SCB), which includes the project area. Further details on the water quality environmental setting are presented in BOEM (2019), which is included in this PEIS by reference.

3.4.1 Regulatory Framework

The Clean Water Act (CWA) of 1972 established the basic structure for regulating discharges of pollutants to Waters of the United States. Section 402 of the CWA authorizes the EPA to issue National Pollutant Discharge Elimination System (NPDES) permits to regulate the discharges of pollutants to waters of the United States, the territorial sea, contiguous zone, and ocean. Since the introduction of the NPDES program, the SCB, in which the project area is located, has seen great reductions in pollutants from all sources. Source control, pretreatment of industrial wastes, and treatment plant upgrades have combined to accomplish these reductions (MMS 2001; Lyon and Stein 2009).

NPDES General Permit No. CAG 280000 regulates discharges from the POCS platforms; it was formally effective from March 1, 2014, through February 28, 2019 (EPA 2013a). The permit is currently active under an administrative extension. The NPDES General Permit regulates 22 types of platform discharges and sets forth effluent limitations and monitoring and reporting requirements, including pollutant monitoring and toxicity testing of effluents. The point of compliance for general permit effluent limitations is the edge of the mixing zone, which is defined as extending laterally 328 ft. (100 m) in all directions from the discharge point and vertically from the ocean surface to the seabed. End-of-pipe sample results and dilution ratios must also be reported.

The U.S. Coast Guard (USCG) regulates discharges from vessels, including those that support platform operations and decommissioning.

The State of California regulates ocean discharges into State waters, which extend to 3 mi from the coast, via the California Ocean Plan, first issued in 1972 (California EPA 2012). This plan includes effluent limitations for 84 pollutants, which apply to any facility that discharges into State waters. No discharges are permitted from O&G facilities located in State waters (Aspen Environmental Group 2005).

BSEE oversees oil spill preparedness and response planning, having taken over this responsibility from EPA in 1991. Offshore operators are required to submit Oil Spill Response Plans to BSEE for review in accordance with 30 CFR 254 (EPA 2013b). Additional information about the Oil Spill Preparedness Division can be found on the BSEE website at https://www.bsee.gov/what-we-do/oil-spill-preparedness/preparedness-verification.

3.4.2 Physical Oceanography and Regional Water Quality

3.4.2.1 Physical Oceanography

The SCB is the 692-km (430-mi) curved portion of the southern California coastline that runs from Point Conception in California to Punta Colonet in Baja California, Mexico, and the portion of the Pacific Ocean defined by this curve. The project area extends somewhat northward of the SCB beyond Point Conception to include a portion of the Santa Monica Basin off Point Arguello in San Luis Obispo County. The remainder of the project area includes the Santa Barbara Channel, from Point Conception to Point Fermin, and San Pedro Bay off Los Angeles and Orange counties. The Eastern Boundary Current of the North Pacific Gyre system, namely the California Current (Figure 3.4-1), dominates the circulation of the SCB. Cold, low-salinity, highly oxygenated subarctic water of the California Current flows toward the equator with an average speed of approximately 0.25 m/s. In the SCB, it joins moderate, saline, central north Pacific water flowing into the bight from the west, and warm, highly saline, low-oxygen-content water entering the bight from the south via the California Counter-Current and the California Undercurrent. The top 200 m (656.2 ft) of these waters, with subarctic origins, is typically low in salinity and high in oxygen content, with temperatures between 9 and 18°C. Waters between 200 and 500 m (656.2 and 1,640 ft) in depth are high in salinity and low in dissolved oxygen, reflecting their equatorial Pacific origins; this water mass has temperatures between 5 and 9°C (MMS 2001). Figures 3.4-2a and b show a more detailed view of current patterns and velocities in the Santa Barbara Channel, as well as bathymetry and temperature contours (Liefer 2019).

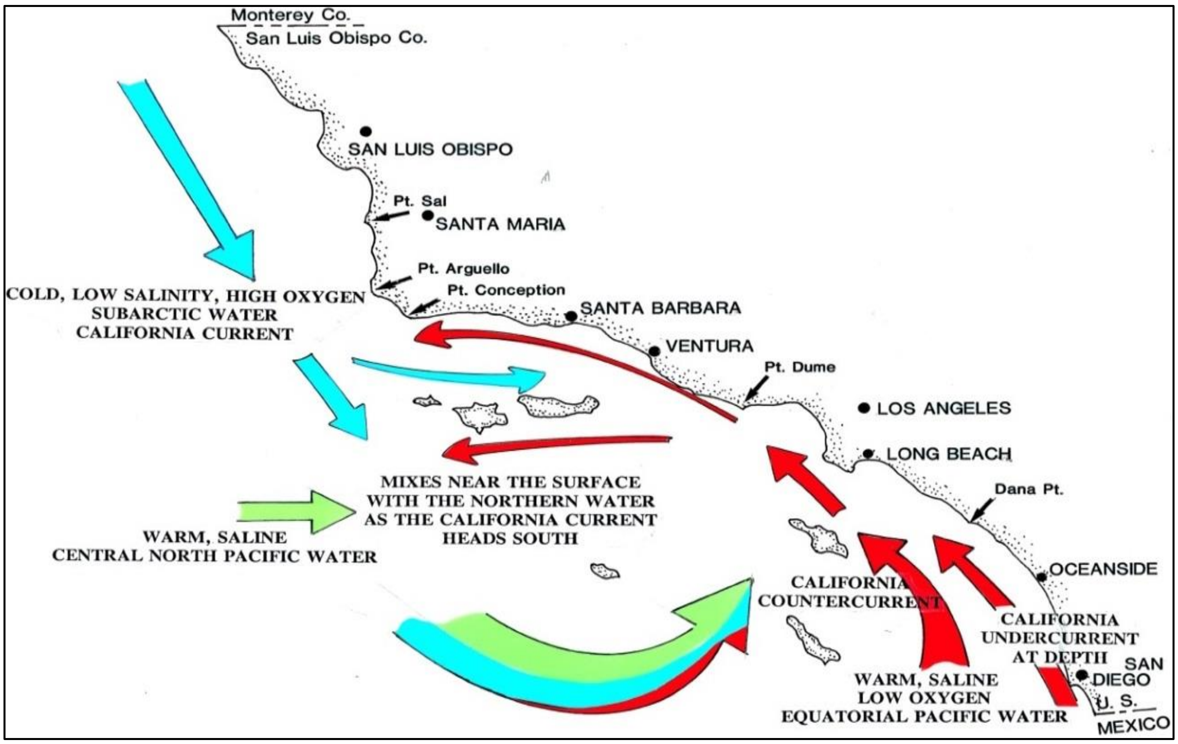

FIGURE 3.4-1 Characteristic Oceanic Circulation in the SCB (Source: MMS 2001)

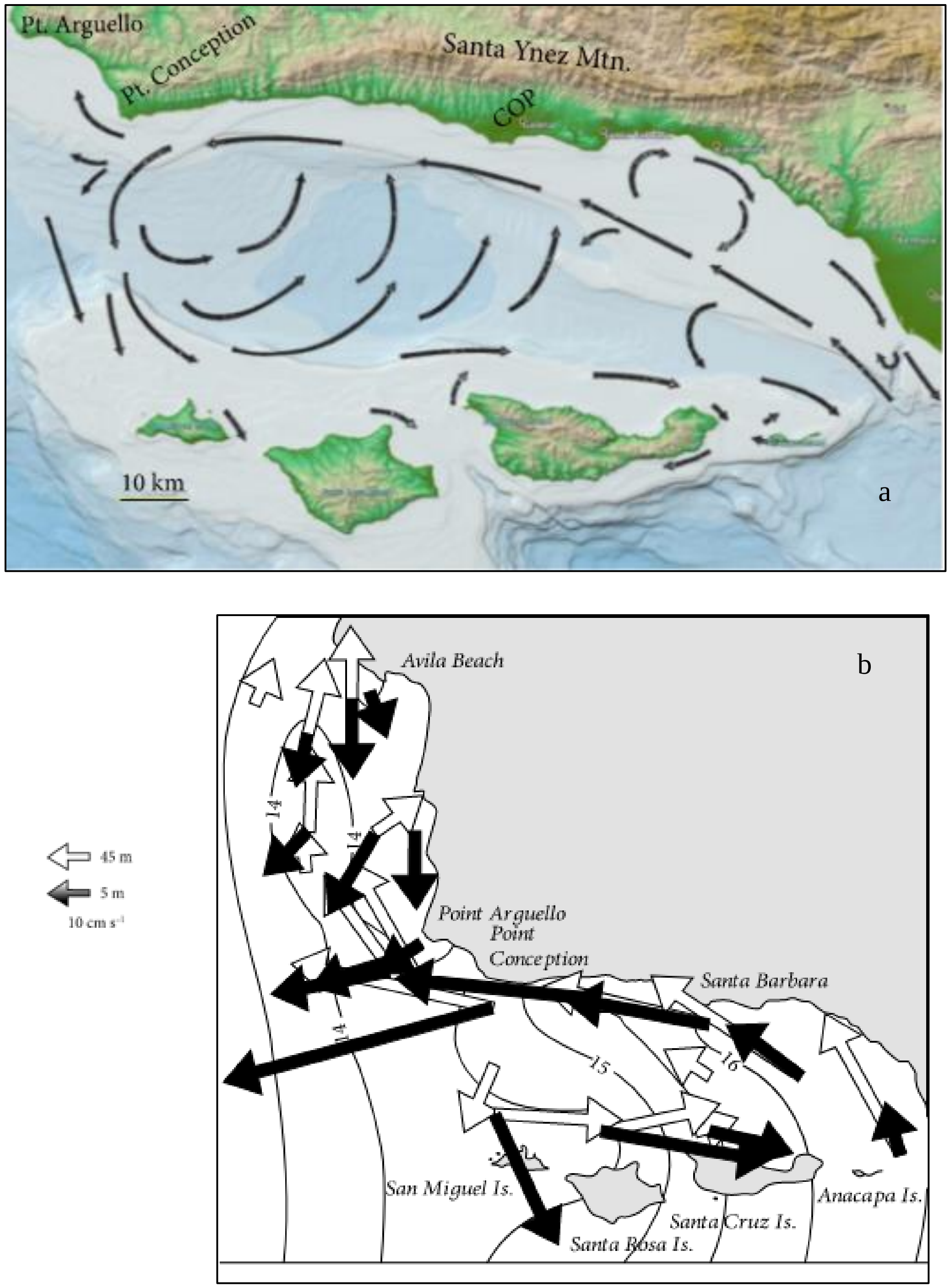

FIGURE 3.4-2 (a) Santa Barbara Channel bathymetry and generalized currents. (b) Annually averaged temperature contours and annual mean current at depths of 5 and 45 m (16.4 and 147.6 ft) (Source: Liefer 2019).

South of San Diego, part of the California Current turns eastward into the SCB and then northward, forming the California Counter-Current, where it joins the deeper, inshore California Undercurrent, generally confined to within 100 km (62.1 mi) of the coast. Below 200 m (656.2 ft), the California Undercurrent brings warm, saline, low-dissolved-oxygen equatorial waters northward into the SCB. Within the Santa Barbara Channel, the California Undercurrent shows considerable seasonal variability. At its weakest in winter and early spring, the California Undercurrent lies below 200 m (656.2 ft) depth; surface flow is typically equatorward. From late summer to early winter, northward core flow increases and ascends to shallower depths, occasionally reaching the surface, where it joins the inshore Countercurrent.

Winds blowing predominantly toward the southeast off the entire coast of California during the late spring to early fall move surface waters offshore. This results in upwelling of cold, nutrient-rich, bottom water at the coast that, in turn, moves this water mass offshore in a continual cycle (MMS 2001). In the project area, surface currents can form clockwise or counterclockwise eddies driven by the atmospheric pressure gradients, or by strong winds when they occur. Clockwise eddies tend to push water away from shore while counterclockwise eddies will tend to drive ocean water towards shore (BOEM 2011).

The Southern California OCS Planning Area encompasses portions of the Santa Maria Basin north of Point Conception, the Santa Barbara Channel from Point Conception to Point Mugu, and San Pedro Bay off Los Angeles and Orange counties (see Figure 3.4-1).

In the Santa Monica Basin, stronger upwelling occurs in the region north of Point Conception, where the coastline turns sharply eastward, and topography begins to block the northwesterly winds. This point marks a transition between the large-scale upwelling region from Washington through central California, and the milder conditions of the Santa Barbara Channel and southward. The Santa Maria Basin lies in the larger upwelling zone north of Point Conception (Kaplan et al. 2010). Consistent northwest winds off Points Sal, Arguello, and Conception move surface waters offshore giving rise to upwelling of cold, nutrient rich, bottom water at the coast. These winds are most prominent in late spring and early fall.

The Santa Barbara Channel is shielded from the northwest winds driving upwelling, but some upwelling still occurs. Three distinct circulation patterns occur within the Santa Barbara Channel: upwelling, surface convergent, and relaxation. Upwelling generally occurs during the early part of the warm season, after the spring transition. The surface convergent pattern is most prevalent in summer, while the relaxation pattern is typical of late fall and early winter. Local upwelling leads to cooler temperatures directly near the coast about 3–5 times per year (Kaplan et al. 2010).

The San Pedro Bay undergoes alternating periods of flushing (renewal) that appear to be driven by strong upwelling in the Santa Barbara Channel followed by stagnation, affecting bottom water exchanges. Such periods of renewal may also be related to the El Niño cycle. (Kaplan et al. 2010).

3.4.2.2 Regional Water Quality

Water quality in the SCB is generally good but varies somewhat among the three main basins due to varying inputs from the adjacent coastal areas. The Santa Maria Basin area and points north benefit from low population and lack of major industry in adjacent coastal areas. In contrast, the Santa Barbara Channel region, which extends from Point Conception to Point Fermin and includes 12 of the 19 producing POCS oil platforms, has larger influxes of pollutants from coastal municipal sewage treatment discharges, power plant cooling water discharges, and industrial waste sources than points further to the north. San Pedro Bay off Los Angeles and Orange counties receives even higher loads of urban runoff and sewage treatment discharges from the Los Angeles metropolitan area. Table 3.4-1 presents water quality characteristics in the project region and range of values for several key parameters.

TABLE 3.4-1 Key Water Quality Parameters (Source: BOEM 2011)

Parameter	Characteristics
Temperature	Temperature at surface ranges from 12–13°C in April to 15–19°C in July–October.
Salinity	33.2–34.3 parts per thousand.
Dissolved oxygen	Maximum about 5–6 ml/L at the surface, decreasing with depth to 2 ml/L at 200 m; below 350 m, as low as 1 ml/L; upwelling can bring this oxygen-poor water to the surface waters, especially from May to July.
pH	Range from about 7.8 to 8.1 at surface and with depth.
Nutrients	Important for primary production; these include nitrogen, phosphorus, and silicon; other micronutrients include iron, manganese, zinc, copper, cobalt, molybdenum, vanadium, vitamin B12, thiamin, and biotin. Depleted near the surface but increasing with depth.
Suspended Sediment (turbidity)	Concentrations about 1 mg/L in the nearshore, surface waters with higher values in near-bottom waters (and after storms); lower levels (0.5 mg/L) in offshore regions. Highest turbidities correspond to periods of highest upwelling, primary production, and river runoff. Controls the depth of the euphotic zone, has applications for (absorbed) pollutant transport and is of aesthetic concern.
Metals	These include barium, chromium, cadmium, copper, zinc, mercury, lead, silver, and nickel, all of which can serve as micronutrients in low levels (parts per trillion or parts per billion) and are potentially toxic at high levels (parts per million or higher).
Organics	May enter the marine environment from municipal and industrial wastewater discharges, runoff, natural oil seeps, and offshore O&G operations.

Since the introduction of the NPDES program, the SCB has seen great reductions in pollutants, including 50% for suspended solids, 90% of combined trace metals, and more than 99% for chlorinated hydrocarbons. Measurements of sediments, fish, and marine mammals all show decreasing contamination. This has occurred despite great increases in population and volumes of discharged wastewater (MMS 2001). Source control, pretreatment of industrial wastes, reclamation, and treatment plant upgrades combined to accomplish this reduction (MMS 2001). Management efforts at publicly owned treatment works (POTWs) and other point sources has reduced mass emissions of major pollutants to the SCB by more than 65% since the 1971 passage of the CWA (Lyon and Stein 2009).

Water quality characteristics that might be locally affected by decommissioning activities under the Proposed Action include suspended sediment (turbidity), reduced dissolved oxygen levels from sediment disturbance, releases of nutrients from sanitary wastes, and possible releases of metals and organic chemicals from decommissioning activities, including possible releases of materials remaining within pipe structures. Nutrients affect several aspects of water quality, including primary productivity, which affects oxygen production and consumption, and contributes to harmful algal blooms. Oxygen minimum zones exist at depths between 400–1,000 meters. Particulate matter, including suspended sediments, that contribute to turbidity has three major sources, riverine discharge, resuspended bottom material, and growth and excretion from the near-surface activity food-chain organisms (Kaplan et al. 2010). Riverine discharges following rainstorms can produce large visible turbidity plumes that can exceed sediment, nutrient, and metal loads from POTWs (Lyon and Sutula 2011).

Non-point-Source Pollution. Unregulated non-point sources contribute to water pollution. The Santa Maria Basin area is sparsely inhabited with little industrial development but with more agriculture and ranching than urban centers to the south. Major sources of pollutants in the Santa Maria Basin derive from agricultural runoff, which includes pesticides, fertilizer nutrients, and pollutants related to animal wastes. With respect to total nitrogen, upwelling contributes the largest load of total nitrogen to the SCB by an order of magnitude over effluents, with riverine inputs being the smallest of the three. Since the Santa Maria Basin has few effluent sources; the Santa Maria River, which discharges on the border of San Luis Obispo and Santa Barbara counties, and the Santa Ynez River, which discharges between Point Purisima and Point Arguello, represent the major sources of anthropogenic nutrient and other non-point pollution to the Santa Maria Basin (MMS 2001).

Major sources of non-point-source pollution in the Santa Barbara Channel derive from agricultural runoff, which includes pesticides and fertilizer nutrients delivered to marine waters by local rivers and storm drains, urban runoff, and atmospheric fallout from metropolitan areas (MMS 2001, 2005; Kaplan et al. 2010; Lyon and Stein 2010). The largest freshwater inputs to the basin are the Santa Clara and Ventura Rivers and the Oxnard municipal wastewater treatment plant, all in Ventura County (MMS 2005). The rivers drain mostly agricultural land; however, storm drains from coastal cities and other non-point runoff contribute further pollution to the Santa Barbara Channel, especially during the rainy season. Stormwater runoff plumes can reach across the Santa Barbara Channel and reach the Northern Channel Islands National Marine Sanctuary (MMS 2005).

Major sources of pollutants in San Pedro Bay are urban, industrial, and agricultural runoff delivered to marine waters by local rivers and storm drains, and atmospheric fallout from metropolitan areas (MMS 2001, 2005; Kaplan et al. 2010; Lyon and Stein 2010). Major rivers discharging into San Pedro Bay are the San Gabriel River/Los Angeles River and the Santa Ana River. Four smaller rivers discharge into San Pedro Bay down-coast of the Santa Ana River:

Aliso Creek, Salt Creek, San Juan Creek, and San Mateo Creek. Regardless of improvements in treatment efficiency, pollutant inputs from runoff now rival those from POTWs due to general increases in runoff due to hardening of surface areas from construction of roads, buildings and other impervious surfaces, (Pondella et al. 2016).

Point Source Pollution. Regulated point source pollution entering the Santa Maria basin include permitted outfalls from municipal and commercial sources. Among these, POTWs represent the largest point source contributors to the basin. Point sources, mostly POTWs, contribute 92% of total anthropogenic nitrogen and 76% of total phosphorus loads to the SCB, with less than 1% of the loads in runoff coming from natural background sources. Discharges via direct ocean outfalls account for most of the loads to the SCB, with about 10% of total nitrogen and 30% of total phosphorus coming from riverine discharges (Sengupta et al. 2013). Only two POTWs discharge directly, and only three, indirectly. All qualify as small, far less than EPA's 25 million gallons per day (mgd) criterion, and employ at least secondary treatment (MMS 2001, 2005).

Offshore O&G operations, located in the southern portion of the Santa Maria Basin, contribute relatively less pollution, but relatively higher amounts of hydrocarbon pollutants than do the other anthropogenic sources (Lyon and Stein 2010). The largest contributors of hydrocarbons to offshore waters, however, are the naturally occurring O&G 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 O&G platform on the POCS. There are no marine terminals or other major source of marine pollution in the Santa Maria Basin region, further accounting for the good water quality in this region (MMS 2005).

In the Santa Barbara Channel, Howard et al. (2014) reported that the Santa Barbara and Ventura sub-regions had net annual downwelling with respect to total nitrogen. Thus, effluent sources and atmospheric deposition were the dominant nitrogen sources in the Santa Barbara region, rather than upwelling, while the Ventura subregion had roughly equivalent contributions of effluent, atmospheric, and riverine inputs. POTW effluents represent the largest point source contributors to the Santa Barbara Channel. The Santa Barbara Channel has the greatest inputs from hydrocarbon seeps of the regional basins (MMS 2001).

In San Pedro Bay, total nitrogen from upwelling only moderately exceeds effluent inputs, both of which exceed riverine inputs and atmospheric deposition by over an order of magnitude (Howard et al. 2014). POTWs represent the largest nutrient point sources to San Pedro Bay, with an estimated nitrogen load roughly three times that of rivers (Pondella et al. 2016). Two major POTWs discharge on either end of San Pedro Bay: the Los Angeles County Sanitation District Joint Water Pollution Control Plant (JWPCP) on the west end of the bay and the Orange County Sanitation District (OCSD) on the east end of the bay (Pondella et al. 2016). Discharging up to 200 mgd each, the JWPCP and OCSD plants are among the largest in the country. Advanced primary/secondary treatment has stabilized pollutant inputs, while discharge volumes have been trending downward due to an increase in water reclamation efforts (MMS 2005).

Hazardous Algal Blooms. Certain dinoflagellates release biotoxins into the water, creating a potentially hazardous situation for warm-blooded birds and mammals, including humans. Releases of biotoxins from actively blooming phytoplankton are commonly known as Harmful Algal Blooms (HABs) (Kaplan et al. 2010). Although overall water quality has improved in recent decades as a benefit of the NPDES program, the frequency of algal blooms, particularly harmful algal blooms, has increased in the SCB.

Algal blooms result from natural nutrient upwelling in an annual cycle characterized by a transition from a diverse phytoplankton assemblage to a homogeneous assemblage dominated by diatoms, dinoflagellates, or a combination of nano- and pico- phytoplankton (Kaplan et al. 2010). However, nutrient pollution from agriculture and population growth may play a contributing role on the sub-regional scale from riverine sources and effluents (Howard et al. 2012). Blooms of *Pseudonitzschia*, several species of diatoms that produce the neurotoxin domoic acid, are becoming more common in the SCB and are associated with numerous marine mammal strandings. HABs occur all along the U.S. west coast (NOAA 2017a), including in the SCB. The California Harmful Algal Bloom Monitoring and Alert Program maintains a monitoring station off Cal Poly Pier in the Santa Maria Basin. The Program's website provides recent monitoring results for stations along the California Coast (https://calhabmap.org/datasites). In the SCB, algal blooms begin roughly in April, corresponding with the timing of spring upwelling, and may last into November. Blooms tend to be large, extending more than 6 km offshore (Howard et al. 2012).

Ocean Acidification. Rising atmospheric carbon dioxide (CO_2) levels compared to the pre-industrial age have driven a reduction in ocean pH, referred to as ocean acidification, which, in turn, has caused a reduction in free carbonate ion (CO_3^{-2}) concentrations in ocean waters around the world. An observed drop of 0.1 pH units and approximately 16% in carbonate concentration has implications for marine organisms that depend on carbonate for the formation of calcium carbonate mineral (calcareous) structures, including shell-forming bivalves, such as oysters. Coral, pteropods, and the larval stages of oysters and other bivalves appear to be particularly sensitive to reductions in carbonate ion concentrations, while adult bivalves showed net calcification in more acidified conditions in some studies (Barton et al. 2012). The effects of ocean acidification may contribute to cumulative stresses on these carbonate-dependent species and other species that depend on them on the POCS.

Ocean Seeps. Approximately 50 oil seeps occur off the shore of Southern California between Point Arguello and Huntington Beach. At least 38 of these seeps are in the Santa Barbara Channel and release an estimated 40–670 bbl of crude oil per day to the channel, with the greatest releases near the Coal Oil Point Seep (MMS 2005; Liefer 2019). This seep field off the shore of Goleta, California, is approximately 6.9 mi^2 (18 km^2) and emits an estimated 50–170 bbl of oil and 100–130 tons of natural gas per day (Hornafius et al. 1999). Farwell et al. (2009) has described an associated 90-km^2 (55-mi^2) sediment plume west of the seep field that has resulted in an estimated 3.1×10^4 metric tons of petroleum in the top 5 cm (1.9 in.) of seafloor sediments. Oil 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). Hydrocarbon seeps provide chemosynthetic energy to microorganisms. Localized microbial communities adapted to use these hydrocarbons for energy and growth have long been known to be associated with oil seeps (Liefer 2019).

3.4.2.3 Discharges from Oil and Gas Operations

Offshore discharges from past and present O&G operations (in both state and federal waters) under the NPDES General Permit program include cooling water, produced water, sanitary waste, fire control system test water, well completion fluids, and miscellaneous other liquids. Of these, produced water represents the greatest discharge of petroleum-related chemical constituents (Steinberger et al. 2004; Lyon and Stein 2010), while well completion and treatment fluids represent the smallest-volume permitted discharges (Steinberger et al. 2004). Permitted discharges also include drill cuttings and water-based drilling fluids (muds).

Produced water is formation water that accompanies O&G upon extraction. Generally, the amount of produced water is low when production begins but increases over time near the end of the field life. Produced water is a mixture (an emulsion) of oil, natural gas, and formation water (water naturally occurring in a geologic formation), as well as any specialty chemicals that may have been added to the well for process purposes (e.g., biocides and corrosion inhibitors). After treatment to separate dissolved natural gas, oil, and other impurities, either onshore or offshore, constituents remaining in produced water may include trace metals and dissolved hydrocarbons, including benzene, toluene, ethylbenzene, and xylene (collectively termed BTEX). Metals may include arsenic, barium, chromium, cadmium, copper, zinc, mercury, lead, and nickel. Most produced water is brine, with total dissolved solids too high for human consumption or for agricultural use. Treated produced water is discharged to the ocean under the NPDES General Permit.

In the limited cases where well stimulation treatments have been used to enhance oil production on the POCS, including hydraulic fracturing, residual well stimulation chemicals may be present in discharged produced water post-treatment. The discharge of produced water from treated wells is regulated under the NPDES General Permit. The potential environmental impacts of well stimulation treatments are the subject of separate environmental analyses under NEPA.

Besides produced water, platform operations produce a variety of other liquid wastes, mainly derived from seawater, and used for various purposes on the platforms (e.g., cooling water and fire control system water), which are then discharged back to the ocean in accordance with NPDES permit requirements. Cooling water is used to cool on-platform natural gas compressors to reject the heat of compression. Cooling water, which may exceed produced water by an order of magnitude, is typically treated with chlorine to prevent biofouling.

Drill cuttings are the fragments of rock produced during drilling by the drill bit, which are flushed out to the well bore by drilling muds circulated continuously during drilling. Drilling muds also lubricate the drill bit. Drill cuttings are separated from muds on the drilling platform or onshore. Cuttings may be disposed in onshore landfills or discharged offshore under the

NPDES General Permit, which permits only water-based drilling muds; these typically include inert mixtures of clays, lime, and cellulose materials in addition to potassium chloride or barite, a barium-containing compound used to increase the density of the muds. NPDES permitted discharges of drill cuttings and muds occur periodically. Only one operator has recently used oil-based muds, at Harmony/Heritage. These drilling fluids were pumped downhole for subsurface encapsulation in the Repetto Formation and were not disposed of overboard. The current NPDES General Permit for BSEE platforms, as noted, prohibits overboard disposal of oil-based muds.

Permitted open-water discharges of drilling muds and cuttings from the drilling platform produces turbidity, originating at the point of discharge, typically 30–40 m (100–130 ft) below the sea surface (MMS 2005). Cuttings deposit mostly near the platform discharge point due to their large grain size and have little direct impact on water quality (MMS 2005). However, up to a third of the volume of cuttings can be adhering drilling muds, and these can produce a continuous plume of turbidity emanating from the falling cuttings as well as making up a portion of the cuttings pile on the seafloor.

All ocean discharges must meet the permit discharge limits and are tracked through quarterly Discharge Monitoring Reports required by the NPDES permits (Kaplan et al. 2010). All discharges in compliance with the NPDES General Permit contribute negligible degradation to water quality of the project area.

3.4.2.4 Shell Mounds and Surrounding Sediments

Shell Mound Sampling. Shell mounds are composed of shells (e.g., mussel and scallop shells) sloughed off or scraped from upper portions of platform jackets and may be comingled with drilling muds and cuttings discharged from platforms. Shell mounds have been identified and measured in multibeam sonar surveys at many of the POCS platforms (MMS 2003, MMS 2007) and may be expected at all operational platforms to some extent. In addition to depositing on shell mounds, depending on local conditions, drilling materials may deposit and affect sediments at distances ranging from 10 to 20 m (32.8 to 65.6 ft) to over 2,000 m (6,562 ft) from platforms, depending on local currents (Gillett et al. 2020; MMS 1991, 2001).

In State waters, shell mounds were found at the base of Platforms Heidi, Hilda, Hazel, and Hope, the “4H” platforms near Summerland and Carpinteria in the Santa Barbara Channel when these platforms were removed in 1996. The mounds, which are approximately 61 m (200 ft) wide and 6.1–9.1 m (20–30 ft) tall, had accumulated from periodic scrapings of the former platform legs (CSLC 2001; Kaplan et al. 2010). Cores taken from shell mound cores at the 4H platforms contained elevated concentrations of metals associated with drilling wastes (e.g., barium, chromium, lead, and zinc), and alkylated benzenes and polynuclear/polycyclic aromatic hydrocarbons (PAH) (CSLC 2001; Kaplan et al. 2010).

Shell mounds at Platform Gina were sampled in 2006 under a shell mound characterization program sponsored by the Mineral Management Service (MMS 2007). Shell mounds at Gina have an estimated volume of 4200 yd^3 and a height of 4 m (13 ft). Four sample cores of 2.4–5.5 m (7.9–18.0 ft) length were collected outside the northern edge of the platform footprint and visually separated into distinct layers for analysis — typically a surface shell hash and sediment layer, a middle layer containing drilling muds and cuttings, and a lower mound base and native sediment layer. A reference sample was collected 2 km from the platform. Core layers were analyzed for total organic carbon, petroleum hydrocarbons, metals, PAH, polychlorinated biphenyls (PCBs), and pesticides among other analytes. Barium, lead, and zinc were elevated up to an order-of-magnitude or more above reference area levels, with barium levels up to 3,300 mg/kg compared to 116 mg/kg in the reference area. PAH and other semi-volatile organics were mostly below reporting limits, except for benzo(a)pyrene, a high molecular weight PAH detected in some samples as high as 0.66 mg/kg. Total recoverable petroleum hydrocarbon (TRPH) levels were as high as 4,000 mg/kg. Petroleum hydrocarbon analysis indicated the presence of a moderately weathered petroleum from various crude oil formations. The combined results indicated a non-homogeneous distribution of chemical constituents derived from platform wastes. The biggest difference between the Gina shell mound results and those for the previously decommissioned 4H platforms in State waters was the low level of volatile aromatic hydrocarbons at Gina compared to levels more than 100 times higher at the 4H platforms. This difference was attributed to the possible use of oil-based drilling muds at the older 4H platforms, a use prohibited under the NPDES General permit during operations at Gina.

In 2011, DCOR, Inc., tested three sample cores taken from shell mounds at Platforms A and B as part of a riser installation project (DCOR 2011). Cores were tested for metals, hydrocarbons, PCBs, and other analytes. The only analyte detected with levels exceeding California hazardous waste guidelines in any of the cores was barium, which was found in one core at each platform. Hydrocarbons were also detected in the cores at low levels; no hazardous waste thresholds were available for hydrocarbons (DCOR 2011). Barium, as low solubility barium sulfate, a key constituent of drilling muds, was considered not of concern for toxicity. Soluble levels of barium in sample leachates of 11 and 4.7 mg/L were below the California Title 22 Soluble Threshold Limit Concentration (STLC) criteria of 100 mg/L, which confirmed the classification of the shell mounds as non-hazardous waste according to California Title 22 criteria.

PAH in water samples taken near shell mounds associated with Platforms A and B were in the parts per trillion range, more than an order of magnitude below California water quality objectives for the protection of marine biota and human health (Bemis et al. 2014). Chemical characterization indicated a predominance of unweathered crude oil, suggesting nearby petroleum seeps as the likely source of the PAH. Shell mounds were not found to contaminate seafloor essential fish habitat (EFH) (Bemis et al. 2014).

Surrounding Seafloor Sediments. To test the possible effects of platform discharges on seafloor sediments at distances away from the immediate deposition area near three platforms, Gillett et al. (2020) collected bottom sediment samples 250 m (820 ft) from platforms, pipelines, and cables in two strata at distances of 0–1 km (0–0.62 mi) and 1–2 km (0.62–1.24 mi). Ten grab samples were collected within each stratum around platforms A, B, C, and Hillhouse in the eastern Santa Barbara Channel. Three measures of habitat condition were evaluated at each site: benthic infaunal community composition, sediment chemistry and sediment toxicity. These measures were compared with data from numerous sites at similar depths in the southern

California area. Sediment chemistry and toxicity are reviewed here and community composition in Section 3.5.1.1, Marine Habitats.

Sediment chemistry was evaluated through the measurement of chemical concentrations in sediment and sediment condition was assessed from measured concentrations used to calculate potential exposure scores using the published values for Effects Range Low (ERL) and Effects Range Median (ERM) values (Long et al. 1995) and the Southern California Chemical Score Index (CSI) and as interpreted using the California Sediment Quality Objectives (SQO) framework (Bay et al. 2021). Sediment toxicity was evaluated using a 10-day amphipod survival test.

Gillett et al. (2020) obtained results of chemical analysis of 87 analytes, which included compounds with published biological effects thresholds, including metals, PAH, and pesticides. No compound concentrations exceeded either the ERM or CSI high impact values and most were below any biological effects level. However, compared to samples collected at similar depths across the region, the areas around the platforms had significantly elevated levels of barium, high molecular weight PAH and total PAH, which may be associated with platform discharges, as described above. Results of toxicity testing at the 20 locations found that 15 samples exhibited no toxicity and 5 samples exhibited low toxicity. The low-toxicity samples were relatively elevated in copper, mercury and zinc, and total DDEs (degradation products of the banned pesticide DDT), but not in barium or PAH. These substances may have been transported from platform discharge areas via adsorption to suspended particulates, which deposited at these locations. The no-toxicity and low-toxicity samples had similar benthic community compositions (see Section 3.5.1.1.). These results supported a conclusion that the soft sediment seafloor surrounding the four platforms was in a relatively good state. Elevated levels of barium and PAH suggested that evidence of oil platform operations could be detected in the sediments, but that operations had not substantially degraded the continental shelf habitat around the platforms.

3.4.2.5 Oil Spills

Oil spills have occurred in the POCS from O&G operations periodically since the late 1960s, shortly after oil production had started. The largest oil spill in the region occurred in 1969, when an estimated 80,000 bbl leaked into the Santa Barbara Channel. Over the next 44-year period (1970 to 2014) a cumulative total of 919 bbl were spilled in the region; the largest spill was a 164-bbl spill from a Platform Irene pipeline in September 1997. However, in routine platform operations, smaller oil spills (less than 50 bbl) have occurred throughout the history of O&G activities on the POCS. Current reservoir pressures have dropped to near zero in most of the fields now in production on the POCS. Under these conditions, the risk of a loss of well control (i.e., a blowout) resulting in a catastrophic spill is very small. However, operational spills from pipelines are still possible and two such spills have occurred since 2015: (1) the 2015 Refugio spill, which originated in an onshore pipeline and leaked an estimated 2,300 bbl into the ocean and coastal areas near Santa Barbara, and (2) the 2021 offshore pipeline leak in the SCB near Los Angeles, for which the volume spilled has not been confirmed.[13] The effects of historic oil spills on water quality and ecological resources from hydrocarbon contamination have been localized and have subsided over time, with the aid of cleanup efforts.

3.5 MARINE HABITATS, INVERTEBRATES, AND LOWER TROPHIC-LEVEL COMMUNITIES

The POCS platforms in the Santa Maria Basin are located within the cold-temperate waters of the Oregonian Province, while the platforms within the Santa Barbara Channel and San Pedro Bay fall within the warm-temperate waters of the San Diego Province (NMFS 2015a). The physical and water quality conditions of the two provinces and the transition zone between them have resulted in the development of a variety of distinctive pelagic (water column) and intertidal and subtidal benthic (bottom) habitats and invertebrate communities in the project area (Seapy and Littler 1978; Blanchette and Gaines 2007). In addition to the biological community surveys described in Argonne National Laboratory (2019), recent comprehensive studies of spatial and temporal trends in regional invertebrate communities can be found in Claisse et al. (2018), Raimondi et al. (2019), and Looby and Ginsburg (2021).

3.5.1 Pelagic Habitat

Pelagic habitat refers to the open water habitat from the surface to the lower water column near the seafloor. Pelagic waters can be classified into depth zones. The epipelagic zone is the uppermost region of the water column. Within the epipelagic zone is the euphotic zone where light levels are high enough to support limited primary production in water as deep as 200 m (656 ft) (Eppley 1986). Below this euphotic zone, light levels and consequently primary production are limited or nonexistent. Below the epipelagic zone, is the mesopelagic zone and below it, the bathypelagic zone. In addition to low light levels, these zones are characterized by increasingly cold temperatures and high pressure as well as low food availability. The bathypelagic zone in particular is a resource-poor habitat. Consequently, predators and scavengers dominate this zone and species have evolved adaptations to the harsh physical and chemical conditions (Miller 2004).

Pelagic communities are dominated by plankton, which are defined as organisms that are primarily carried by currents with limited or no swimming ability (Eppley 1986). One exception is the California market squid (*Loligo* spp.), an abundant and commercially important large pelagic invertebrate that can propel itself through the water. Plankton includes a diverse array of organisms, some of which are plants (phytoplankton) and animals (zooplankton), as well as bacterioplankton, and viruses. In addition, some plankton are only planktonic during their early life stages (e.g., many fish and larval crustaceans). As described below, there are spatial

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[13] The spill was reported on October 2, 2021, located about 5 mi off the coast of Huntington Beach in Orange County from a pipeline connected to oil platform Elly. The pipeline was found to have been displaced more than 30 m (100 ft), perhaps by a ship's anchor, but this has not been confirmed. The pipeline leaked from a 13-in. linear crack, which may have been pre-existing. Initial spill estimates ranged from 25,000 to 132,000 gal (588 to 3,000 bbl), with later estimates favoring the lower volume.

differences in the abundance and composition of pelagic biota reflecting the influence of large landforms (i.e., the biogeographic transition zone offshore of Point Conception), currents, differences in inshore and offshore productivity, as well as local environmental conditions like submerged topographic features that also affect plankton productivity (Eppley 1986).

Phytoplankton are photosynthetic algae like diatoms, phytoflagellates, and cyanophytes that serve as the basis of the marine food web (Eppley 1986). Phytoplankton are consumed by protozooplankton (e.g., flagelletes and ciliates) and metazooplankton such as copepods, krill, and jellyfish, and these organisms are in turn eaten by larger consumers. When they die and sink to the seafloor, plankton also provide food for benthic (bottom dwelling) organisms (Eppley 1986). The distribution of phytoplankton is determined by a number of climatic, physical, and water chemistry factors resulting in distinct but variable communities that change temporally by season and time of day, and spatially by depth within water column and distance from the shoreline (Eppley, 1986; Taylor and Landry 2018). Within the water column phytoplankton growth is greatest in the euphotic zone where light is sufficient for phytoplankton to grow.

The greatest biomass of phytoplankton is found in 1) nutrient rich marine areas near the coastline where runoff from coastal areas can promote seasonal algal blooms and 2) seasonal upwelling areas where cold, nutrient-rich deep water moves upward to the euphotic zone (Venrick 2012). Satellite analysis reveals the highest phytoplankton biomass is offshore of Point Conception, in the Santa Barbara Channel, and the northern Channel Islands south to San Nicolas Island (Gelpi 2018). In contrast, phytoplankton productivity is lower in the more nutrient-poor SCB (Gelpi 2018; Catlett et al. 2021). Phytoplankton population fluctuations are also associated with El Niño events, which tend to depress phytoplankton biomass. Over the past several decades, phytoplankton biomass has increased and the peak phytoplankton biomass has changed from spring to summer (Venrick 2012).

Metazooplankton communities consist of micro- to mesozooplanktonic crustaceans (e.g., copepods, euphausids, cladocerans), as well as protochordates, mollusks, and gelatinous zooplankton like ctenophores (Eppley 1986; Kaplan et al. 2010). Crustaceans, specifically euphausid krill and copepods, are some of the most abundant zooplankton in the epipelagic and mesopelagic zones (Pitz et al. 2020). Crustacean zooplankton migrate vertically in the water column between mesopelagic and epipelagic zones, in the process transferring a significant amount of carbon within the water column over each daily migration cycle (Eppley 1986).

Like phytoplankton, zooplankton community productivity is highly variable both within years and from year to year, as they are heavily dependent on temperature and food resources, as well as the strength and timing of upwelling events (Kaplan et al. 2010; Weber et al. 2021). For example, there has been a decrease of zooplankton biomass since the 1970s, potentially due to changes in the timing of nutrient upwelling (Venrick 2012). The greatest zooplankton productivity occurs in years in which strong upwelling occurs earlier in the winter. There is a gradual decrease in zooplankton biomass through the summer and early fall months (Kaplan et al. 2010; Weber et al. 2021). Zooplankton populations are strongly controlled by forage fish such as the Northern Anchovy (*Engraulis mordax*) and Pacific sardine (*Sardinops sagax*), making zooplankton a key food web link between phytoplankton and higher trophic level organisms. Consequently, zooplankton population dynamics are an important determinant of fish, marine mammal, and bird populations.

3.5.2 Intertidal Benthic Habitats

The intertidal zone is defined as the area between the high tide line and the low tide line. The two predominant intertidal habitats within the Southern California OCS Planning Area are sandy beaches and rocky shorelines. Rocky shore habitats are more common north of Point Conception and offshore along the Channel Islands, while sandy beaches predominate south of Point Conception. Rocky intertidal substrates provide stable attachment sites for sessile plants, algae, and invertebrate species that, in turn, create structurally complex habitat for a diverse community of mobile fish and invertebrates (Menge and Branch 2001; Witman and Dayton 2001).

Attached rocky intertidal communities in the Santa Maria Basin, Channel Islands, and Santa Barbara Channel consist of sessile invertebrates like barnacles (*Chthamalus/Balanus* spp.) and mussels (*Mytilus* spp.) as well as non-coralline crusting algae and rockweed (*Silvetia compressa*), turfweed (*Endocladia muricata*), surfgrasses (*Phyllospadix spp.*), and kelp (*Egregia menziessi*) (MMS 2001; Gaddam et al. 2014; Miner et al. 2015; Blanchette et al. 2015). Snails, limpets (*Lottia* spp.), chitons (*Nuttallina* spp.), sea urchins (*Strongylocentrotus purpuratus*), sea stars, and various crab species are the predominant mobile epifauna. In San Pedro Bay, rocky intertidal habitats are scarcer and are more heavily affected by human activities. MMS (2001) and Miner et al. (2015) provide detailed descriptions of rocky benthic communities in central California and there are numerous investigations of rocky intertidal sites along the coast of the Santa Barbara Channel (Blanchette et al. 2015; Gaddam et al. 2014).

Intertidal sandy beach habitats are dynamic and subject to continual shifting of sand by wind, wave, and current actions. In the SCB, rocky shore habitat decreases, and sandy beach begins to dominate the shoreline (Dugan et al. 2000; Gaddam et al. 2014). While less common on the Channel Islands, sandy beaches are still present, especially on San Miguel and Santa Rosa Islands. Sandy intertidal habitats are dominated by burrowing animal species, including crustaceans (sand crabs, isopods, and amphipods), polychaete and nemertean worms, snails, and bivalves (MMS 2001). Detailed descriptions of sandy beach ecology and associated biotic communities in the Point Arguello and the Santa Maria Basin area can be found in MMS (2001) and PXP (2012).

3.5.3 Subtidal Benthic Habitats

Both soft and hard bottom habitats may be found in subtidal areas of the POCS. Subtidal soft sediments in the Santa Maria Basin are primarily sandy sediments with more silty sediments in deeper waters. There have been multiple comprehensive surveys of subtidal soft sediments in the Santa Maria Basin and western Santa Barbara Channel (SAIC 1986; Blake and Lissner 1993; Edwards et al. 2003; Allen et al. 2011; Ranasinghe et al. 2012; Gillett et al. 2017). The dominant infauna across most depth zones, including sediments around O&G platforms, are amphipod crustaceans, polychaetes, echinoderms, and bivalve mollusks. The most abundant epifauna on sandy substrates were shrimp, echinoderms, octopods, and cnidarians. A variety of crab species, including the commercially important rock crabs (*Cancer* spp.) are also present (Carroll and Winn 1987; Edwards et al. 2003).

Soft sediments are a major reservoir of chemical contaminants in the San Pedro Bay due to historical wastewater discharges from water treatment plants and industrial operations, and from storm water runoff (Reisch et al. 1980; Long Beach 2009; Bay et al. 2015; Pondella et al. 2010). However, the quality of the soft-bottom habitats has been steadily improving, primarily due to improvements in water treatment methods and reductions in contaminant discharges (Bay et al. 2015).

Subtidal hardbottom habitat consists of rocky reefs offshore of the mainland and the Channel Islands, as well as isolated rock outcrops scattered throughout the continental shelf (Blake and Lissner, 1993; Pondella et al. 2015). One particularly valuable habitat associated with subtidal hardbottom are the giant kelp (*Macrocystis pyrifera* and *Nereocystis leutkana*) beds, which develop in areas with wave sheltered, rocky substrates at depths up to 100 feet in the Santa Maria Basin, Santa Barbara Channel, and the Channel Islands (Young 2003; Johnson et al. 2017; Mearns et al. 1977; Pondella et al. 2015; Graham 2004). Kelp beds are diverse, biologically productive habitats that support reef associated fish and invertebrates. In addition to physical factors like wave energy and water chemistry, kelp density and distribution are heavily influenced by herbivorous sea urchins (Pondella et al. 2015; Young et al. 2016).

Rocky outcrops are a unique geologic feature in the SCB. Outcrops are differentiated into low profiles such as unconsolidated sediment (low relief) and rugged profiles such as ledges (high relief). Low- and high-relief isolated, rocky outcrops are colonized by anemones, sea urchins, corals, hydroids, tubeworms, sponges, and bryozoans, and are scattered throughout the Santa Barbara Channel south to San Pedro Bay (Blake and Lissner 1993; MMS 2001). Santa Monica Bay includes a number of high-quality reefs (Edwards et al. 2003; Pondella 2009), while hardbottom habitat in San Pedro Bay is largely limited to linear features of the breakwater and riprap. High-relief features are characterized by less-tolerant long-lived species of sponges, branching and cup corals, and feather stars along with mobile invertebrate and fish communities (Blake and Lissner 1993; Aspen Environmental Group 2005). See Pondella et al. (2011 and 2016) for recent data on the location and physical and biological characteristic of nearshore subtidal rocky reefs in the Santa Barbara Channel and San Pedro Bay.

Methane seeps are another unique subtidal benthic habitat type found in the POCS. The presence of methane seeps (also referred to as cold seeps) are often indicated by carbonate boulders, outcrops, biogenic reefs, and bacterial mats created by biological or chemical processes (Levin et al. 2016; Georgieva et al. 2019). However, seeps can also be found in soft sediments with little distinctive topography (Hovland et al. 2012; Levin et al. 2016). Methane seeps are associated with chemosynthetic communities that are based on microbial carbon fixation using chemical energy from sulfides and methane, in contrast to photosynthetic carbon fixation by phytoplankton (Levin et al. 2016). Carbon produced by these microbes forms the base of a food web that supports higher trophic levels of invertebrates including foraminiferans, reef-building tubeworms, vesicomyid clams, polychaetes, gastropods, hydroids, sponges, and lithodid crabs

(Grupe et al. 2015). Macrofaunal abundance declines with distance from the seeps, suggesting the importance of chemosynthetic production for animal communities.

Methane seeps are often associated with fault lines and can be found in water depths ranging from 10 m (32.8 ft) to more than 1,500 m (4,921 ft). Off Coal Point, there are well-studied shallow methane seep invertebrate and microbial communities located from the coastline to water depths of 200 m (656.2 ft) (Steichen et al. 1996; Hill et al. 2003; Hovland et al. 2012). Deep water (>500 m [1,640 ft]) methane seeps are located in many areas within the California Continental Borderlands (Bernardino et al. 2012; McGann and Conrad 2018). Overall, methane seeps have been found in the Santa Monica Basin, Santa Cruz Basin, Santa Barbara Channel, San Diego Trough, and San Pedro Bay (Hill et al. 2003; Ding et al. 2008; Hovland et al. 2012; Bernardino et al., 2012; Grupe et al. 2015; Pasulka et al. 2017; Georgieva et al. 2019). Globally, methane seeps contribute to biogeochemical cycling and increase the local diversity of deep-sea marine communities (Levin et al. 2016).

The POCS platforms provide artificial subtidal hardbottom habitat, in contrast with the surrounding softbottom habitats. The platform structure provides attachment sites for algae and sessile invertebrates such as anemones (*Metridium spp. Anthopleura elegantissima,*) mussels (*M. californianus*), barnacles (*Tetraclita squamosa, Balanus* spp.), calcareous worm tubes, and encrusting sponges. Platform structures are home to a diverse community of mobile invertebrates such as echinoderms, gastropods, and polychaetes. Species composition was zonated by depth along the legs of the platform (Continental Shelf Associates 2005; Love 2019). Intertidal species like *Mytilus*, barnacles, and scallops dominate the upper leg while sponges, anemones, and corals dominate the lower portion of the platform. See Blake and Lissner (1993), MMS (2001), and PXP (2012), and Continental Shelf Associates (2005) for a comprehensive list of platform invertebrate communities.

There have been a few studies comparing platform invertebrates to natural hardbottom habitat in the POCS. While similar species are found on both natural rock outcrops and platforms, Continental Shelf Associates (2005) found diversity was higher at the natural rock outcroppings compared to the platforms, while other studies found higher barnacle and mussel growth rates on platforms compared to natural substrates (Love 2019). Non-native species also occur on the platforms, including the bryozoan *Watersipora subtorquata*, the anemone *Diadumene* sp., and the amphipod *Caprella mutica* (Page et al. 2006). *Watersipora subtorquata* has spread to multiple platforms although the mechanism of spread is not entirely clear (Simons et al. 2016). Modeling studies suggest the potential of platforms to facilitate the spread of invasive species will vary by platform location and species traits (Page et al. 2018; Simons et al. 2016).

Seafloor habitats in the vicinity of O&G platforms have been influenced by platform construction and operations, which in turn has altered the benthic invertebrate communities. For example, shell mounds are a unique and important benthic habitat that forms around the base of O&G platforms due to the sloughing of molluscans from the platform legs. These shell mounds have distinct invertebrate communities that differ from soft bottom invertebrate communities (Page et al. 2005). High densities of echinoderms, sea slugs, mollusks and crabs are all typical of invertebrates living on shell mounds (Page et al. 2005; Krause et al. 2012; Love 2019; Meyer

Gutbrod et al. 2019). At some platforms, comparisons of invertebrate densities indicated that shell mounds have higher invertebrate densities than nearby softbottom benthic habitat (Meyer Gutbrod et al. 2019). Shell mound characteristics are strongly related to platform depth (Table 3.5.3-1). Platforms in shallow water generally have thicker shell mounds because there is less distance for shells to fall. In contrast, platforms in deeper water have more scattered shell material (Table 3.5.3-1). Shell mounds at some, but not all, platforms may currently be releasing low levels of contaminants (e.g., nickel and PCBs) into overlying waters, where they may be expected to quickly dilute. At high levels these contaminants may have toxic effects in benthic organisms living on the shell mounds, but existing studies do not suggest benthic organisms on shell mounds are experiencing significant toxic exposures or adverse impacts (Phillips et al. 2006; Scarborough-Bull and Love 2019; Love 2019).

TABLE 3.5.3-1 Shell Mound Volume for Platforms for Which Data Are Available.[a]

Platform	Platform Depth (m)	Shell Mound Height (m)	Shell Mound Size (m)	Shell Mound Volume (m^3)
Gina	29	4	46 × 64	3,211
Gail	224	1	4 scattered small mounds	<382
Grace	96	4	61 × 119	4,205
Gilda	62	5.5	67 × 87	5,635
Habitat	88	2.7	Dia 76	5,229
Hogan	47	8	Dia 79	9,557
Houchin	49	6.4	Dia 85	8,334
Henry	52	5.8	Dia 76	5,505
Hillhouse	58	6.7	55 × 82	5,199
A	58	6	43 × 79	5,551
B	58	5.4	49 × 64	6,567
C	58	4	49 × 72	3,509
Hondo	255	2.7	3 mounds: 12 × 52 18 ×40 15 × 30	1,147
Hermosa	183	0.6	2 mounds: 9 × 18 Dia 6	<382
Hildago	130	<0.6	Small and scattered	<382
Irene	73	2.7	Dia 66	2844

[a] Shell mound data were not available for all platforms. Data from MMS (2003).

The sediments surrounding platforms have also been affected by the release of drilling fluids and muds and other discharges that alter sediment granulometry and composition and contribute chemical contaminants to shell mounds and sediments, including metals, PCBs, and PAHs (see Section 3.4.2.4 for a review of sediment chemistry and toxicology). In a recent study, benthic organisms were sampled within 0–1 km (0–0.62 mi) and 1–2 km (0.62–1.24 mi) of four active platforms (A, B, C, and Hillhouse) in the Santa Barbara Channel to assess whether platform contamination affected benthic invertebrate communities (Gillett et al. 2020). The benthic community composition of samples from the oil platform were compared to benthic community compositions from across the region at the same mid-shelf depth as those collected as part of 2013 Southern California Bight Regional Monitoring Program Survey (Bay et al. 2015; Dodder et al. 2016; Gillett et al. 2017). The benthic community composition from the vicinity of the platforms differed from that in the regional locations; comparatively, total abundance, species richness, and diversity of benthic organisms were lower than found elsewhere across the region. However, only 5 of the 20 sediment samples from near the platforms exhibited low-level laboratory toxicity (i.e., 82–89% survival of the test organisms [amphipods]). The other 15 samples exhibited no toxicity (i.e., >90% survival). All platform sampling sites had benthic infauna-based condition assessment scores that would characterize the sites as being of reference condition (i.e., best habitat quality). In contrast, only 90% of the reginal sites were of reference condition. Applying the California Sediment Quality Objectives guidelines (Bay et al. 2014), all of the samples collected from around the platforms were evaluated to be in "unimpacted" condition. Overall, these results would suggest that oil platform operations were not substantially degrading continental shelf seafloor habitat (Gillett et al. 2020).

3.5.4 Threatened and Endangered Species

Of the coastal and marine invertebrates in central and Southern California, the Morro shoulderband snail (*Helminthoglypta walkeriana*), the black abalone (*Haliotis cracherodii*), and the white abalone (*Haliotis sorenseni*) have been listed as endangered under the Endangered Species Act of 1972 (ESA) (16 U.S.C. 1531 et seq.).

Morro Shoulderband Snail. The Morro shoulderband snail is found only in coastal dune and scrub communities and maritime chaparral in western San Luis Obispo County (USFWS 2001). Its range includes the Morro Spit and areas south of Morro Bay, west of Los Osos Creek, and north of Hazard Canyon (USFWS 1998). The species was listed as endangered on December 15, 1994 (USFWS 1994a). However, in 2020, the U.S. Fish and Wildlife Service (USFWS) proposed to downlist this species from endangered to threatened based on data indicating the species is not currently in danger of extinction (USFWS 2020). Threats to the species include habitat destruction and degradation from development, pesticides, non-native plants and snails, and recreational vehicles (USFWS 1998).

Critical habitat was listed on February 7, 2001 (USFWS 2001). There are 1,039 ha (2,566 ac) of critical habitat within San Luis Obispo County, designated across three Critical Habitat Units, two of which include coastline. These include Unit 1 (Morro Spit and West Pecho) which includes 10 km (6 mi) of the Pacific coast and Unit 3 (Northeast Los Osos), which borders about 0.8 km (0.5 mi) of the eastern shoreline of Morro Bay.

Black Abalone. The black abalone is a marine mollusk found in rocky intertidal and subtidal marine habitats. This species was listed as endangered on January 14, 2009 (NMFS 2020a). The black abalone population south of Monterey County, California, is estimated to have declined by as much as 95% (Neuman et al. 2010). Historical and/or ongoing threats include overfishing, habitat destruction, and more recently, the disease of withering syndrome. Black abalone abundance stabilized during 2011–2015 following the significant decline in abundance found between 1992 and 2005 (Miner et al. 2015). However, new abalone recruitment appears to be minimal in the region. Most of the rocky subtidal and intertidal areas of the mainland California coastline south of Del Mar Landing Ecological Reserve south to Los Angeles Harbor, and the shoreline of most of the Channel Islands have been listed as critical habitat for the black abalone (NOAA 2011).

White Abalone. The white abalone was listed as endangered throughout its range along the Pacific Coast (from Point Conception, California, United States, to Punta Abreojos, Baja California, Mexico) on June 2001 (NOAA 2001). The initial decline in white abalone abundance has been attributed to commercial overharvesting. Closure of the white abalone fishery in 1996 and the closure of all abalone fisheries in central and Southern California in 1997 have proven inadequate for recovery (NMFS 2008). Surveys conducted in Southern California indicate that there has been a 99% reduction in white abalone abundance since the 1970s (Smith et al. 2003). Recent population assessments concluded that white abalone are far below the necessary populations required for downlisting and delisting (NMFS 2018a).

Sunflower Sea Star. The sunflower sea star (*Pycnopodia helianthoides*) has been petitioned to be listed under the Endangered Species Act as of August 2021. Sunflower sea stars are distributed throughout intertidal and subtidal coastal areas of southern California. (https://www.fisheries.noaa.gov/species/sunflower-sea-star).

3.6 MARINE FISH AND ESSENTIAL FISH HABITAT

The following sections provide summary overviews of the marine and coastal fishes in the POCS, including EFH and managed species, and the threatened and endangered fish species. Detailed discussions of these resources appear in BSEE and BOEM (2016).

3.6.1 Marine and Coastal Fish

The POCS supports a diverse fish community, with 554 species of California marine fishes, 481 of which occur in the SCB (MMS 2001). The life history of fish species can greatly differ in terms of seasonal movements, spawning location and season, and by depth and habitat distribution. Broadly, fish species found in the POCS can be characterized as diadromous (moving between the ocean and inland rivers), pelagic (occupying some portion of the water column), softbottom demersal, or reef-associated, based on their habitat associations and life history traits. Comprehensive fish surveys of the POCS can be found in Stephens et al. (2016); Allen et al. (2011) and Miller and Schiff (2012).

Reef-oriented fish species congregate around offshore platforms and their associated pipelines and shell mounds (reviewed in Love 2019). Various species of rockfish, sea perches, sheephead, and rudderfish are typical dominant species. Platforms also tend to have higher abundances of large fishes, particularly economically important species (such as cowcod, bocaccio, and lingcod) compared to natural reefs (Love and Schroeder 2006; Meyer-Gutbrod et al. 2020). There is distinct vertical zonation of fish species along the platform. Fish densities are usually highest at the base of the platform jacket where the fish community is dominated by rockfish. Densities are lowest at the upper portion of the platform where the fish community is dominated by blacksmith (*Chromis punctipinnis*) (Meyer-Gutbrod et al. 2020). Both juvenile and subadult fishes occur, especially in mid-water, suggesting platforms function as both nursery and adult habitat.

The relative abundance of fish species differs between platforms and natural hardbottom and some studies have noted greater diversity and fish density at platforms compared to surrounding soft seafloor habitat and natural reef habitat (Love 2019; Meyer-Gutbrod et al. 2020). Claisse et al. (2014) reported very high fish productivity at platforms compared to natural habitat, which they attributed to the dense rockfish populations and lower predation rates on these fishes at platforms compared to natural reefs. Meyter-Gutbrod et al. (2020) estimated total fish biomass and somatic fish production across all 24 platforms and calculated that the platforms and shell mounds support almost 30 million kg (66 million lb.) of fish biomass and an annual somatic fish production of 4,772 kg/yr (10,520 lb./yr).

In addition to the platform itself, shell mounds and pipelines provide important habitat for reef fish. Studies of shell mounds surrounding platforms found fish communities were composed of species found at the adjacent platform base along with juvenile fish and habitat generalists (Meyer-Gutbrod et al. 2019; Love 2019). Comparative studies indicated fish communities at shell mounds were denser and more diverse than in nearby soft bottom habitat, suggesting shell mounds provide high habitat value similar to natural low relief hardbottom (Krause et al. 2012; Love 2019).

Surveys of platforms in the Santa Barbara Channel indicate rockfish are the most common fish species on shell mounds (Meyer Gutbrod et al. 2019). Similarly, pipelines support distinct fish communities dominated by rockfish, and fish densities along pipelines in the Santa Barbara Channel were much higher than on the adjacent seafloor (Love 2019).

An indication of the importance of platforms as fish habitat is the 2005 recommendation by the Pacific Fishery Management Council (PFMC) to designate 13 platforms as potential groundfish Habitat Area of Particular Concern (HAPCs) (Scarborough-Bull and Love 2019). The PFMCs recommendation was due to the importance of the platforms for managed rockfish species (Scarborough-Bull and Love 2019). However, after reviewing the proposal, NOAA decided not to designate the platforms as EFH in the Pacific Groundfish Fishery Management Plan (FMP).

3.6.2 Essential Fish Habitat and Managed Species

The PFMC was established by the Magnuson Fishery Conservation and Management Act of 1976 (FCMA) to manage fisheries resources in the Pacific exclusive economic zone (EEZ). The Act requires regional fishery management councils, with assistance from the NMFS, to delineate EFH in Fishery Management Plans (FMPs) or FMP amendments for all federally managed fisheries. An EFH is defined as the water and substrate necessary for fish spawning, breeding, feeding, and growth to maturity (NMFS 2002). In addition to designating EFH, the NMFS requires fishery management councils to identify habitat areas of particular concern (HAPCs), which are discrete subsets of EFH. Although a HAPC designation does not confer additional protection for, or restrictions on, an area, it can help prioritize conservation efforts.

The PFMC has designated EFH for four fishery management groups in the Pacific region: Pacific Coast groundfish (87 species), highly migratory species (11 species), coastal pelagic species (8+ species), and Pacific coast salmon (3 species). The Pacific Coast Groundfish Fishery Management Plan identifies EFH for flatfish, rockfish, groundfish, and sharks and rays (PFMC 2020a). Groundfish EFH (Figure 3.6-1) includes (1) all waters and substrate within depths less than or equal to 3,500 m (11,480 ft) to the to mean higher high water level or the upriver extent of saltwater intrusion; (2) seamounts in depths greater than 3,500 m (11,480 ft) (as mapped in the EFH assessment geographic information system); and (3) designated HAPCs, including estuaries, canopy kelp, seagrass, rocky reefs and "areas of interest," which in Southern California includes the San Juan Seamount, the Channel Islands National Marine Sanctuary, and the Cowcod Conservation Area (PFMC 2020a). The O&G platforms, while not designated as EFH, may serve important EFH functions that enhance the survivorship of juvenile rockfishes (Emery et al. 2006; Nishimoto and Love 2011).

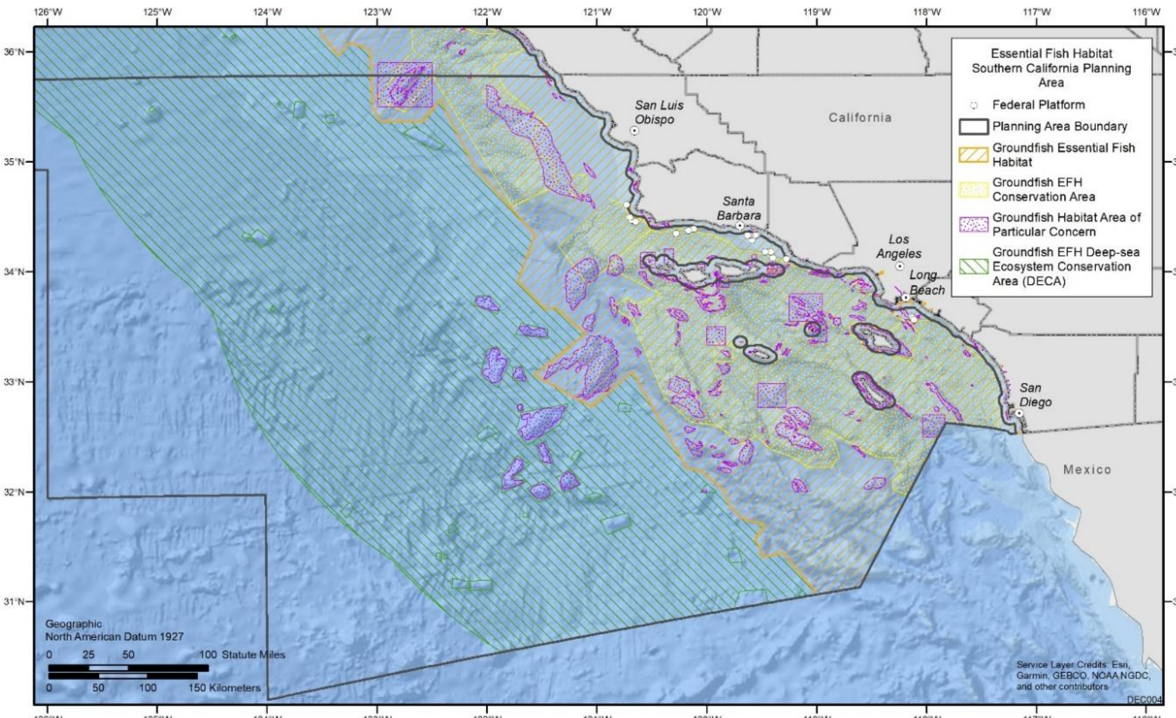

FIGURE 3.6-1 Groundfish EFH (including EFH-HAPC) Designated by the PFC and NMFS (Source: NOAA 2021b).

The Coastal Pelagic Species Fishery Management Plan identified EFH for four finfish species (Pacific sardine, Pacific mackerel, northern anchovy, and jack mackerel), market squid, and all euphausiid (krill) species that occur in the West Coast EEZ (PFMC 2021a). The combined EFH for these species (Figure 3.6-2) covers the marine and estuarine waters from the shoreline along the coasts of California offshore to the limits of the California EEZ and above the thermocline where sea surface temperatures range between 10 and 26°C (PFMC 2021a). The EFH designation for all species of krill extends the length of the West Coast from the shoreline seaward to the 1,829 m (6,000 ft) isobath and from the surface to a depth of 400 m (1,312 ft). No HAPC have been designated for coastal pelagics (PFMC 2021a).

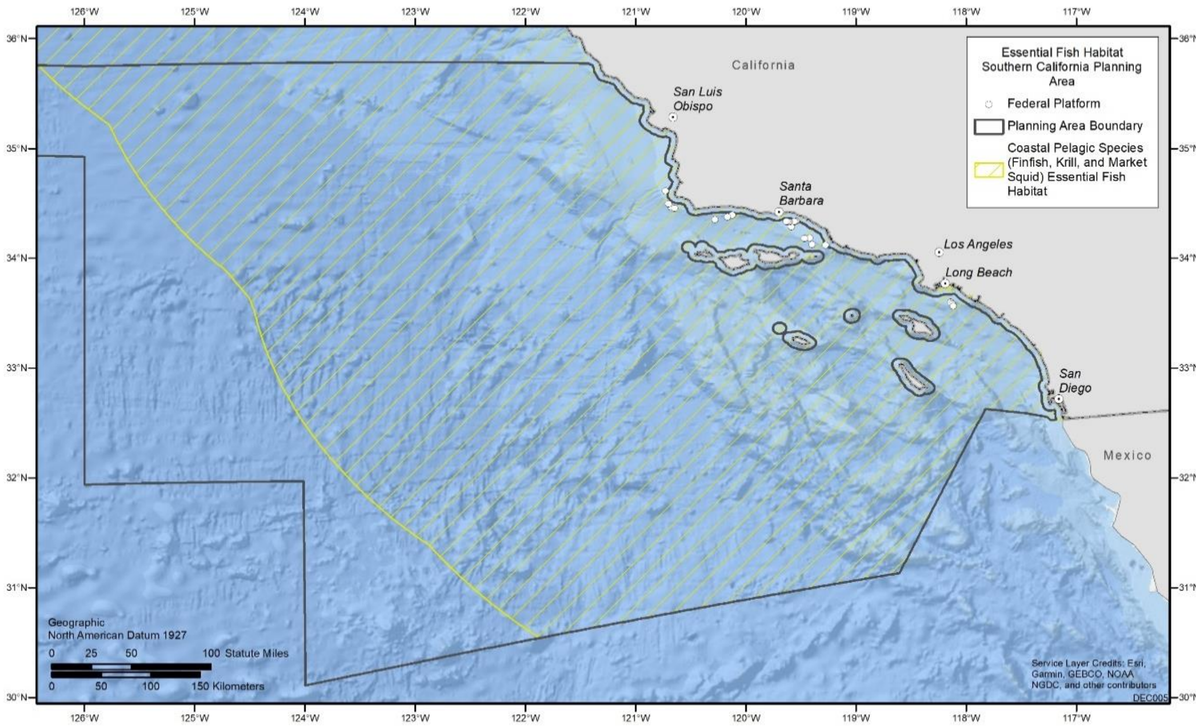

FIGURE 3.6-2 EFH for Coastal Pelagic Managed Species as Designated by the PFMC and NMFS (Source: NOAA 2021c).

Highly migratory species are defined by their pelagic habitat orientation and the large geographic extent of their migrations. The Highly Migratory Species Fishery Management Plan identified EFH for several species of tuna and oceanic sharks, as well as for Dorado (*Coryphaena hippurus*), swordfish (*Xiphias gladius*), and striped marlin (*Tetrapturus audax*) (Figure 3.6-3) (PFMC 2018). EFH designation varies by species, but in total, it covers all offshore waters of Southern California. No HAPCs have been designated for highly migratory species (PFMC 2018).

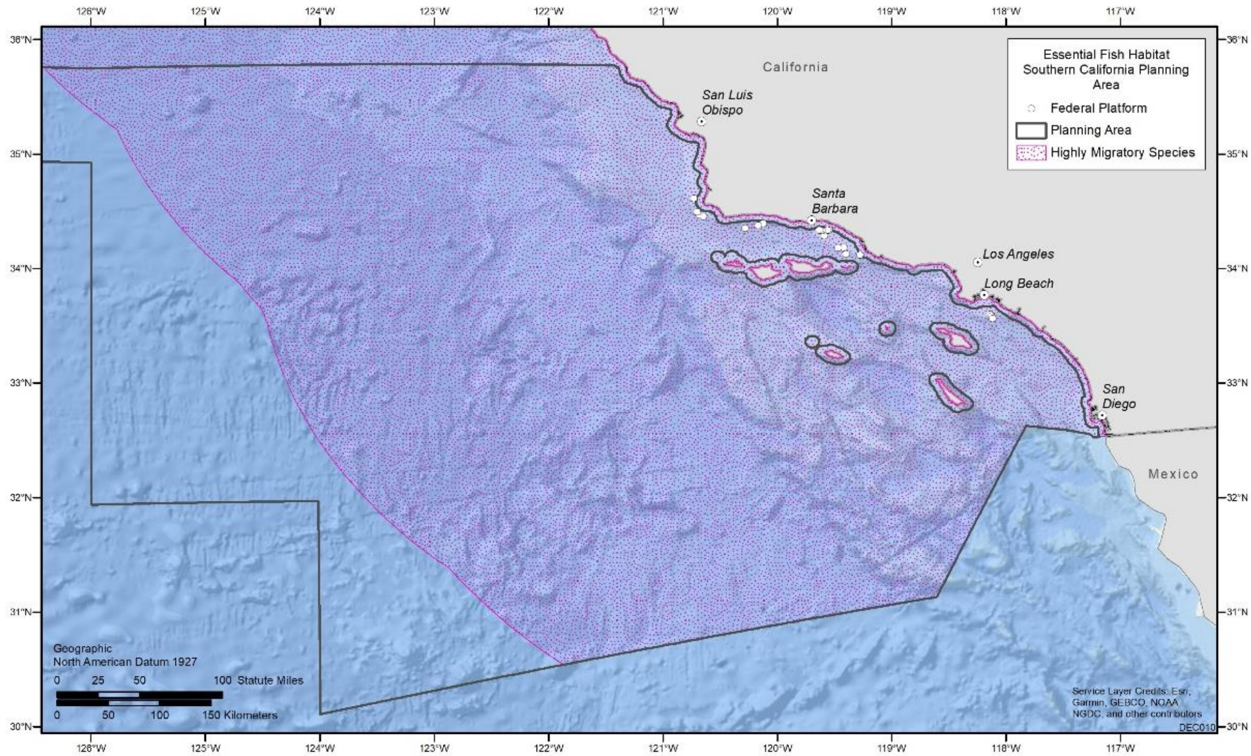

FIGURE 3.6-3 EFH for Highly Migratory Species as Designated by the PFMC and NMFS (Source: NOAA 2021c).

The Pacific Coast Salmon Fishery Management Plan designates EFH for chinook, coho, and pink salmon. The EFH includes estuarine and marine areas from the extreme high tide line in nearshore and tidal submerged environments within State territorial waters out to the full extent of the exclusive economic zone (370 km [200 nautical mi]) offshore of California north of Point Conception (PFMC 2021b). Although they have not been mapped, estuaries, estuary-influenced offshore areas, and submerged aquatic vegetation are designated as HAPCs in the project area (PFMC 2016).

3.6.3 Threatened and Endangered Species

Several species of fish occurring in the coastal and marine habitats of Southern California are listed as threatened or endangered under the ESA. These species are the green sturgeon (*Acipenser medirostris*), the steelhead (*Oncorhynchus mykiss*), the scalloped hammerhead shark (*Sphyrna lewini*), and the tidewater goby (*Eucyclogobius newberryi*).

Green Sturgeon. The green sturgeon inhabits nearshore marine waters from Mexico to the Bering Sea and enters bays and estuaries along the west coast of North America (Moyle et al. 1995). Although the green sturgeon was historically found along the entire coast of California, studies suggest that the southern population of green sturgeon is primarily found to the north of the Sacramento River, and the NMFS has designated no critical habitat south of Monterey Bay (NMFS 2009, 2018b).

Steelhead. Adult steelhead migrate to freshwater areas to spawn, and the resulting offspring travel back downstream and eventually enter marine waters to mature. The endangered Southern California steelhead evolutionarily significant unit (ESU) extends from the Santa Maria River basin to the U.S.–Mexico border (NMFS 1999). The Southern California Steelhead (SCS) Recovery Planning Area includes seasonally accessible coastal watersheds and the upstream portions of watersheds including the Santa Maria, Santa Ynez, Ventura, and Santa Clara Rivers, and Malibu and Topanga Creeks. Major steelhead watersheds in the southern portion of the SCS Recovery Planning Area include the San Gabriel, Santa Margarita, San Luis Rey, San Dieguito, and Sweetwater Rivers, and San Juan and San Mateo Creeks (NMFS 2012a). Critical habitat for the Southern California steelhead includes multiple rivers between the Santa Maria River and San Mateo Creek (NMFS 2005).

Scalloped Hammerhead Shark. The NMFS listed the Eastern Pacific Distinct Population Segment (DPS) of scalloped hammerhead sharks as an endangered species in 2014 (NMFS 2020b). The scalloped hammerhead is found in coastal waters off the southern California coast, extending as far north as Point Conception (Baum et al. 2009). However, NMFS found that there are no marine areas within the jurisdiction of the United States that meet the definition of critical habitat for the Eastern Pacific DPS (NMFS 2015b).

Tidewater Goby. The tidewater goby was listed as endangered in 1994 (USFWS 1994b), but recently the USFWS has proposed to reclassify this species as threatened (USFWS 2014). The tidewater goby is found only in California, where it is restricted primarily to brackish waters of coastal wetlands, brackish shallow lagoons, and lower stream reaches larger than 1 ha (2.5 ac) (Lafferty et al. 1999). A number of estuarine rivers and lagoons in San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Orange, and San Diego counties have been designated as Critical Habitat (USFWS 2013).

3.7 SEA TURTLES

Four sea turtle species occur in the Southern California OCS Planning Area. These species include the federally endangered leatherback sea turtle (*Dermochelys coriacea*), loggerhead sea turtle (North Pacific Ocean DPS) (*Caretta caretta*), the federally threatened green sea turtle (*Chelonia mydas*) (East Pacific DPS), and the olive ridley sea turtle (*Lepidochelys olivacea*).[14] No known nesting habitat for any of the sea turtle species occurs in the project area (Argonne 2019).

[14] Stragglers of the federally endangered hawksbill sea turtle (*Eretmochelys imbricata bissa*) occasionally stray north to southern California, probably during El Niño years. As most sightings are not documented (California Herps 2021), it can be assumed that this species would not likely be affected by decommissioning activities.

Green Sea Turtle. Green sea turtles occur year-round off the Southern California coast with highest concentrations observed from July through September when it is often seen feeding (BSEE 2011; Kaplan et al. 2010). Between September 29, 2013, and October 31, 2019, there were no opportunistic sightings of green sea turtles off Santa Barbara County, one in Ventura County, 13 in Los Angeles County, and 17 in Orange County. There were also four reported sightings in the southern Channel Islands in 2015/2016 (Hanna et al. 2021). Green sea turtles feed primarily on algae and seagrasses (NMFS 2021a), but some also forage on invertebrates (Seminoff et al. 2015).

Leatherback Sea Turtle. Leatherback sea turtles occur annually off the California coast between Point Conception and Point Arena from July through November (CDFW 2021). Locations where leatherback sea turtles have been observed in Southern California ranges from San Luis Obispo County south to San Diego County (California Herps 2021), which encompasses the region of the Santa Maria Basin, Santa Barbara Channel-West, and Santa Barbara Channel-East Platforms. In California, critical habitat has been designated in the coastal area from Point Arguello northward and inshore of the 3,000-m (9,842-ft) depth contour (NMFS 2012b), which is near Platform Irene in the Santa Maria Basin (Figure 3.7-1).

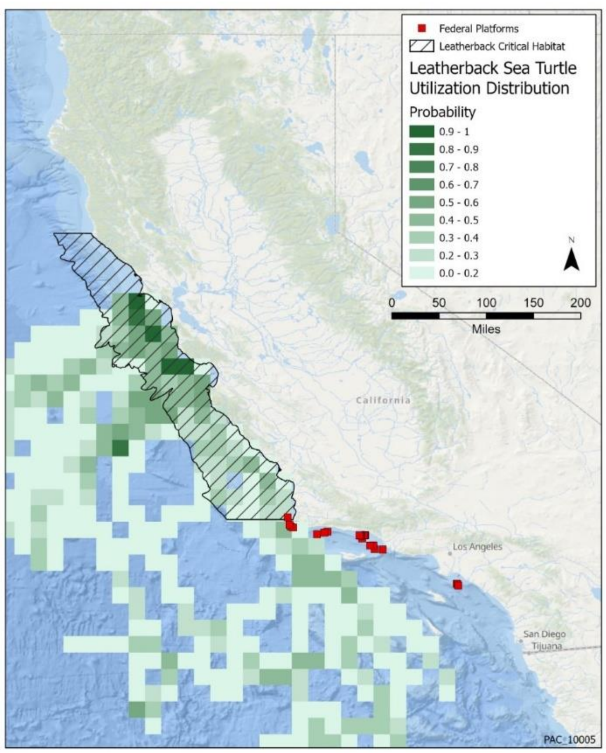

FIGURE 3.7-1 Leatherback Sea Turtle Critical Habitat and Utilization Distribution (Source: NMFS 2012b).

Locations where leatherback sea turtles have been observed in Southern California ranges from San Luis Obispo County south to San Diego County (Nafis 2018), which encompasses the region of the Santa Maria Basin, Santa Barbara Channel-West, and Santa Barbara Channel-East Platforms. Leatherback sea turtles observed in southern California nest in Indonesia, Papua New Guinea, and the Solomon Islands (NMFS 2021b). Their diet is primarily jellyfish, but also includes other invertebrates, small fish, and plant material (NMFS 2021b; California Herps 2021). The abundance of leatherback sea turtles has been declining within the turtle's range in California (CDFW 2021). For example, the average number of leatherback sea turtles that annually foraged off central California from 1990 to 2003 was 128, but from 2004 to 2017 averaged only 55 individuals (Benson et al. 2020).

Loggerhead Sea Turtle. Most sightings of the loggerhead sea turtle off the California coast are of juveniles and tend to occur from July to September but can occur over most of the year during El Niño years. No important foraging areas are apparent in Southern California, although loggerheads may move up the Pacific coast during El Niño events following pelagic red crabs, a preferred prey species (NMFS and USFWS 2011). The loggerhead sea turtle is primarily pelagic, but occasionally enters coastal bays, lagoons, salt marshes, estuaries, creeks, and mouths of large rivers (California Herps 2021). Loggerhead sea turtles have been observed at scattered locations from Point Conception to the U.S./Mexico border (California Herps 2021); therefore, the potential exists for individuals to be observed around any of the OCS platforms. Loggerhead sea turtles consume whelks and conchs, but also sponges, crustaceans, jellyfish, worms, squid, barnacles, fish, and plants (NMFS 2021c; California Herps 2021).

Olive Ridley Sea Turtle. Olive Ridley sea turtles are highly migratory and spend much of their non-breeding life cycle in the oceanic zone (NMFS and USFWS 2014), but are known to inhabit coastal areas (e.g., bays, estuaries) (NMFS 2021d). The Olive Ridley sea turtle rarely occurs along the California coast. Observation locations in the Southern California OCS Planning Area include areas off Point Sal and Point Conception (California Herps 2021). These observations are in the region of the Santa Maria Basin and Santa Barbara Channel-West Platforms. Olive Ridley sea turtles are omnivorous and consume mollusks, crustaceans, jellyfish, sea urchins, fish, and occasional plant material (e.g., algae, seagrass) (NMFS 2021d; California Herps 2021).

3.8 MARINE AND COASTAL BIRDS

Many bird species breed along the Southern California coast, while others are non-breeding summer residents, winter residents, or migrants. Argonne (2019) provides detailed information on the marine and coastal birds that occur in the Southern California OCS Planning Area and the adjacent coastal counties (San Luis Obispo, Santa Barbara, Ventura, Los Angeles, and Orange). The Channel Islands provide essential nesting and feeding grounds for 99% of the breeding seabirds in Southern California and important wintering areas and stopover points for shorebirds (Kaplan et al. 2010; NPS 2021a).

More than 50 seabird species have been identified between Cambria, California, and the Mexican border (Mason et al. 2007), which encompasses the area of the OCS platforms. A number of the seabird species have been observed near, or even roosting upon, the platforms (Argonne 2019; Hamer et al. 2014; Johnson et al. 2011; Mason et al. 2007). Nearshore species are most numerous in winter months, with relatively few remaining during the summer. Pelagic species are generally present throughout the year, although their abundance varies seasonally (Argonne 2019; Mason et al. 2007). The migratory flyways for most seabirds are located farther offshore than the nearshore coastal region within which the OCS platforms are located (Johnson et al. 2011).

More than 20 seabird species are known to breed in southern California, especially on the Channel Islands (Mason et al. 2007; NPS 2021a). Other areas of elevated seabird abundance within the project area include Point Conception, the Santa Monica Basin, Anacapa Island, Bolsa Bay, and Palos Verdes/Bolsa Chica (Sydeman et al. 2012). For many seabirds, the region off Point Conception is a particularly important foraging area (SAIC 2011). Some seabird species (e.g., California brown pelican, cormorants, and gulls) habitually use substructures of POCS platforms for nighttime roosting (Johnson et al. 2011). This association is due more to the availability of appropriate structures for roosting than to platform lighting (Johnson et al. 2011).

Fewer than 25 species of shorebirds occur regularly in the planning area and vicinity. Most species migrate to the area in the fall to overwinter and leave in spring for northern breeding grounds. The Channel Islands are a particularly important wintering and migratory stopover area (NPS 2021a). Specific areas commonly used by shorebirds include Mugu Lagoon, Santa Clara River mouth, Carpinteria Marsh, Goleta Slough, Morro Bay, Santa Maria River mouth, the Santa Ynez River mouth, Malibu Lagoon, Ballona Wetlands, and the Orange County coastal wetlands (e.g., Seal Beach, Bolsa Chica, Huntington Beach Wetlands, Santa Ana River mouth, and Upper Newport Bay) (Argonne 2019).

About 40 waterfowl species (e.g., geese and ducks) and 25 species of wading birds (e.g., herons, egrets, and rails) inhabit coastal and interior wetlands. Along the planning area coastline, these birds inhabit saltwater marshes and various river and stream mouths. Several raptor species also occur along the coast (Argonne 2019).

Forty special-status bird species, including six federally listed species, have been reported from the Southern California POCS and may occur in the project area. Table 3.8-1 presents the status of and summarizes the occurrence and distribution of the special status bird species within southern California. Argonne (2019) provides additional information on most of these species.

TABLE 3.8-1 Special Status Marine and Coastal Birds within or near the Project Area

Species	Federal Status[a]	State Status[a]	Occurrence/Distribution in Southern California
Grebes (Podicipedidae)			
Clark's Grebe (*Aechmophorus clarkii*)	BCC	—	Rests on water, usually well offshore. Observed, primarily in winter, throughout the project area, particularly along the coastline, Santa Barbara and Anacapa Islands, and the waters between the islands and the coastline. Uncommon along the coast in summer. Most migration occurs at night.
Western Grebe (*Aechmophorus occidentalis*)		—	Rests on water, usually well offshore. Common to abundant October to May along entire coast in marine subtidal and estuarine waters. Winters mainly on sheltered bays or estuaries on coast, but also large freshwater lakes. Observed, primarily in winter, throughout the project area, particularly along the coastline, Santa Barbara and Anacapa Islands, and the waters between the islands and the coastline. Uncommon along the coast in summer. Most migration occurs at night.
Albatrosses (Diomedeidae)			
Black-footed Albatross (*Phoebastria nigripes*)	BCC, BMC*	—	Observed throughout Southern California, mostly far offshore (e.g., more than 45 km (28 mi) from shore, over deeper waters 1,260 m [4,134 ft]). Observed throughout the project area at scattered locations between the coast and Channel Islands.
Short-tailed Albatross (*Phoebastria albatrus*)	E, BMC	SSC	Nests off Japan. After breeding, the birds are found throughout the Bering Sea and Gulf of Alaska, along the Aleutian Islands, southeast Alaska, and the Pacific coasts of Canada and the United States. In the project area this species has been observed off Santa Barbara Island (February 2002), Santa Cruz Island (July 2005), and >10 km (6.2 mi) southwest of Huntington Beach (June 2021).
Shearwaters, Petrels (Procellariidae)			
Black-vented Shearwater (*Puffinus opisthomelas*)	BCC, BMC	—	Breeds off the west coast of Mexico with birds remaining in their colonies for at least 10 months. They have been observed at sea throughout southern California where they are generally found within 25 km (15.5 mi) of shore.
Hawaiian Petrel (*Pterodroma sandwichensis*)	E, BMC	—	Breeds on larger islands in the Hawaiian chain. Individuals have been recorded off Oregon and California from April to October, with the California records occurring from April to early September. Scattered records near the southern California OCS Planning Area with most from 39 to 161 km (24 to 100 mi) offshore. No observations reported in the project area between the coast and the Channel Islands.

TABLE 3.8-1 (Cont.)

Species	Federal Status[a]	State Status[a]	Occurrence/Distribution in Southern California
Pink-footed Shearwater (*Ardenna creatopus*)	BCC, BMC	—	Observed at sea throughout Southern California. Its numbers off southern California increase from March to May and then decrease from September to November. Less common within 8 km (5 mi) of shore. Numerous sightings throughout the project area.
Storm-Petrels (Hydrobatidae)			
Ashy Storm-Petrel (*Hydrobates homochroa*)	BCC, BMC	SSC	Occurs in waters over and just seaward of the continental slope. Half of the world's population of ashy storm-petrels breed on San Miguel, Santa Barbara, Santa Cruz, and Anacapa islands. Moves to and from colonies at night. The breeding season is spread throughout most of the year, although off southern California breeding typically occurs from March to October. At sea, remains within the central and southern California Current System year-round, preferring continental slope waters (200–2,000 m [656–6,562 ft] deep) that are within a few kilometers of the coast in some areas (e.g., Monterey Bay) and more than 50 km offshore in other areas. Based on normal distribution and abundance, this species could occur within the Southern California OCS Planning Area year-round but has the highest potential of occurrence during the spring, summer, and fall months.
Black Storm-Petrel (*Hydrobates melania*)	BCC	SSC	Occurs year-round in waters overlying the continental shelf off southern California. It frequents waters of the continental shelf, shelf break, and continental slope (100–3,000 m [328–9,842 ft] deep). Breeds on the Channel Islands, the Baja Peninsula, and the Gulf of California, and winters off the coasts of Colombia and Ecuador. Southern California is at the northern periphery of its range. The black storm-petrel has been observed at sea throughout southern California.
Pelicans (Pelecanidae)			
California Brown Pelican (*Pelecanus occidentalis californicus*)	DE	DE, FP	The only breeding colonies in the western United States are on Anacapa and Santa Barbara islands. Inhabits shallow inshore waters, estuaries, and bays. Occurs throughout coastal southern California. Juveniles and non-breeding adults disperse during the late spring, summer, and early fall months from breeding colonies along the Gulf of California and in southern California as far north as southern British Columbia and Canada, and south into southern Mexico and Central America. Numerous sightings throughout the project area. Uses platform substructures for nighttime roosting.

TABLE 3.8-1 (Cont.)

Species	Federal Status[a]	State Status[a]	Occurrence/Distribution in Southern California
Cormorants (Phalacrocoracidae)			
Double-crested Cormorant (*Nannopterum auritum*)	BMC	WL	Occurs throughout southern California. Uses a variety of habitats, including sheltered marine waters such as estuaries, bays and mangrove swamps, rocky coasts and coastal islands, and inland lakes, rivers, swamps, reservoirs, and ponds. Begins laying eggs from April to July, nesting on a wide variety of substrates forming colonies sometimes over thousands of pairs strong. Numerous sightings throughout the project area. Uses platform substructures for nighttime roosting.
Brandt's Cormorant (*Urile penicillatus*)	BCC	—	Strictly marine and is restricted to rocky coasts and islands. Nests on rocky headlands or islets along coast and islands south to Morro Bay and Channel Islands. Observed all year throughout the project area including along the coast, the Channel Islands, and throughout the open waters. Common winter visitant in some habitats along mainland south of San Luis Obispo County, but uncommon to fairly common from April to October. It can dive to over 73 m (240 ft). Spends little time on water, except while fishing.
Herons, Bitterns (Ardeidae)			
Reddish Egret (*Egretta rufescens*)	BMC*	—	Individuals from the west coast of Mexico wander north into California. Breeding is not reported to occur in California; the species has been observed in low numbers in coastal areas throughout southern California (as far north as Monterey County). Frequents shallow coastal waters, saltpans, open marine flats, and shorelines. Seldom observed away from coastal areas. No observations between Point Conception and Devereux Slough (Santa Barbara County).
Ducks, Geese, Swans (Anatidae)			
Brant (*Branta bernicla*)	BMC*	SSC	Occurs throughout coastal southern California mainly from late October to late May. Breeds in the Arctic, but small numbers remain through the summer in the project area. The entire California coastline is within the winter and migrant staging range. It is very numerous in coastal bays during spring migration, but most are well offshore during fall migration.

TABLE 3.8-1 (Cont.)

Species	Federal Status[a]	State Status[a]	Occurrence/Distribution in Southern California
Falcons (Falconidae)			
American Peregrine Falcon (*Falco peregrinus anatum*)	DE, BCC	DE, FP	Resident as a breeder; other individuals breeding farther north migrate into California for the winter. Breeding habitat ranges from cliffs in uninhabited areas to tall buildings and bridges. Observed along coast and on the Channel Islands year-round with most observations in fall and winter. Nesting occurs on the Channel Islands, particularly the northern Channel Islands. Uses platforms as roosting and hunting habitats.
Rails, Gallinules, Coots (Rallidae)			
Light-footed Ridgway's Rail (*Rallus obsoletus levipes*)	E, BMC	E, FP	Inhabits coastal salt marshes from Santa Barbara County south to Baja California. Marshes near the project area where nesting pairs have been documented include Carpinteria Marsh in Santa Barbara County, Mugu Lagoon in Ventura County, and Seal Beach, Bolsa Chica, Huntington Beach Wetlands, and Upper Newport Bay in Orange County. In the general area of the Southern California OCS Planning Area near the existing O&G platforms, only two marshes are, or have the potential to be, occupied by the species: Carpinteria Marsh in Santa Barbara County and Mugu Lagoon in Ventura County.
Lapwings, Plovers (Charadriidae)			
Mountain Plover (*Charadrius montanus*)	BCC, BMC*	SSC	Winter visitor, mainly from September to mid-March, peaking from December to February. Main wintering area is inland areas of California including heavily grazed pastures, burned fields, fallow fields, and tilled fields; but also uses coastal prairies and alkaline flats. Observed at scattered inland and coastal locations throughout southern California. It is extirpated from the Channel Islands. Along the southern California coast, there are coastal sightings from October through January from all project-area counties. No observations between Point Conception and Devereux Slough (Santa Barbara County).

TABLE 3.8-1 (Cont.)

Species	Federal Status[a]	State Status[a]	Occurrence/Distribution in Southern California
Western Snowy Plover (*Charadrius nivosus nivosus*)	T, BCC, BMC*	SSC	Mainly occurs along seacoasts, but also open flats near brackish or saline lakes, lagoons, seasonal water courses, salt-works, and depressions. Critical habitat is associated with coastal beach-dune ecosystems along the Pacific Coast. Twenty-three critical habitat units occur along the coast of the Southern California Planning Area. These critical habitat units represent 11% of the total designated critical habitat for the species. Breeds and winters along the coasts of San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Orange, and San Diego counties and on several of the Channel Islands. Numerous coastal and Channel Island sightings throughout the project area.
Oystercatchers (Haematopodidae)			
Black Oystercatcher (*Haematopus bachmani*)	BCC, BMC*	—	Observed throughout coastal southern California, including the Channel Islands. It is a permanent resident on rocky shores of marine habitats along most of the California coast and adjacent islands. Numerous sightings throughout the project area.
Sandpipers, Phalaropes (Scolopacidae)			
Willet (*Tringa semipalmata*)	BCC	—	Abundant in nonbreeding season (July through April) in estuarine habitats, saline emergent wetlands, and salt ponds along the entire California coast. Small numbers remain on the coast in the breeding season, but do not nest. Intertidal mudflats are a very important winter feeding habitat, where it is among the most common of the large shorebirds. Observed along the coastline and the Channel Islands.
Long-billed Curlew (*Numenius americanus*)	BCC, BMC*	WL	Observed throughout southern California during winter. Winter habitat includes coastal sandy beaches, intertidal mudflats, salt marshes, coastal and inland pastures and farmlands, freshwater wetlands, salt ponds, and agricultural pastures. Numerous sightings throughout the project area along the coast and at the Channel Islands.
Long-billed Curlew (*Numenius americanus*)	BCC, BMC*	WL	Observed throughout southern California during winter. Winter habitat includes coastal sandy beaches, intertidal mudflats, salt marshes, coastal and inland pastures and farmlands, freshwater wetlands, salt ponds, and agricultural pastures. Numerous sightings throughout the project area along the coast and at the Channel Islands.

TABLE 3.8-1 (Cont.)

Species	Federal Status[a]	State Status[a]	Occurrence/Distribution in Southern California
Marbled Godwit (*Limosa fedoa*)	BCC, BMC*	—	Observed from mid-August to early May throughout southern California, with highest concentrations along the coast. Nearly all sites used during winter are on or near marine coastlines and river deltas; the few exceptions are large wetlands at inland sites. Important migration and wintering sites in California are north and south of the project area including Mugu Lagoon. Numerous sightings throughout the project area along the coast and at the Channel Islands.
Whimbrel (*Numenius phaeopus*)	BCC, BMC	—	During migration, observed throughout southern California with highest concentrations along the coast. Numerous coastal and Channel Island sightings throughout the project area.
Red Knot (*Calidris canutus*)	BCC, BMC*	—	Wintering locations for the subspecies *roselaari* includes California. During winter it is strictly coastal, frequenting tidal mudflats or sandflats, sandy beaches of sheltered coasts, rocky shelves, bays, lagoons and harbors, and occasionally oceanic beaches and saltmarshes. Numerous sightings throughout the project area. Other than an April 2021 observation at Point Conception, there are no other observations between Point Conception and Devereux Slough (Santa Barbara County).
Short-billed Dowitcher (*Limnodromus griseus*)	BCC, BMC	—	Observed throughout southern California. Common to abundant during migration along the entire California coast (late March to mid-May and mid-July to October), but is a rare migrant on the Channel Islands. It is rare to uncommon along the southern coast in winter. Some individuals remain in California during the summer. Numerous coastal sightings throughout the project area, although few observations from the Channel Islands and from the immediate Point Conception area.
Skuas, Gulls, Terns, Skimmers (Laridae)			
California Gull (*Larus californicus*)	BCC	WL	Winters throughout southern California. Occurs on a variety of habitats, including coasts, estuaries, bays, mudflats, and fields. Breeds in open habitats, usually on low rocky islands in freshwater and hypersaline lakes in the interior west. Numerous sightings throughout the project area.

TABLE 3.8-1 (Cont.)

Species	Federal Status[a]	State Status[a]	Occurrence/Distribution in Southern California
Heermann's Gull (*Larus heermanni*)	BCC	—	Coastal species that often breeds at high densities on remote rocky coasts and islets. Feeds largely within inshore waters and in the littoral zone, but also oceanic waters surrounding breeding islands. Observed in all seasons throughout the project area including along the coast, the Channel Islands, and throughout the open waters. Most common in coastal California from late June through November. Preferred feeding areas are offshore kelp beds, rocky shorelines, and sandy beaches. Floats on the ocean surface and loafs on pieces of driftwood.
Western Gull (*Larus occidentalis*)	BCC	—	Most of the California population breeds on the Farallon and Channel islands. Coastal species that nests on barren substrates on rocky islets with some herbaceous cover and gravelly beaches. Observed in all seasons throughout the project area including along the coast, the Channel Islands, and throughout the open waters. Uses platform substructures for nighttime roosting.
California Least Tern (*Sternula antillarum browni*)	E, BMC	E, FP	Summer visitor to California. Breeds on sandy beaches close to estuaries and embayments discontinuously along the California coast. In the project area, breeds along the coasts of San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Orange, and San Diego counties. Fall migration to wintering grounds in Central and South America begins in late July and ends by mid-September. Numerous sightings throughout the project area.
Elegant Tern (*Thalasseus elegans*)	BCC	WL	Non-breeding individuals summer from California to Costa Rica and are observed along all of coastal southern California. Breeding colonies occur in San Diego, Orange and Los Angeles counties on manmade habitats. Forages in inshore waters, estuarine habitats, salt ponds, and lagoons, with some individuals venturing further offshore in the non-breeding season. Numerous sightings throughout the project area.
Gull-billed Tern (*Gelochelidon nilotica*)	BCC, BMC*	SSC	Primarily a summer resident (mid-March to mid-September), but also a very rare winter visitor. The only recent breeding noted in southern California occurred at the Salton Sea and San Diego Bay. Most observations in project area are within Orange County, centered around Huntington Beach and Newport Beach.

TABLE 3.8-1 (Cont.)

Species	Federal Status[a]	State Status[a]	Occurrence/Distribution in Southern California
Black Skimmer (*Rynchops niger*)	BCC, BMC	SSC	In southern California, nests along the coast and the Salton Sea. On the Pacific coast, winters from southern California to as far south as El Salvador and Nicaragua. Observed from coastal areas throughout southern California. Fewer observations from the Channel Islands. Present year-round in coastal Santa Barbara, Ventura, Los Angeles, Orange, and San Diego counties. Winters locally in substantial numbers on the southern California coast from Santa Barbara to San Diego counties.
Auks, Murres, Puffins (Alcidae)			
Cassin's Auklet (*Ptychoramphus aleuticus*)	BCC, BMC	SSC	Nests locally on islands along the entire length of California, including the smaller islands associated with the Channel Islands. It winters mainly offshore within the breeding range. Occurs in offshore waters year-round. Numerous sightings throughout the project area (fewer observations in the Point Conception area).
Craveri's Murrelet (*Synthliboramphus craveri*)	BCC	—	Does not breed within the project area. Scattered observations primarily from Ventura to Huntington Beach, most observations reported from open waters. Occurs irregularly in offshore waters in late summer.
Guadalupe Murrelet (*Synthliboramphus hypoleucus*)	BCC, BMC	T	During the breeding season, concentrates in or near the breeding colonies off the coast of northern Baja California. Known to breed on Guadalupe and San Benito islands off the Pacific coast of Baja California. Within the United States, breeding is unconfirmed on San Clemente and Santa Barbara islands. Occurs off southern California from July to December. Few observations within the project area.
Marbled Murrelet (*Brachyramphus marmoratus*)	T, BMC	E	Occurs in Washington, Oregon, and California, where it spends most of its life in the nearshore marine environment but nests and roosts inland. Very rare late summer, fall, and winter visitor to the Santa Barbara County coast, but a somewhat more regular visitor in late summer in the Vandenberg AFB area. The San Luis Obispo coast extending south to Point Sal in Santa Barbara County is an important wintering area for the species. Occurs less frequently south of Point Conception, with observations reported along the coastline of Ventura and Los Angeles counties.

TABLE 3.8-1 (Cont.)

Species	Federal Status[a]	State Status[a]	Occurrence/Distribution in Southern California
Rhinoceros Auklet (Cerorhinca *monocerata*)	—	WL	Occurs both offshore and along seacoasts and islands. Observed at sea throughout southern California. Breeding occurs on maritime and inland grassy slopes and rarely on steep island or mainland cliffs. In winter, it occurs in offshore pelagic waters and sometimes in nearshore coastal waters. Numerous sightings throughout the project area.
Scripps's Murrelet (*Synthliboramphus scrippsi*)	BCC, BMC	T	During the breeding season, concentrates in or near the breeding colonies on the Channel Islands and off the coast of northern Baja California. Breeding occurs primarily from January to September, with a peak of abundance between late February and July. Within the United States, this species breeds on San Miguel, Santa Cruz, Anacapa, Santa Barbara, and San Clemente islands. Winters offshore from northern California (rarely) south to southern Baja California. Numerous sightings throughout the project area.
Tufted Puffin (*Fratercula cirrhata*)	BCC	SSC	The only recent known breeding location in southern California (1989–1991) was on Prince Island in Santa Barbara County. At sea during the breeding season, occurs mainly in waters of the OCS and continental slope within 65 km (40.4 mi) of colonies. In the nonbreeding season, more numerous in California, ranging widely over pelagic waters along the entire length of California, although generally rare south of Monterey Bay. In southern California, occurs occasionally in midwinter and spring. Sporadic offshore observations in the project area, most northeast to southeast of Santa Barbara Island and in the Santa Barbara Channel.
Owls (Strigidae)			
Burrowing Owl (*Athene cunicularia*)	BCC	SSC, FP	Observed along coast and on the Channel Islands year-round with most observations in fall and winter. Breeding occurs on several of the Channel Islands. Uses rodent or other burrows for roosting and nesting cover. Uses platforms as stopover sites when dispersing from mainland to the Channel Islands.

[a] Status: C = candidate; BCC = bird of conservation concern; BMC = bird of management concern, DE = delisted (formerly endangered); E = endangered; FP = fully protected; SSC = species of special concern; T = threatened; WL = watch list; * = focal species under birds of management concern, – = not listed.

Sources: Andres and Stone (2010); BirdLife International (2018a,b,c,d,e,f,g; 2020a,b,c,d,e,f); CDFW (2022c); CNDDB (2022); Collins and Garrett (1996); eBird (2021); Fellows and Jones (2009); Hamer et al. (2014); Johnson et al. (2011); Mason et al. (2007); National Audubon Society (2021); Niles et al. (2010); NPS (2021a); Shuford and Gardali (2008); Sharpe (2017); USFWS (2006; 2011a,b; 2012, 2016; 2019; 2021a; 2022); Zembal and Hoffman (2012); Zembal et al. (2014, 2016).

3.9 MARINE MAMMALS

The waters from the Southern California OCS Planning Area support a diverse marine mammal community including a variety of whales, dolphins, porpoises, seals, and the southern sea otter (*Enhydra lutris nereis*).14 At least 8 species of baleen whales and 23 species of toothed whales (including dolphins and porpoises) have been reported from the Southern California Planning Area. During winter and spring, most baleen whale sightings occur within ~370 km (230 mi) of shore, while in winter and spring baleen whale sightings primarily occurred along the continental slope and in offshore waters (Debich et al. 2017). In general, the 16 most commonly observed species in the SCB, in descending order of frequency, are:

- Long- and short-beaked common dolphins (*Delphinus capensis capensis* and *Delphinus delphis delphis*) — considered together, because they are difficult to differentiate at sea;

- Risso's dolphin (*Grampus griseus*); fin whale (*Balaenoptera physalus physalus*);

- Common bottlenose dolphin (*Tursiops truncatus truncatus*);

- Gray whale (*Eschrichtius robustus*);

- Blue whale (*Balaenoptera musculus musculus*);

- Pacific white-sided dolphin (*Lagenorhynchus obliquidens*);

- Humpback whale (*Megaptera novaeangliae*);

- Northern right whale dolphin (*Lissodelphis borealis*);

- Minke whale (*Balaenoptera acutorostrata*);

- Dall's porpoise (*Phocoenoides dalli dalli*);

- Killer whale (*Orcinus orca*), Bryde's whale (*Balaenoptera edeni*), and Cuvier's beaked whale (*Ziphius cavirostris*) — these three species observed with equal frequency; and

- Sperm whale (*Physeter macrocephalus*).

The marine mammals are protected under the Marine Mammal Protection Act, and eight species are federally listed under the Endangered Species Act (ESA). The federally listed species are under the jurisdiction of NMFS, except for the southern sea otter, which is under the jurisdiction of the USFWS. Table 3.9-1 summarizes occurrence and distribution information for the marine mammals in Southern California, and identifies the species listed under the ESA.

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[14] The rough-toothed dolphin (*Steno bredanensis*) and false killer whale (*Pseudorca crassidens*) are not addressed in this document as their occurrence in the area likely represents extralimital occurrences (Douglas et al. 2014). However, more than 50 false killer whales were observed in 2014 (Kim 2015) and about 30 in 2016 (Ritchie 2016).

TABLE 3.9-1 Marine Mammals of Southern California POCS

Species[a]	Status[b]	Occurrence/Distribution in Southern California
Order Cetacea: Suborder Mysticeti (baleen whales)		
Blue whale: Eastern North Pacific Stock (*Balaenoptera musculus musculus*)	E/D	Occurs in the continental shelf, continental slope, and offshore waters. Common in southern California. Within the project area, blue whales are observed most often in the central and eastern portions of the Santa Barbara Channel. First observed around the Channel Islands in May/June and present on the continental shelf in the area from August to November. Tend to aggregate in the Santa Barbara Channel along the shelf break (seaward of 200-m [656-ft] depth line). Concentrations of feeding animals have been reported from June through October in the following areas: within the area of Point Conception and Point Arguello, close to the Santa Maria Basin platforms and western portion of the Western Santa Barbara Channel platforms; Santa Barbara Channel and the San Miguel area, close to the Western Santa Barbara Channel platforms; and Santa Monica Bay to Long Beach, close to the San Pedro Bay platforms. NMFS has required USACE to consult on Blue Whale BIA.
Bryde's whale: Eastern Tropical Pacific Stock (*Balaenoptera edeni*)	--	Occurs in the continental shelf waters. Little known about its occurrence in the SCB. Typically, not considered part of the southern California cetacean fauna. Infrequent summer occurrence, considered accidental in southern California.
Fin whale: California/Oregon/Washington Stock (*Balaenoptera physalus physalus*)	E/D	Occurs in the continental shelf, continental slope, and offshore waters. Occurs year-round off central and southern California, peaking in summer and fall, with most observations in October. In SCB, summer distribution is generally offshore and south of the northern Channel Islands chain. Usually in pelagic but sometimes nearshore waters. Common in southern California. In the project area, most observations are from the Santa Barbara Channel between the coast and the Northern Channel Islands and between the coast and Santa Catalina Island.
Gray whale: Eastern North Pacific Stock (ENPC) and Pacific Coast Feeding Group (PCFG) (*Eschrichtius robustus*)	DL (ENPC) E (PCFG)	Common in southern California. In the project area, peak southbound migration occurs in January, and peak northbound migration occurs in March, with individuals observed moving in both directions during January and February. Nearly the entire population migrates along coastal waters during migration, although most travel outside the Channel Islands. Also observed in all other months. In the project area, most observations are from the Santa Barbara Channel between the coast and the Northern Channel Islands and between the coast and Santa Catalina Island. Gray whales from the PCFG are rare visitors to the Southern California POCS.

TABLE 3.9-1 (Cont.)

Species[a]	Status[b]	Occurrence/Distribution in Southern California
Humpback whale: California/Oregon/Washington Stock (*Megaptera novaeangliae*)	E/D[d]	Occurs in the continental shelf, continental slope, and offshore waters. While reported sightings in Southern California waters typically peak from May through September, it has been observed year-round. Migrates through the area in spring and fall. In the project area, most observations are from the Santa Barbara Channel between the coast and the Northern Channel Islands, with lesser observations between the coast and Santa Catalina Island. Tends to concentrate along the shelf break north of the Channel Islands. Common in southern California.
Minke whale: California/Oregon/Washington Stock (*Balaenoptera acutorostrata*)	--	Occurs in the coastal/inshore, continental shelf, continental slope, and offshore waters. Occurs year-round off California, with average number of observations highest in summer and fall months. Winter range includes SCB, with a small portion residing there throughout the summer, especially around the northern Channel Islands. Common in southern California. In the project area, most observations from the Santa Barbara Channel between the coast and the Northern Channel Islands with lesser observations between the coast and Santa Catalina Island.
North Pacific Right Whale: Eastern North Pacific Stock (*Eubalaena japonica*)	E	Most sightings occur in the Bering Sea and adjacent areas of the Aleutian Islands. Sightings of this species off the coast of California and Mexico are rare, and there is no evidence that these areas were ever regularly frequented by this species. Observed off the Channel Islands in 1981, 1990, and 1992. No recent observations within the project area.
Sei whale: Eastern North Pacific Stock (*Balaenoptera borealis*)	E	Movement patterns not well known, but typically observed in deeper waters far from the coastline. Observations in southern California waters are extremely rare. Individual observed off Laguna Beach in September 2019, previous observation in project area occurred in 2017.
Order Cetacea: Suborder Odontoceti (toothed whales, dolphins, and porpoises)		
Baird’s beaked whale: California/Oregon/Washington Stock (*Berardius bairdii*)	--	Prefers cold deep oceanic waters 1,006 m (3,300 ft) deep or greater, but may occur occasionally near shore along narrow continental shelves. Often associated with submarine canyons, seamounts, and continental slopes. Uncommon in southern California. Primarily along the continental slope from late spring to early fall.
Common bottlenose dolphin: California Coastal Stock (CCS) and California/Oregon/Washington Offshore Stock (COWOS) (*Tursiops truncatus truncatus*)	--	Occurs both offshore and in coastal waters. California Coastal Stock occurs primarily from Point Conception south within 1 km of shore. California/Oregon/Washington Offshore Stock has a more-or-less continuous distribution off California. There are coastal populations that migrate into bays, estuaries, and river mouths as well as offshore populations that inhabit waters along the continental shelf. Common in southern California, with observations made throughout the year. In the project area, most observations from the Santa Barbara Channel between the coast and the Northern Channel Islands.

TABLE 3.9-1 (Cont.)

Species[a]	Status[b]	Occurrence/Distribution in Southern California
Cuvier's beaked whale: California/Oregon/Washington Stock (*Ziphius cavirostris*)	--	Prefers pelagic waters usually greater than 1,006 m (3,300 ft) deep off the continental slope and edge, as well as around steep underwater geologic features like banks, seamounts, and submarine canyons. Occurs year-round in the deep waters of the SCB. Uncommon in southern California.
Dall's porpoise: California/Oregon/Washington Stock (*Phocoenoides dalli dalli*)	--	Occurs in the continental shelf, continental slope, and offshore waters. Common in winter. While common in southern California, the average number of individuals observed per month is generally five or less. In the project area, most observations from the Santa Barbara Channel between the coast and the Northern Channel Islands.
Dwarf sperm whale: California/Oregon/Washington Stock (*Kogia sima*)	--	Most common along the continental shelf edge and slope. Rare in southern California.
Harbor porpoise: Morro Bay Stock (*Phocoena phocoena*)	--	Occurs from Point Sur to Point Conception and from shore to the 200-m (656-ft) isobath. Rare south of Point Conception. No observations recorded within the project area.
Killer whale: Eastern North Pacific Offshore Stock (*Orcinus orca*)	--	Occurs in the continental shelf, continental slope, and offshore waters. May occur in the SCB year-round, but fewest observations occur during summer months. Most observations from the Santa Barbara Channel between the coast and the Northern Channel Islands. Common in Southern California.
Long-beaked common dolphin: California Stock (*Delphinus capensis capensis*)	--	Prefers shallow waters closer to the coast (e.g., 50–100 nautical miles) and on the continental shelf. Commonly found from Baja California northward to central California. Common in southern California. Year-round presence, with thousands of individuals observed every month. In the project area, most observations from the Santa Barbara Channel between the coast and the Northern Channel Islands, with lesser observations between the coast and Santa Catalina Island.
Mesoplodont beaked whales: California/Oregon/Washington Stock (*Mesoplodon* spp.)	--	Generally found along the continental slope and offshore waters (seaward of 500- to 1000-m [1,640- to 3,281-ft)] depth) from late spring to early fall, with fewer individuals observed during winter and early spring.
Northern right whale dolphin: California/Oregon/Washington Stock (*Lissodelphis borealis*)	--	Occurs in the continental shelf, continental slope, and offshore waters. Mostly occurs during winter and spring. Common in southern California, but rare south of Point Conception. No recent observations recorded within the project area.

TABLE 3.9-1 (Cont.)

Species[a]	Status[b]	Occurrence/Distribution in Southern California
Pacific white-sided dolphin: California/Oregon/Washington Stock (*Lagenorhynchus obliquidens*)	--	Occurs in the continental shelf, continental slope, and offshore waters. Common in southern California. Observed year-round but more abundant November–April. In the project area, most observations are from the Santa Barbara Channel between the coast and the Northern Channel Islands, with lesser observations between the coast and Santa Catalina Island.
Pygmy sperm whale: California/Oregon/Washington Stock (*Kogia breviceps*)	--	Most common in waters seaward of the continental shelf edge and the slope. Rare in southern California.
Risso's dolphin: California/Oregon/Washington Stock (*Grampus griseus*)	--	Occurs from nearshore to oceanic waters, but prefers the continental shelf and continental slope waters over nearshore and oceanic waters. Common off southern California year-round, but no observations reported for January–March in recent years. In the project area, most observations are from the Santa Barbara Channel between the coast and the Northern Channel Islands, with lesser observations north of Santa Barbara and between the coast and Santa Catalina Island.
Short-beaked common dolphin: California/Oregon/Washington Stock (*Delphinus delphis delphis*)	--	Primarily occurs within oceanic and offshore waters, but also occurs along the continental slope in waters 198 to 1,981 m (650 to 6,500 ft) deep. Prefers waters altered by underground geologic features where upwelling occurs. Found off the California coast especially during warmer months. Common, with hundreds to several thousand observed monthly. In the project area, most observations from the Santa Barbara Channel between the coast and the Northern Channel Islands.
Short-finned pilot whale: California/Oregon/Washington Stock (*Globicephala macrorhynchus*)	--	Associated with continental slope waters and pelagic and island waters characterized by steep bathymetry. Considered uncommon in Southern California but is observed south of Point Conception.
Sperm whale: California/Oregon/Washington Stock (*Physeter macrocephalus*)	E/D	Present in offshore waters year-round with peak abundance during migrations from April to mid-June and from late August through November. Generally found in waters with depths >600 m (1,968 ft). Uncommon at depths <300 m (984 ft). Uncommon in the SCB. Within the project area, there have been sporadic observations since 1991. Recent observations include 11 in July 2018, 1 in August 2018, and 1 in September 2021.
Striped dolphin: California/Oregon/Washington Stock (*Stenella coeruleoalba*)	--	Prefers oceanic and deep waters. Often linked to upwelling areas and convergence zones. Common in southern California, but infrequently observed in the project area.

TABLE 3.9-1 (Cont.)

Species[a]	Status[b]	Occurrence/Distribution in Southern California
Order Carnivora: Suborder Caniformia (includes seals, sea lions, and sea otters)		
California sea lion: U.S. Stock (*Zalophus californianus californianus*)	--	Resides in shallow coastal and estuarine waters. Sandy beaches are preferred haul-out sites, but will also haul out on marina docks, jetties, buoys, and O&G platforms. Common in southern California. Breeds in southern California and is present year-round. Breeds on San Miguel, San Nicolas, Santa Barbara, and San Clemente islands. Highest densities in Santa Barbara Channel in nearshore waters, with moderate densities in nearshore waters north of Point Conception.
Guadalupe fur seal (*Arctocephalus townsendi*)	T/D	Occurs in waters off southern California and the Pacific coast of Mexico. Occurs in coastal rocky habitats and caves during the breeding season; little known about its whereabouts during non-breeding season. Regularly occurs in the Channel Islands. Breeding occurs almost entirely on Guadalupe Island, Mexico, but there are small populations off the coast of Baja California on San Benito Archipelago and off southern California at San Miguel Island. Some pups from San Miguel Island are likely hybrids with California sea lions. Uncommon in southern California.
Harbor seal: California Stock (*Phoca vitulina richardii*)	--	Occurs in continental shelf waters. Breeds in southern California and is present year-round. Spends most of its time throughout fall and winter at sea. Hauls out on all Channel Islands and on beaches along the mainland, particularly from Ventura County northward. Common in southern California. Bulk of stock occurs north of Point Conception.
Northern elephant seal: California Breeding Stock (*Mirounga angustirostris*)	--	Occurs in continental shelf, continental slope, and offshore waters. Breeds in southern California and is present year-round. San Miguel and San Nicolas islands are the major rookery islands. Some also born on Santa Rosa, Santa Barbara, and San Clemente islands. When on land, they occur on sandy beaches. Uncommon in southern California. Feeding occurs in deep waters seaward of the continental slope.
Northern fur seal: California Stock (*Callorhinus ursinus*)	--	Most fall and winter sightings are from offshore waters west of San Miguel Island. Breeds in southern California and is present year-round. Breeds on San Miguel Island. Uncommon in southern California. In winter and spring, large numbers feed along the California coast beyond the edge of the continental shelf.
Southern sea otter (*Enhydra lutris nereis*)	T/D	Uncommon in southern California. Range of the mainland population extends from Marin County in northern California southward to Santa Barbara County. Since 1998, southern sea otters have occupied areas south of Point Conception. In 2019, 102 sea otters were counted southeast of Point Conception, with only 1 spotted southeast of Gaviota State Park. There is also a population at San Nicolas Island off Ventura County, with 114 individuals as of February 2020. Typically inhabits waters <18 m (59 ft) deep and rarely moves more than 2 km (1.2 mi) offshore.

TABLE 3.9-1 (Cont.)

Species[a]	Status[b]	Occurrence/Distribution in Southern California
Steller sea lion: Western U.S. Stock (*Eumetopias jubatus*)	DL	Forages near shore and in pelagic waters. Rookery sites do not occur in southern California. Occasionally uses O&G platforms as haul-out sites.

[a] The rough-toothed dolphin (*Steno bredanensis*) and false killer whale (*Pseudorca crassidens*) are not included as their occurrence in the area likely represents extralimital occurrences (Douglas et al. 2014).

[b] Status: D = depleted under the Marine Mammal Protection Act (MMPA); DL = delisted under the ESA; E = endangered under the Endangered Species Act (ESA); T = threatened under the ESA; – = not listed. All species are protected under the MMPA.

[c] Stewart and Weller (2021) provided a 2019/2020 estimate of abundance migrating southward off central California coast of 20,580. The decline may be associated with the unusual mortality event for the Eastern North Pacific Stock of gray whales.

[d] Individuals from the endangered Central America DPS and threatened Mexico DPS make use of the waters off California as feeding areas, as do a small number of whales from the non-listed Hawaii DPS. Until stock delineation under the MMPA is completed, the California/Oregon/Washington stock will continue to be considered E/D for MMPA management purposes.

Sources: Calambokidis et al. (2015); Campbell et al. (2014; 2015); Carretta et al. (2021a,b); CMLPAI 2009; Connelly (2019); Cooke and Clapham (2018); Culik (2010); Debich et al. (2017); Douglas et al. (2014); Hatfield et al. (2019); Jefferson et al. (2014); Kaplan et al. (2010); Kim (2015); Maxon Consulting, Inc. (2014); McCue et al. (2021); Muto et al. (2020); NMFS (2021e, f, g); Orr et al. 2017; Smultea and Jefferson (2014); Stewart and Weller (2021); USFWS (2021b,c); Tinker et al. (2017); Whale Alert – West Coast (2022); Yee et al. (2020).

3.10 COMMERCIAL AND RECREATIONAL FISHERIES

This section presents an overview of the recreational and commercial fishing that occurs in the Southern California Planning area and its five adjacent coastal counties (San Luis Obispo, Santa Barbara, Ventura, Los Angeles, and Orange).

3.10.1 Commercial Fisheries

Commercial fishing occurs throughout most of the Southern California OCS Planning Area and adjacent coastal areas. The nearshore waters along the coast from Los Angeles to Monterey Counties and the waters just off the Channel Islands contain beds of giant kelp that provide habitats for numerous species of commercially important fish and shellfish species. About 65 commercial fish and shellfish species are fished using a variety of gear types. Fishery seasons are established and regulated by the California Department of Fish and Wildlife (CDFW). Figure 3.10-1 shows the spatial distribution of OCS oil platforms and associated pipeline and cable infrastructure together with commercial fishing blocks in the project area. Fishing blocks are comprised of 14.5-km × 17.7-km (9-mi × 11-mi) areas, each encompassing approximately 258 km^2 (100 mi^2) of ocean area. The CDFW uses data from these fishing blocks to evaluate commercial fisheries and to organize information on commercial fish catch.

The CDFW reports the total number of pounds of commercial fishery species (comprised of fishes, invertebrates, and kelp) landed in California and the estimated value of those landings annually for nine statistical reporting areas along the coast. Each of the reporting areas is named for a major port within its boundaries (CDFW 2022c). The portion of the OCS addressed in this PEIS is nearest to the Santa Barbara and Los Angeles reporting areas. The Santa Barbara reporting area encompasses coastal waters associated with San Luis Obispo, Santa Barbara, and Ventura counties and includes the ports of Morro Bay, Avila Beach, Oceano, Santa Barbara, Ventura, Oxnard, and Port Hueneme. The Los Angeles reporting area encompasses coastal waters associated with Los Angeles and Orange counties and includes the ports of Santa Monica, Redondo Beach, San Pedro, Huntington Beach, Dana Point, and Los Angeles. It should be noted that the reported statistics are based on the ports where the fishery data are collected upon landing, not necessarily where the fishing activity occurred.

The overall landing weights and values reported by CDFW for commercial fisheries in the Santa Barbara and Los Angeles reporting areas during 2015–2019 are provided in Table 3.10-1 (information for earlier years is provided in Argonne 2019). Nearly all the landings in the Santa Barbara reporting area are from Santa Barbara, Ventura, Oxnard, and Port Hueneme harbors and nearly all the landings in the Los Angeles reporting area are associated with the San Pedro, Terminal Island, Long Beach, and Dana Point harbors.

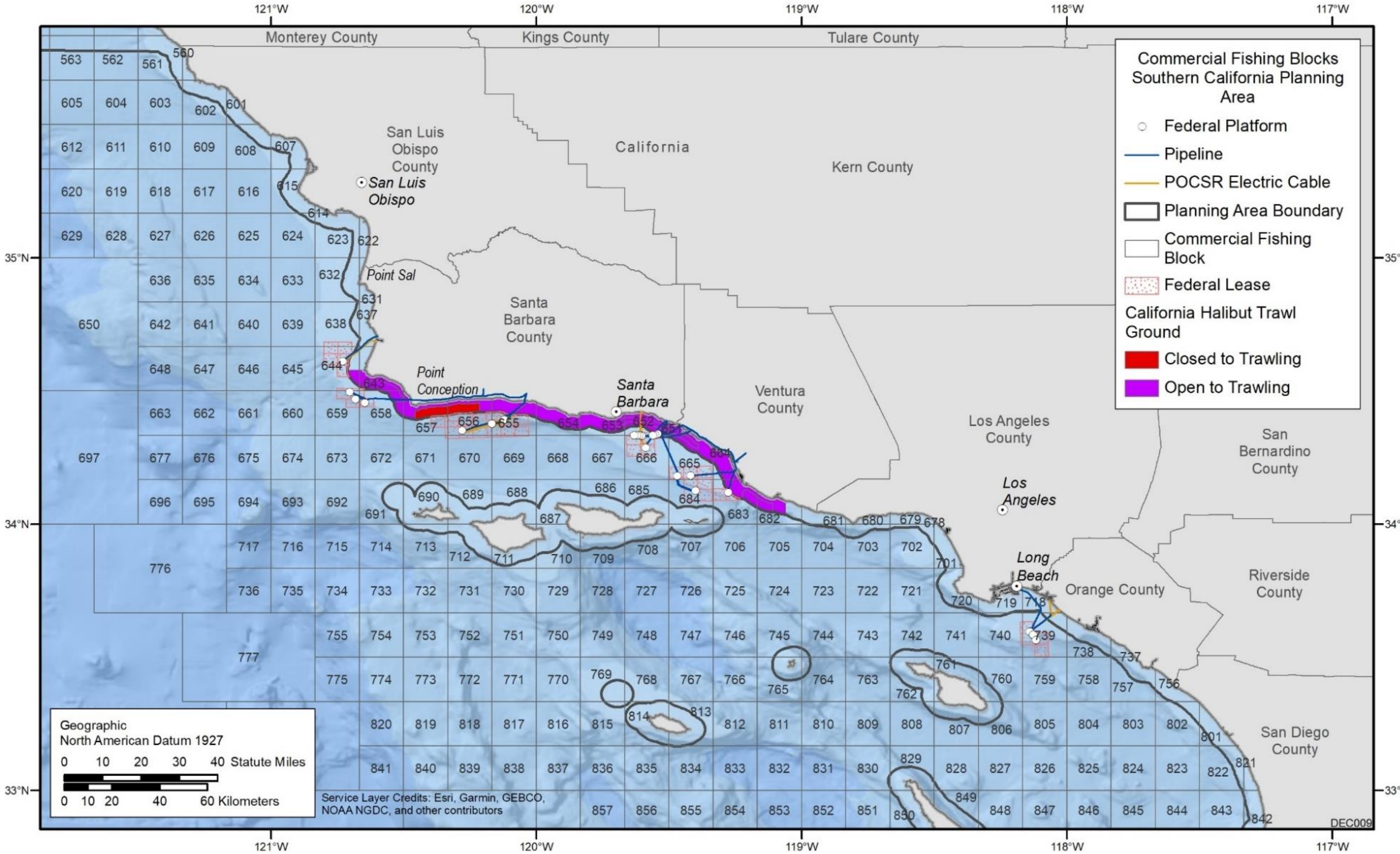

FIGURE 3.10-1 Commercial Fishing Blocks in Southern California OCS Planning Area and Vicinity (Source: Perry et al. 2010.)

TABLE 3.10-1 Total Annual Reported Landing Weights and Landing Values for the Commercial Fishery in the Santa Barbara and Los Angeles Reporting Areas, 2015–2019

	Santa Barbara Reporting Area		Los Angeles Reporting Area	
Year	Landing Weight (lb.)	Landing Value ($)	Landing Weight (lb.)	Landing Value ($)
2015	49,912,708	$34,727,339	15,082,154	$11,698,705
2016	43,269,600	$39,614,498	36,743,539	$21,321,705
2017	94,983,169	$65,760,724	43,554,835	$29,197,248
2018	34828207	$36,801,833	29,312,445	$21,975,766
2019	14,424,189	$24,142,390	25,713,048	$18,588,057
5-yr Average	47,483,575	$40,209,357	30,081,204	$20,556,296

Source: CDFW (2022b).

Many species of fish and invertebrates are caught and landed in commercial fisheries off the California coast. The most important species groups are benthic invertebrates, oceanic pelagic (epipelagic) fishes, demersal fish species, and anadromous species. Important invertebrate species include Dungeness crab, spiny lobster, squid, and oysters (oysters are primarily harvested in inland waters). Important targeted fish species include anadromous salmon (primarily Chinook), tuna and swordfish (epipelagic); and sablefish, halibut, and rockfishes (demersal). Many fishers in the area do not fish for just one species or use only one gear type. Most commercial fishers switch targeted species during any given year depending on market demand, prices, harvest regulations, weather conditions, and fish availability.

Each species or species group is caught using various methods and gear types. Traps are used for crab, spiny lobster, and some demersal fish species; sardines are usually caught in surrounding lampara or purse nets; tuna are caught on surface troll lines or longlines; rockfishes are generally captured using trawls, set longlines, or trolling rigs; California halibut are captured using trawl, set gill net, and hook-and-line; and squid are caught by encircling schools with a round-haul net, such as a purse seine or lampara net. Generally, fishing activities with the highest potential for interactions (or conflicts) with OCS structures and activities (e.g., O&G operations) are bottom trawling (potential for snagging on pipelines, cables, and debris) and surface longlining (potential for space-use conflicts with construction vessels, seismic survey vessels and possible entanglement with thrusters on drill ships).

From 2015 to 2019 (the most recent year for which final summaries of commercial fisheries data from CDFW is available for the applicable reporting blocks), landings of more than 237 million lb. of fish and invertebrates—with a total value of approximately $201 million were reported for the Santa Barbara reporting area and more than 150 million lb.—worth a total of approximately $103 million—were reported for the Los Angeles reporting area (Table 3.10-1). Estimated landing weights and revenues for the top-ranked species reported in the commercial fishery from 2017 through 2021 are presented in Tables 3.10-2 and 3.10-3, respectively.

TABLE 3.10-2 Annual Reported Landing Weights (Metric Tons), by Species, for the Commercial Fishery in the Santa Barbara and Los Angeles Reporting Areas, 2017–2021[a,b]

	Santa Barbara Reporting Area					Los Angeles Reporting Area					
Species Name	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021	% of 5-yr Total
Market Squid	39,715	12,536	4,146	2,240	15,969	13,071	6,760	5,434	3,201	7,569	73.6
Chub Mackerel	243	588	164	5	3	1,999	1,917	3,602	544	855	6.6
Red Sea Urchin	1,262	899	466	491	648	381	411	430	187	190	3.6
Yellowfin Tuna	2	0	0	0	0	1,709	1,383	366	1,605	18	3.4
Pacific Sardine	92	129	73	173	125	159	130	756	917	828	2.3
Rock Crab	414	413	468	391	256	23	64	64	64	46	1.5
Pacific Bonito	101	2	1	1	0	782	671	1	84	5	1.1
California Spiny Lobster	149	201	203	187	177	81	108	105	78	60	0.9
Skipjack Tuna	0	0	0	0	0	37	1,120	14	175	0	0.9
Sablefish	149	210	215	146	104	36	23	27	31	17	0.6
Bluefin Tuna	0	2	1	2	2	468	17	232	139	76	0.6
Ridgeback Prawn	168	164	193	219	100	5	17	8	0	27	0.6
Swordfish	39	14	7	9	5	205	145	122	223	83	0.6
Northern Anchovy	43	0	109	59	165	179	3	20	52	84	0.5
Spotted Prawn	63	113	92	113	62	50	33	45	35	21	0.4
California Halibut	68	60	75	74	86	14	21	22	8	17	0.3
Bigeye Tuna	0	0	0	0	0	0	153	98	122	51	0.3
Shortspine Thornyhead	133	90	65	38	32	0	9	7	5	5	0.3
White Seabass	55	44	35	38	34	34	36	15	8	23	0.2
Opah	12	2	0	1	0	43	67	55	81	19	0.2

[a] Information for species comprising less than 0.2% of the total 5-year catch is not shown.

[b] Source: Pacific Fisheries Information Network (2022). Retrieval dated 1 March 2022. Pacific States Marine Fisheries Commission, Portland, Oregon (www.psmfc.org).

TABLE 3.10-3 Annual Reported Landing Values ($Million) for the Commercial Fishery in the Santa Barbara and Los Angeles Reporting Areas, 2017–2021[a,b]

	Santa Barbara Reporting Area				Los Angeles Reporting Area						
Species Name	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021	% of 5-yr Total
Market Squid	$43.74	$13.60	$4.49	$2.47	$21.07	$14.41	$7.32	$5.96	$3.62	$10.01	42.7
California Spiny Lobster	$6.28	$7.30	$6.23	$7.83	$8.99	$3.40	$3.81	$3.25	$3.17	$3.08	18.0
Red Sea Urchin	$4.15	$3.36	$2.09	$2.78	$4.69	$1.53	$1.80	$2.06	$0.97	$1.29	8.3
Spotted Prawn	$1.96	$3.55	$3.00	$3.57	$2.08	$1.61	$1.08	$1.53	$1.17	$0.89	6.9
Rock Crab	$1.53	$1.53	$1.82	$1.60	$1.18	$0.08	$0.27	$0.26	$0.27	$0.25	3.0
Swordfish	$0.38	$0.15	$0.09	$0.12	$0.08	$1.71	$1.09	$1.07	$1.69	$0.68	2.4
Shortspine Thornyhead	$2.18	$1.58	$1.20	$0.70	$0.60	$0.00	$0.09	$0.12	$0.07	$0.07	2.2
Sablefish	$0.96	$1.33	$1.36	$0.84	$0.66	$0.29	$0.18	$0.19	$0.22	$0.12	2.1
Yellowfin Tuna	$0.02	$0.00	$0.00	$0.00	$0.00	$2.16	$1.52	$0.41	$1.83	$0.04	2.0
California Halibut	$0.84	$0.76	$0.90	$0.82	$1.06	$0.14	$0.22	$0.20	$0.07	$0.15	1.7
Ridgeback Prawn	$0.89	$1.01	$0.96	$1.07	$0.65	$0.03	$0.10	$0.04	$0.00	$0.20	1.7
Chub Mackerel	$0.06	$0.21	$0.05	$0.00	$0.00	$0.58	$0.75	$1.20	$0.24	$0.45	1.2
White Seabass	$0.49	$0.43	$0.36	$0.34	$0.30	$0.26	$0.26	$0.13	$0.06	$0.19	0.9
Bigeye Tuna	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.00	$0.63	$0.71	$0.30	0.9
Unsp. Sea Cucumbers	$0.55	$0.44	$0.37	$0.28	$0.32	$0.14	$0.10	$0.10	$0.15	$0.06	0.8
Bluefin Tuna	$0.00	$0.01	$0.01	$0.02	$0.02	$0.53	$0.06	$0.32	$0.36	$0.42	0.6

[a] Information for species comprising less than 0.5% of the total 5-year value is not shown.

[b] Source: Pacific Fisheries Information Network (2022). Retrieval dated March 1, 2022. Pacific States Marine Fisheries Commission, Portland, Oregon (www.psmfc.org).

One of the most important commercial fisheries within the project area that may be affected by decommissioning of O&G platforms, pipelines, and cables is the fishery for California halibut. California halibut is a flatfish species in the commercial bottom trawl, set gill net, and hook-and-line fisheries off central and southern California. Limited entry permits are required to participate in the commercial halibut trawl and gill net fisheries; the commercial hook-and-line fishery does not require such permits but requires a commercial fishing license (CDFW 2021). A seasonal closure for trawling occurs within the California Halibut Trawl Grounds, which are generally located in areas containing suitable bottom habitat between 1.6 and 4.8 km (1 and 3 mi) offshore from portions of Santa Barbara and Ventura Counties (Figure 3.10-1). Many of the state's Marine Protected Areas (see Section 3.11) include suitable habitat for California halibut, and take is prohibited in those areas. From 2017 through 2021, an average of 89 metric tons of California halibut, with an estimated average annual value of over one million dollars, were landed in the commercial fisheries of the Santa Barbara and Los Angeles reporting areas. Halibut generally live in benthic habitats with soft bottom substrate such as sand or mud. Although populations appear to be concentrated in areas that are shallower than 60 m (200 ft), they can also occur at depths greater than 305 m (1,000 ft) (CDFW 2021). Thus, activities that disturb, place obstructions in, or interfere with fishing activities in California halibut habitats could affect fisheries for this species, especially within designated trawling areas (Figure 3.10-1).

Seaweeds, especially kelp, are commercially harvested within the area using bow- or stern-mounted cutting mechanisms and conveyor systems (CDFW 2014a). Commercial harvesting of seaweeds is regulated by the California Fish and Game Commission and the CDFW through the issuance of licenses. Depending on the status of the kelp resource within a given year, specific kelp beds may be open or closed to commercial harvesting (CDFW 2014a) and may be leased by specific harvesters. An average of 7 million lb. of kelp were commercially harvested annually from California waters during the 2006 to 2013 period (CDFW 2014b), although commercial harvests have been very low compared to historic levels since 2007 (CDFW 2022a)

Although OCS operators are required to conduct activities without interfering with fishing activities, there is still a potential for fishers to experience adverse impacts due to past and present OCS activities in the Pacific Region. This includes space use conflicts, OCS-associated seafloor debris, and reduced catch due to seismic surveys. In 1978, amendments to the Outer Continental Shelf Lands Act established the Federal Fishermen's Contingency Fund to compensate commercial fishers for economic and property losses caused by O&G obstructions on the U.S. Outer Continental Shelf (NOAA 2021d). In 1988, Santa Barbara County established the Local Fishermen's Contingency Fund that compliments the Federal Fishermen's Contingency Fund, which provides loans for timely repair or replacement of damaged or lost fishing gear while claims to the Federal Fishermen's Contingency Fund are being processed, and reimburses commercial fishers for the costs of repairs or replacements that occur in state waters due to either state or federal O&G development activities (County of Santa Barbara 2022).

3.10.2 Marine Recreational Fishing

Southern California is a leading recreational fishing area along the west coast, with weather and sea conditions allowing for year-round fishing. Recreational fishing includes hook-and-line fishing from piers and docks, jetties and breakwaters, beaches and banks, private or rental boats, and commercial passenger fishing vessels. Recreational fishing also includes activities such as dive, spear- and net-fishing. Recreational fishers in Southern California access both nearshore and offshore areas, targeting bottomfish as well as coastal migratory and highly migratory species that are in pelagic waters. The majority of offshore recreational fishing is done by "jigging" baited hooks or lures, although trolling methods are also commonly used for pelagic species such as tunas, billfish, and salmon.

Recreational fishing catch statistics within the Southern California OCS Planning Area and vicinity are reported separately for three California recreational fishing districts: Central District (San Luis Obispo, Monterey, and Santa Cruz counties), Channel District (Ventura and Santa Barbara counties), and the South District (San Diego, Orange, and Los Angeles counties). The most commonly landed recreational species for the Central District, the Channel District (which includes most of the project area), and the South District from 2017 through 2021 (based on landing weights) are provided in Tables 3.10-4, 3.10-5, and 3.10-6, respectively. Based on catch data from 2017 through 2021, July and August are the months with the greatest proportion (12–18% depending on month) of the total annual recreational catch for the three districts (Figure 3.10-2). About 55% of the total annual recreational catch occurs during the period from June through September based on the past five years of compiled landing data (Figure 3.10-2).

Popular recreational target species include a variety bottomfish species (e.g., rockfish, lingcod, bocaccio halibut, and sanddab), as well as midwater and pelagic species (e.g., yellowtail, mackerel, and barracuda) (Tables 3.10-4, 3.10-5, and 3.10-6). Combined recreational fishing survey data (Pacific States Marines Fisheries Commission 2022) for the waters greater than 3 mi from shore during the 2017 through 2021 period indicate that fishing trips in the Central, Channel, and South Districts primarily targeted bottomfish species (62% of recreational landings by weight), followed by coastal migratory (18% of recreational landings by weight) and highly migratory pelagic species (18% of recreational landings by weight) (Table 3.10-7). Nontargeted recreational fishing trips accounted for 2% of recreational landings by weight (Pacific States Marines Fisheries Commission 2022; Table 3.10-7). For the same time period, fishing from party or charter boats accounted for 82% of recreational landings by weight while fishing from private or rental boats accounted for 18% of recreational landings by weight (Pacific States Marines Fisheries Commission 2022; Table 3.10-7).

In addition to being an important target species in the commercial fishery, California halibut is also an important component of the recreational fishery. The primary gear used to catch halibut in the recreational fishery is hook-and-line tackle fished near the bottom, although some halibut are also taken by divers using spears (CDFW 2021). California has imposed a minimum legal-size limit of 22 in. total length for halibut on both commercial and recreational fisheries and bag and possession limits are applicable to the recreational fishery (CDFW 2021). Take of halibut is also prohibited in Marine Protected Areas (see Section 3.11.6).

TABLE 3.10-4 Estimated Total Catch (Metric Tons) of Fish Reported for Marine Recreational Anglers in the California Central District (San Luis Obispo, Monterey, and Santa Cruz Counties), 2017–2021[a,b]

	Landing Weights (Metric Tons)						
Species Name	2017	2018	2019	2020	2021	Annual Average	% of 5-yr Total
Vermilion Rockfish	128.0	136.2	136.5	108.8	82.4	118.4	20.5
Lingcod	169.6	97.5	61.0	44.3	33.3	81.1	14.0
Blue Rockfish	83.3	90.6	69.7	32.9	41.8	63.7	11.0
Copper Rockfish	57.0	49.0	43.8	27.9	24.3	40.4	7.0
Barred Surfperch	83.6	1.0	1.6	5.5	58.6	30.0	5.2
Bocaccio	40.6	23.9	32.2	20.0	26.1	28.6	4.9
Gopher Rockfish	27.3	21.2	31.6	21.6	31.7	26.7	4.6
Yellowtail Rockfish	28.1	27.4	31.3	13.4	23.0	24.7	4.3
California Halibut	6.7	20.7	26.1	36.3	28.4	23.7	4.1
Brown Rockfish	23.7	25.7	19.7	15.1	23.0	21.4	3.7
Olive Rockfish	14.2	22.6	27.9	17.7	18.6	20.2	3.5
Canary Rockfish	27.6	18.1	21.6	12.4	16.4	19.2	3.3
Starry Rockfish	7.8	8.7	12.1	9.8	14.0	10.5	1.8
Jacksmelt	11.8	6.5	6.4	6.3	11.0	8.4	1.5
Pacific Sanddab	9.8	6.5	3.9	3.9	4.9	5.8	1.0

[a] Information for species comprising less than 1% of the total 5-year catch is not shown.

[b] Information for previous years is reported in Argonne (2019).

Source: Pacific States Marines Fisheries Commission (2022).

TABLE 3.10-5 Estimated Total Catch (Metric Tons) of Fish Reported for Marine Recreational Anglers in the California Channel District (Ventura and Santa Barbara Counties), 2017–2021[a,b]

	Landing Weights (Metric Tons)						
Species Name	2017	2018	2019	2020	2021	Annual Average	% of 5-yr Total
Ocean Whitefish	47.4	88.9	111.3	64.5	67.5	75.9	17.7
Copper Rockfish	68.1	86.2	51.5	5.7	8.8	44.0	10.3
Vermilion Rockfish	45.9	59.5	77.2	14.5	20.5	43.5	10.1
Lingcod	61.5	41.0	38.1	17.4	19.3	35.4	8.3
Bocaccio	26.9	51.4	51.1	4.0	12.2	29.1	6.8
White Seabass	16.0	8.3	23.7	22.7	69.1	27.9	6.5
California Halibut	9.3	12.5	16.6	15.5	49.1	20.6	4.8
California Sheephead	14.5	17.7	24.7	23.2	21.4	20.3	4.7
Blue Rockfish	32.0	27.4	25.7	4.7	1.8	18.3	4.3
Barred Surfperch	64.0	0.2	0.5	3.8	10.1	15.7	3.7
Yellowtail	36.9	12.6	7.6	4.2	6.3	13.5	3.2
Kelp Bass	9.7	11.9	18.5	12.2	10.3	12.5	2.9
Pacific (Chub) Mackerel	13.6	11.0	10.3	3.0	3.6	8.3	1.9
Pacific Barracuda	5.5	5.8	4.4	4.3	11.1	6.2	1.4
Starry Rockfish	7.7	8.0	9.2	1.3	2.5	5.7	1.3
Greenspotted Rockfish	3.7	6.4	8.6	0.8	8.6	5.6	1.3

[a] Information for species comprising less than 1% of the total 5-year catch is not shown.

[b] Information for previous years is reported in Argonne (2019).

Source: Pacific States Marines Fisheries Commission (2022).

TABLE 3.10-6 Estimated Total Catch (Metric Tons) of Fish Reported for Marine Recreational Anglers in the California South District (San Diego, Orange, and Los Angeles Counties), 2017–2021[a,b]

	Landing Weights (Metric Tons)						
Species Name	2017	2018	2019	2020	2021	Annual Average	% of 5-yr Total
Yellowtail	223.3	70.8	62.2	383.0	86.3	165.1	17.9
Pacific Bonito	119.5	158.6	9.2	265.9	38.9	118.4	12.8
Pacific (Chub) Mackerel	177.4	147.2	95.2	37.0	44.5	100.3	10.9
California Scorpionfish	72.6	90.5	111.7	59.4	118.1	90.5	9.8
Vermilion Rockfish	69.1	47.3	136.8	28.3	38.3	63.9	6.9
Kelp Bass	66.1	61.8	47.1	46.4	33.8	51.0	5.5
Ocean Whitefish	45.3	67.6	58.0	38.0	38.4	49.5	5.4
Bocaccio	42.8	35.4	51.4	20.2	25.2	35.0	3.8
California Sheephead	35.5	28.5	23.8	44.0	41.1	34.6	3.7
Barred Sandbass	31.4	42.4	33.1	18.2	28.3	30.7	3.3
Pacific Barracuda	18.1	33.6	4.5	24.7	50.0	26.2	2.8
Squarespot Rockfish	15.3	21.8	20.7	0.8	6.8	13.1	1.4
Spotfin Croaker	9.9	6.6	2.8	0.6	42.2	12.4	1.3
California Halibut	17.3	12.2	11.2	8.2	7.9	11.4	1.2
Copper Rockfish	13.7	9.0	22.8	8.2	3.0	11.3	1.2
Starry Rockfish	18.8	9.6	14.8	2.7	6.7	10.5	1.1
Lingcod	13.4	5.8	15.6	11.8	4.9	10.3	1.1
Pacific Sanddab	18.3	21.3	8.4	2.0	0.7	10.1	1.1
White Seabass	11.5	8.9	5.3	4.8	14.7	9.0	1.0

[a] Information for species comprising less than 1% of the total 5-year catch is not shown.

[b] Information for previous years is reported in Argonne (2019).

Source: Pacific States Marines Fisheries Commission (2022).

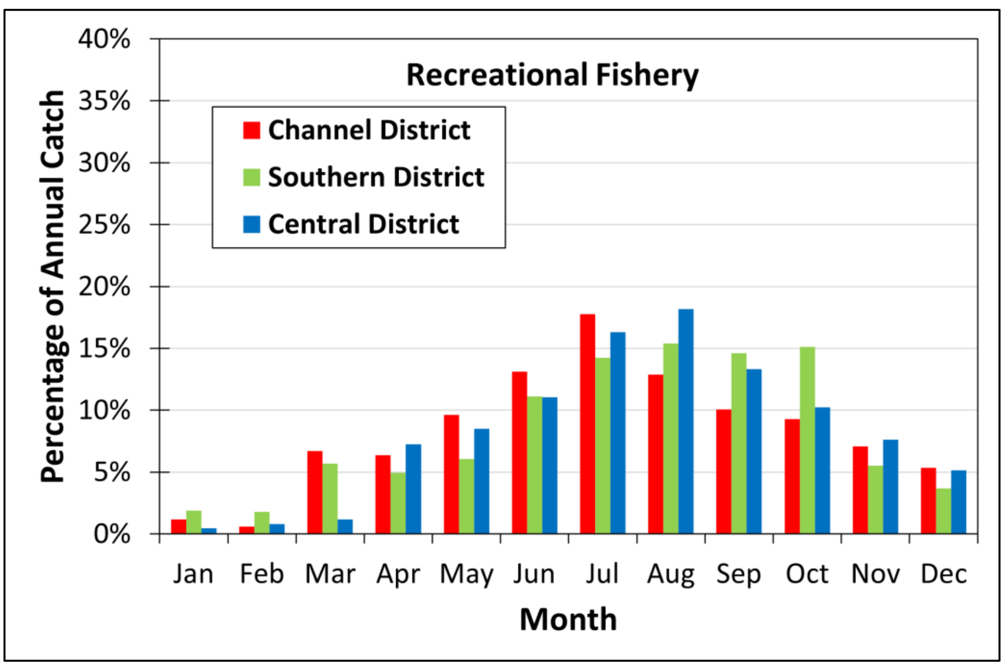

FIGURE 3.10-2 Monthly Proportions of Combined 2017 through 2021 Annual Recreational Fishery Catch in the Southern California OCS Planning Area and Vicinity. (Source: Pacific States Marines Fisheries Commission 2022).

TABLE 3.10-7 Estimated Total Catch (Metric Tons) of Fish Reported for Marine Recreational Anglers in the California Central, Channel, and South Districts by Trip Mode and Trip Type, 2017–2021

	Central District					Channel District					South District						
	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021	5-yr Total	% of 5-yr Total
Trip Mode																	
Party/Charter Boats	19.6	0.0	40.0	16.5	29.0	0.7	2.5	2.7	1.5	3.8	257.9	295.2	232.3	369.2	251.4	1522.2	82
Private/Rental Boats	0.5	4.7	10.7	3.0	8.9	1.4	1.2	1.1	1.8	0.7	85.8	51.3	55.6	45.5	53.2	325.3	18
Trip Type																	
Bottomfish	19.9	3.2	49.5	18.4	32.8	1.1	3.5	3.3	2.7	4.4	220.3	231.0	262.9	104.1	191.8	1149.0	62
Coastal Migratory	0.0	0.6	0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.0	90.5	77.3	12.0	90.4	57.4	328.8	18
Highly Migratory	0.1	1.0	1.2	1.0	5.0	0.0	0.0	0.0	0.0	0.0	21.9	31.5	8.5	214.9	50.0	335.0	18
Other Species	0.0	0.0	0.0	0.0	0.0	0.8	0.1	0.3	0.5	0.1	11.1	6.7	4.5	5.2	5.4	34.6	2

Source: Pacific States Marines Fisheries Commission (2022).

3.11 AREAS OF SPECIAL CONCERN

This section identifies and briefly discusses areas of special concern that occur within the Southern California OCS Planning Area and vicinity. These areas include federally and State managed areas such as Marine Protected Areas (MPAs) and onshore and offshore military use areas. Federally managed MPAs include areas designated as National Marine Sanctuaries (NMSs), National Parks (NPs), National Wildlife Refuges (NWRs), National Estuarine Research Reserves (NERRs), and National Estuary Program (NEP) estuaries. The Southern California OCS Planning Area also includes State of California protected areas. Critical habitat (as designated under the ESA) for endangered species is discussed in the biota-specific sections presented earlier.

3.11.1 Marine Sanctuaries

The only NMS along the southern Pacific coast is the Channel Islands NMS, designated in 1980 under the National Marine Sanctuaries Act (U.S. Department of Commerce et al. 2009). The Channel Islands NMS is located in the waters surrounding the islands and offshore rocks in the Santa Barbara Channel: San Miguel Island, Santa Rosa Island, Santa Cruz Island, Anacapa Island, Santa Barbara Island, Richardson Rock, and Castle Rock (Figure 3.11-1). The sanctuary covers an area of about 1,110 nautical mi^2 (3,807 km^2) and extends seaward about 6 nautical mi (11 km) from the Channel Islands and offshore rocks.

In 2002, the California Fish and Game established a network of MPAs within the nearshore waters of the sanctuary, and in 2006 and 2007, NOAA expanded this network into the sanctuary’s deeper waters (National Ocean Service 2022). The entire MPA network consists of 11 marine reserves (where all fish take and harvest is prohibited) and 2 marine conservation areas (where limited take of lobster and pelagic fish is allowed). The Channel Islands NMS supports a diversity of marine life and habitats, unique and productive oceanographic processes and ecosystems, and culturally significant resources such as submerged cultural artifacts and shipwrecks (U.S. Department of Commerce et al. 2009).

Located along the central California Coast, the Monterey Bay NMS extends from Marin to Cambria in San Luis Obispo County (National Ocean Service 2019). The sanctuary extends an average distance of 48 km (30 mi) from shore and reaches a depth of 3,884 m (12,743 ft) (more than 3.2 km [2 mi]) at its deepest point. It is one of the nation’s largest national marine sanctuaries, covering an area of about 15,783 km^2 (6,094 mi^2), and includes marine reserves and marine conservation areas. The sanctuary supports a diverse marine ecosystem, including a very large contiguous kelp forest, one of North America's largest underwater canyons, rocky shores, sandy beaches, and estuaries (NOAA 2021e). These habitats harbor an incredible variety of marine life, including 36 species of marine mammals, more than 180 species of seabirds and shorebirds, at least 525 species of fishes, 4 species of sea turtles, and an abundance of invertebrates and algae (NOAA 2021e).

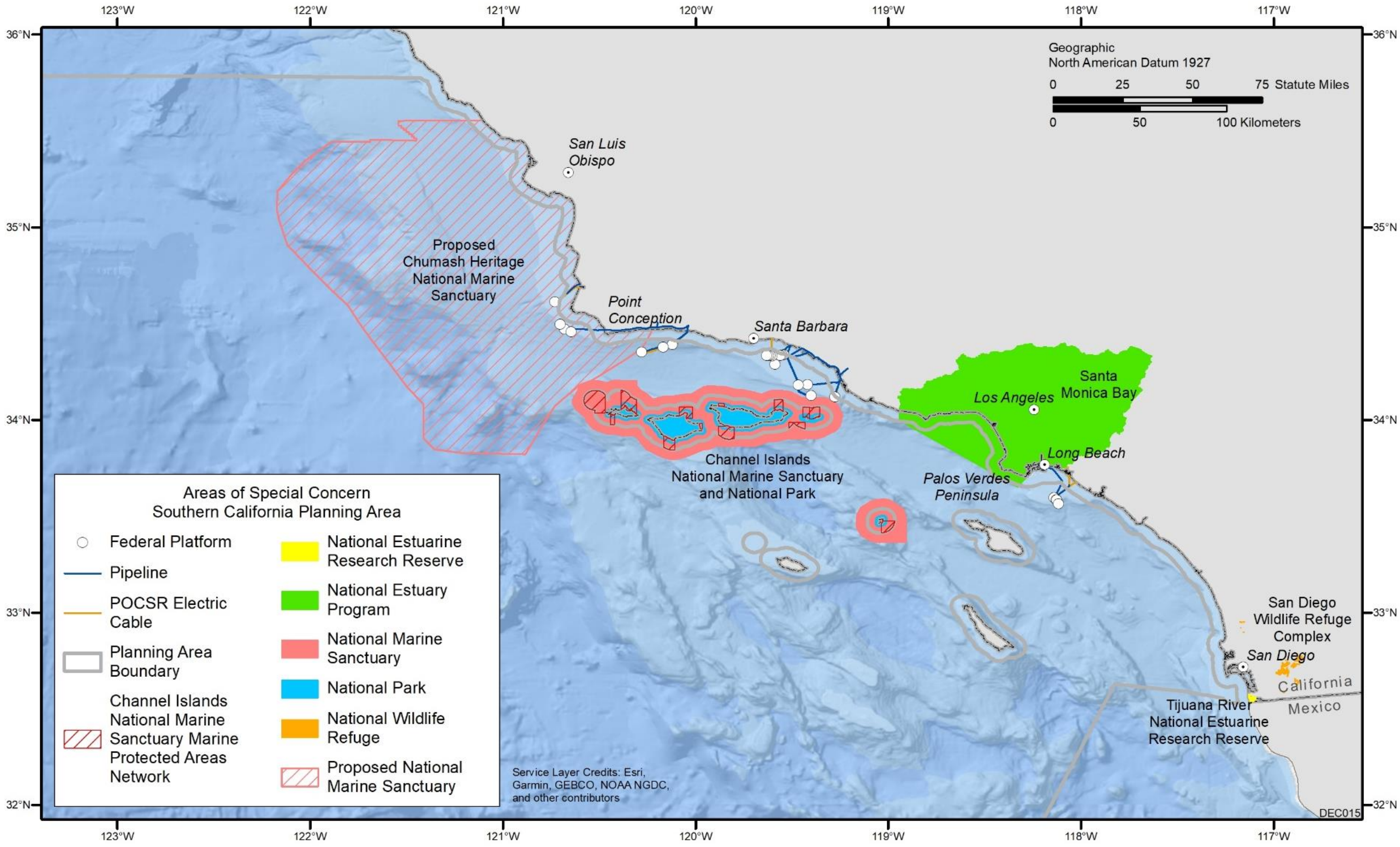

FIGURE 3.11-1 Federally Managed Marine Protected Areas along the Southern Pacific Coast.

In 2015, the Northern Chumash Tribal Council (NCTC) submitted a nomination for the creation of the Chumash Heritage National Marine Sanctuary, and the National Oceanic and Atmospheric Administration (NOAA) is currently considering this sanctuary designation to protect the region's important marine ecosystem, maritime heritage resources, and cultural values of Indigenous communities. The area proposed for sanctuary designation is adjacent to San Luis Obispo and Santa Barbara counties (Figure 3.11-1). The proposed sanctuary would recognize Chumash tribal history and protect an internationally significant ecological transition zone, where temperate waters from the north meet the subtropics (NOAA 2021f).

3.11.2 National Parks

The Channel Islands NP encompasses an area of more than 1,000 km^2 (380 mi^2) and includes five islands off the southern coast of California (San Miguel Island, Santa Rosa Island, Santa Cruz Island, Anacapa Island, and Santa Barbara Island) and the seaward waters for 1 nautical mile beyond the islands (Figure 3.11-1). The park has both terrestrial and aquatic habitats (e.g., kelp forests, seagrass beds, rock reefs and canyons, pelagic waters, coastal marshes and lagoons, sand beaches, sea cliffs, and rocky intertidal benches). Ecological resources in the park include seal, sea lion, and seabird rookeries; and at least 26 species of cetaceans have been reported from the park's waters. Archaeological and cultural resources (spanning more than 12,000 years) are also present (BOEMRE 2010; NPS 2021b).

Other sensitive areas managed by the National Park Service (NPS) include National Monuments and National Recreation Areas. Cabrillo National Monument is located on Point Loma Peninsula, on the Southern California coast just west of San Diego (NPS 2017a). The monument features rocky intertidal habitats, including tidal pools, seal and sea lion habitat, and cultural resources. Santa Monica Mountains National Recreation Area is located west of Los Angeles, with 66 km (41 mi) of coastline extending from Point Mugu to Santa Monica (NPS 2017b). Coastal habitats within the recreation area boundaries include rocky tide pools, sand beaches, lagoons, and salt marshes. Numerous protected areas within the recreation area are managed by state and local agencies.

3.11.3 National Wildlife Refuges

There are 28 NWRs along the Pacific coast, most of which were established to provide feeding, resting, and wintering areas for migratory waterfowl and shorebirds. Four of these are located off the southern coast of California: (1) Seal Beach, (2) San Diego Bay, (3) San Diego, and (4) Tijuana Slough. Together, these NWRs comprise the San Diego Wildlife Refuge Complex (Figure 3.11-1). There are no coastal or offshore NWRs for San Luis Obispo, Santa Barbara, or Ventura counties.

3.11.4 National Estuarine Research Reserves

The Tijuana River NERR, one of six NERRs within the Pacific Region, is located on the Southern California coast just to the north of the U.S.–Mexico border (Figure 3.11-1) and is jointly managed by the California State Park system and the USFWS. Established in 1982, the Tijuana River NERR is a saline marsh reserve that encompasses 928 ha (2,293 ac) and is recognized as a wetland of international importance (NOAA 2017b). It is home to eight threatened and endangered species, including the light-footed clapper rail and the California least tern.

3.11.5 National Estuary Program

Of the six estuaries established under the NEP in the Pacific region, one is located along the southern California coast and one along the central coast (Figure 3.11-1). The Santa Monica Bay NEP was established off Los Angeles County in 1988 to improve water quality, conserve and rehabilitate natural resources, and protect the Bay's benefits and values (Santa Monica Bay Restoration Commission 2008). The Santa Monica Bay ecosystem includes a wide diversity of habitats such as sandy and rocky intertidal habitats, lagoons, saltmarshes, and mudflats, with a watershed that encompasses 1,072 km^2 (414 mi^2). Residing within the estuary are threatened and endangered species, such as the California least tern; western snowy plover; green, leatherback, loggerhead, and olive Ridley sea turtles; and steelhead (BOEMRE 2010).

The Morro Bay National Estuary Program was established in 1994 in San Luis Obispo County to protect and restore the Morro Bay Estuary. Residing within the 930 ha (2,300 ac) estuary include a wide range of wetlands, creeks, salt and freshwater marshes, intertidal mud flats, and eelgrass beds. The priority issues for the estuary and watershed are accelerated sedimentation, bacterial contamination, elevated nutrient levels, toxic pollutants, scarce freshwater resources, preserving biodiversity, and environmentally balanced uses (Morro Bay National Estuary Program 2017).

3.11.6 California State Marine Protected Areas

There are 50 State-designated MPAs along the southern Pacific coast (from Point Conception to the U.S.–Mexico border), covering about 922 km^2 (356 mi^2) of ocean, estuary, and offshore rock/island waters, and 9 State-designated MPAs along the central California coast (from the Monterey County line to Point Conception) (Figure 3.11-2) (CDFW 2016, 2019). These designations have been in effect in State waters since January 1, 2012, and include the following:

- 19 State marine reserves, which prohibit damage or take of all marine resources (living, geological, or cultural);

- 21 State marine conservation areas, which may allow some recreational and/or commercial take of marine resources; and

- 10 State marine conservation areas, which generally prohibit the take of marine resources (living, geological, or cultural), but allow some ongoing permitted activities such as dredging to continue.

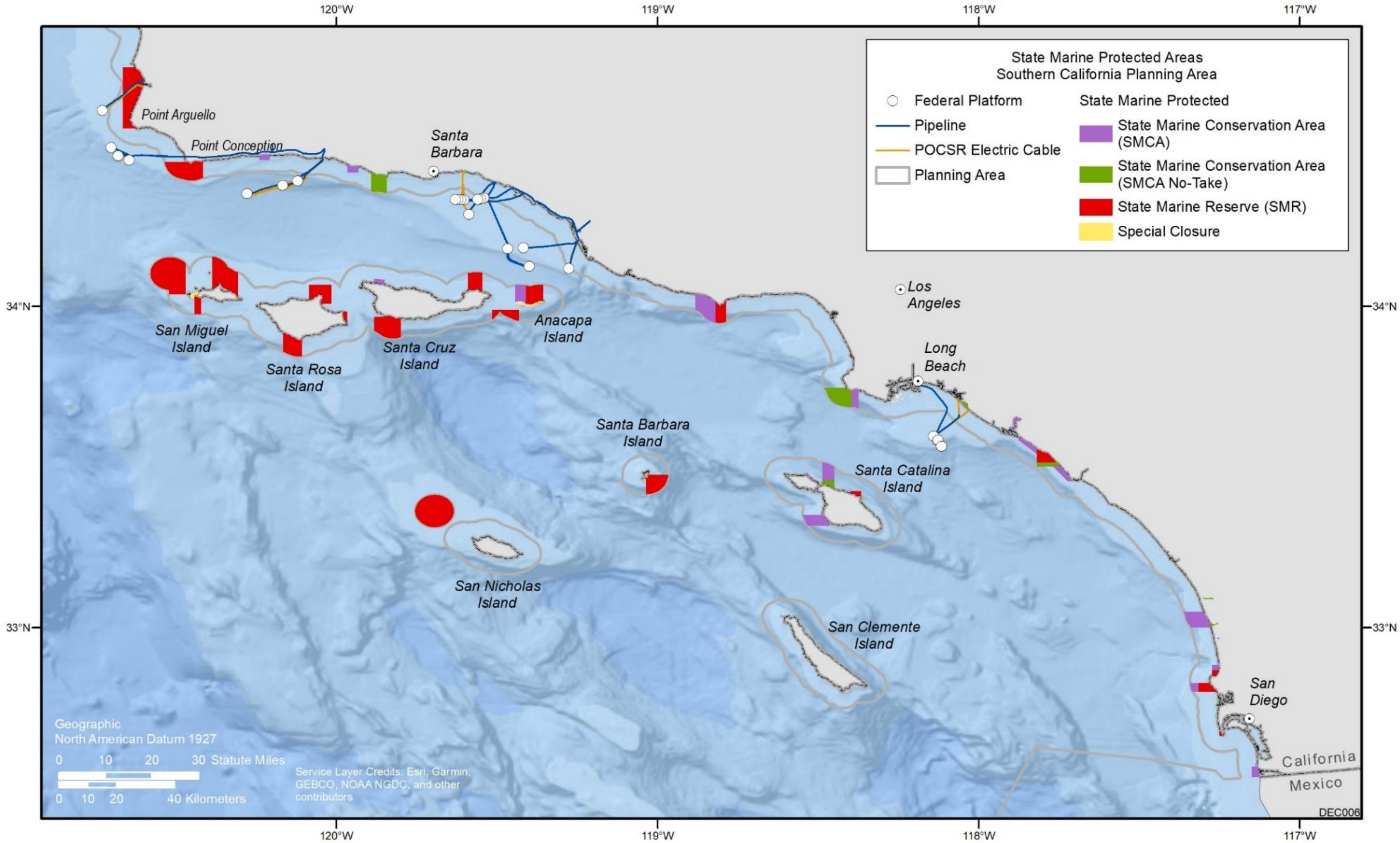

FIGURE 3.11-2 State-designated MPAs along the Southern California Coast.

In addition, two special closure areas, designated by the California Fish and Game Commission and managed within the California MPA network, prohibit access or restrict boating activities in waters adjacent to seabird rookeries or marine mammal haul-out sites.

3.11.7 Military Use Areas

Military use areas, established in numerous areas off all U.S. coastlines, are used by the U.S. Air Force, Navy, Marine Corps, and Special Operations Forces to conduct various testing and training missions. Military activities can be quite varied, but normally consist of air-to-air, air-to-surface, and surface-to-surface naval fleet training, submarine and antisubmarine training, and air force exercises. The Navy Fleet and Marine Corps amphibious training occurs almost daily along the Pacific coast, with activity varying from unit-level training to full-scale carrier/expeditionary strike group operations and certification.

Two major military facilities occur along the Southern California POCS. Naval Base Ventura County (NBVC) is a United States Navy base in Ventura County, California. Formed by the merger of Naval Air Station (NAS) Point Mugu and Naval Construction Battalion (CBC) Port Hueneme. NBVC is a diverse installation composed of three main locations — Point Mugu, just south of Port Hueneme; Port Hueneme, in Oxnard, CA; and San Nicolas Island. The base serves as an all-in-one mobilization site, with a deep water port, a railhead, and an airfield. NBVC supports more than 100 tenant commands with a base population of more than 19,000 personnel, making it the largest employer in Ventura County.

At Point Mugu, the NBVC operates two runways and a 93,000 km^2 (36,000 mi^2) sea test range, anchored by San Nicolas Island. At Port Hueneme, the NBVC operates the only deep-water port between Los Angeles and San Francisco, dedicated access for on- and off-loading of military freight for the various branches of service. The port is the West Coast homeport of the U.S. Navy Seabees.

The Point Mugu Sea Range (PMSR) supports the testing and tracking of weapons systems in restricted air and sea space without encroaching on civilian air traffic or shipping lanes (Point Mugu Sea Range 2022). The range can be expanded through interagency coordination between the U.S. Navy and the Federal Aviation Administration. The PMSR encompasses 93,000 km^2 (36,000 mi^2) of ocean and controlled airspace, is about 518 km (200 mi) long (north to south), and extends west into the Pacific Ocean from its nearest point at the mainland coast (3 nautical mi at Ventura County) out to about 466 km (180 mi) offshore (Figure 3.11-3). There are only four OCS platforms (Harvest, Hermosa, Hidalgo, and Irene) in any military-use area. These platforms are located within Military Warning Area W-532; they were installed in 1985 and 1986 and are still in place (BOEMRE 2010). Lessees and platform operators are required to coordinate their O&G activities with appropriate military operations to prevent potential conflicts with military training and use activities.

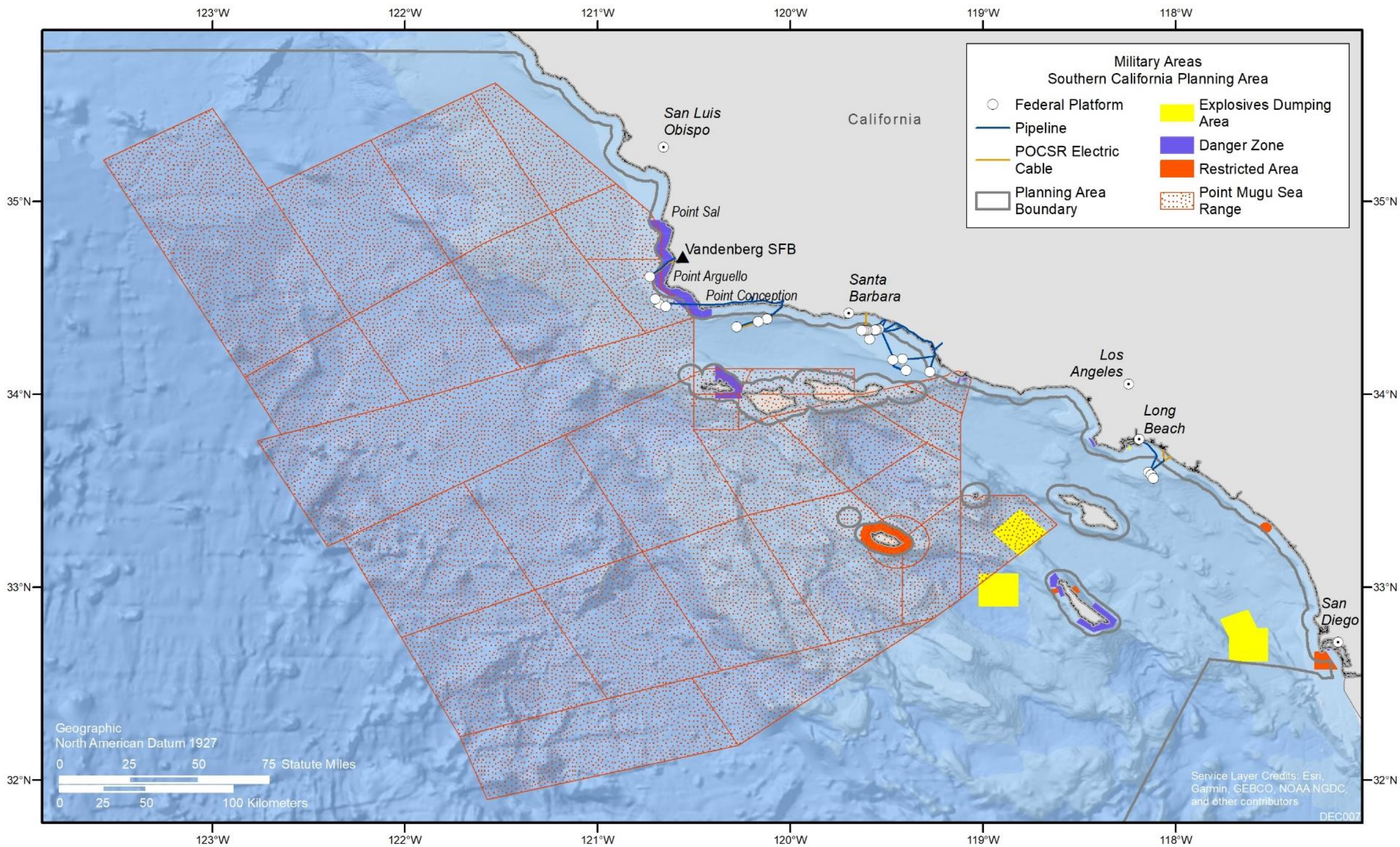

FIGURE 3.11-3 Military Use Areas Along the Southern California Coast.

Within the PMSR, the U.S. Army Corps of Engineers has established surface danger zones and restricted areas which are used for a variety of hazardous operations (Figure 3.11-3) (33 CFR Part 34). The danger zones may be closed to the public on a fulltime or intermittent basis. A restricted area is a defined water area for the purpose of prohibiting or limiting public access. Restricted areas generally provide security for government property and/or protection to the public from the risks of damage or injury arising from the government's use of that area. The USCG also conducts mission and training activities within the sea range, including monitoring of safety zones and conducting observations of marine mammals and sea turtles (Point Mugu Sea Range 2022).

The Vandenberg Space Force Base (VSFB) which, in addition to conducting military space launches and missile testing, also conducts launches for civil and commercial space entities (e.g., NASA and Space-X). The U.S. Army is proposing to conduct Extended Range Cannon Artillery II (ERCA) testing at VSFB; the proposed activities would include testing ERCA II by firing projectiles over the Pacific Ocean from the shoreline of VSFB (Point Mugu Sea Range 2022).

3.12 ARCHAEOLOGICAL AND CULTURAL RESOURCES

3.12.1 Regulatory Overview

Per Section 106 of the National Historic Preservation Act of 1966, as amended (National Historic Preservation Act [NHPA]; 54 U.S.C. 306108), and its implementing regulations (36 CFR Part 800), Federal agencies must consider the effects of Federal undertakings on historic properties. By definition, historic properties are those resources that are listed in or eligible for listing in the National Register of Historic Places (NRHP); 36 CFR Part 60. These can include precontact and historic archaeological sites, districts, buildings, structures, objects, and traditional cultural properties (TCPs). Per Notice to Lessees (NTL) 2006-P03, "Archaeological resources are any material remains of human life or activities that are at least 50 years of age and that are of archaeological interest. Material remains include physical evidence of human habitation, occupation, use, or activity including the site, location, or context in which such evidence is situated. Items of archaeological interest are those that may provide scientific or humanistic understanding of past human behavior, cultural adaptation, and related topics through the application of scientific or scholarly techniques." Cultural resources are more broadly defined but are generally considered to be places or evidence of human activity such as archaeological sites, buildings and structures, cultural landscapes, and ethnographic resources, which can include natural features and objects important to various cultural groups.

Through consultation between agency officials and other interested parties — such as the Advisory Council on Historic Preservation, State Historic Preservation Officers, Native American Tribes, local government officials, applicants, other consulting parties, and the public — the Section 106 process involves identification of historic properties that may be affected by the undertaking; assessment of effects; and avoidance, minimization, or mitigation of any adverse effects. For offshore oil, gas, and sulfur leases, BSEE and BOEM have established regulations at 30 CFR Part 250 and 30 CFR Part 550, respectively, and issued guidance on archaeological survey and reporting (i.e., NTL 2006-P03) to ensure compliance with Section 106 of the NHPA.

3.12.2 Pacific Region Cultural Resources

Existing or potential cultural resources on the POCS include (1) submerged pre-Western contact archaeological sites; (2) submerged historic archeological sites, particularly shipwrecks; (3) TCPs that are partially or wholly maritime in nature; and (4) built architectural resources, such as platforms, manmade islands and their associated infrastructure such as pipelines and transmission cables. Nearby cultural resources on shore that could be indirectly impacted by activities on the POCS include precontact and historic archaeological sites, built architectural resources, and TCPs. A 2013 study completed for BOEM details the types of cultural resources that are or may be located within the POCS U.S. Exclusive Economic Zone (EEZ), which extends 200 mi offshore, and on the nearby shore up to one mile inland (ICF et al., 2013).

Some of the region's oldest known archeological sites, dating to 13,000 to 12,000 years Before Present (BP), have been identified in the Northern Channel Islands. Many more likely lie submerged on the POCS due to sea level rise since the Last Glacial Maximum (LGM) about 26,000 to 19,000 years ago. Although the extent of ancient shorelines, or paleoshorelines, varies by theoretical model and may have fluctuated regionally due to many local factors, global sea level has risen about 130 m since the LGM. This means that large areas of the POCS were exposed for thousands of years during the millennia when people began to migrate to the Americas from Asia along a Pacific coastal route, including areas of the POCS where platforms are now located (ICF et al., 2013; Clark et al., 2014) (Figure 3.12-1). These early, submerged precontact sites have significant potential to contribute to our understanding of early coastal adaptations and the peopling of the Americas. Numerous known terrestrial precontact sites dating to between 12,000 BP and 1542 AD are located throughout the region. Again, many as-yet unidentified sites are likely located underwater on the POCS due to rising sea levels since the LGM. Archeological sites dating to the historic era, which began when Europeans first arrived in what is now California in 1542 AD, also abound in the resource-rich southern California region. Such sites include mission sites; Native American, European, Mexican, and American habitation sites and settlements; shipwrecks; coastal exploitation sites, such as fishing camps and whaling stations; industrial sites; and more. While some of these sites are located almost exclusively underwater (i.e., shipwrecks), many others have the potential to be located on land or in submerged/partially submerged environments (i.e., Native American habitation sites and settlements, coastal exploitation sites, etc.) due to coastal fluctuation and sea level change.

The terrestrial built environment in the region dates to the historic era as well, with the oldest known extant historic properties dating to the 1780s and the most recent dating to the past few decades. Buildings and structures cover a wide range of resource types, including, but not limited to missions, residences, churches, lighthouses, railroad depots, schools, research facilities, farms, government buildings, industrial facilities, commercial buildings, and transportation infrastructure. While historic properties are typically 50 years old or older, younger buildings and structures may be eligible for the NRHP if they are of exceptional importance. Additional information about the archeological context, historical context, archeological site types, and historic built environment of the southern California OCS planning area can be found in a recently completed Environmental Setting report (Argonne 2019).

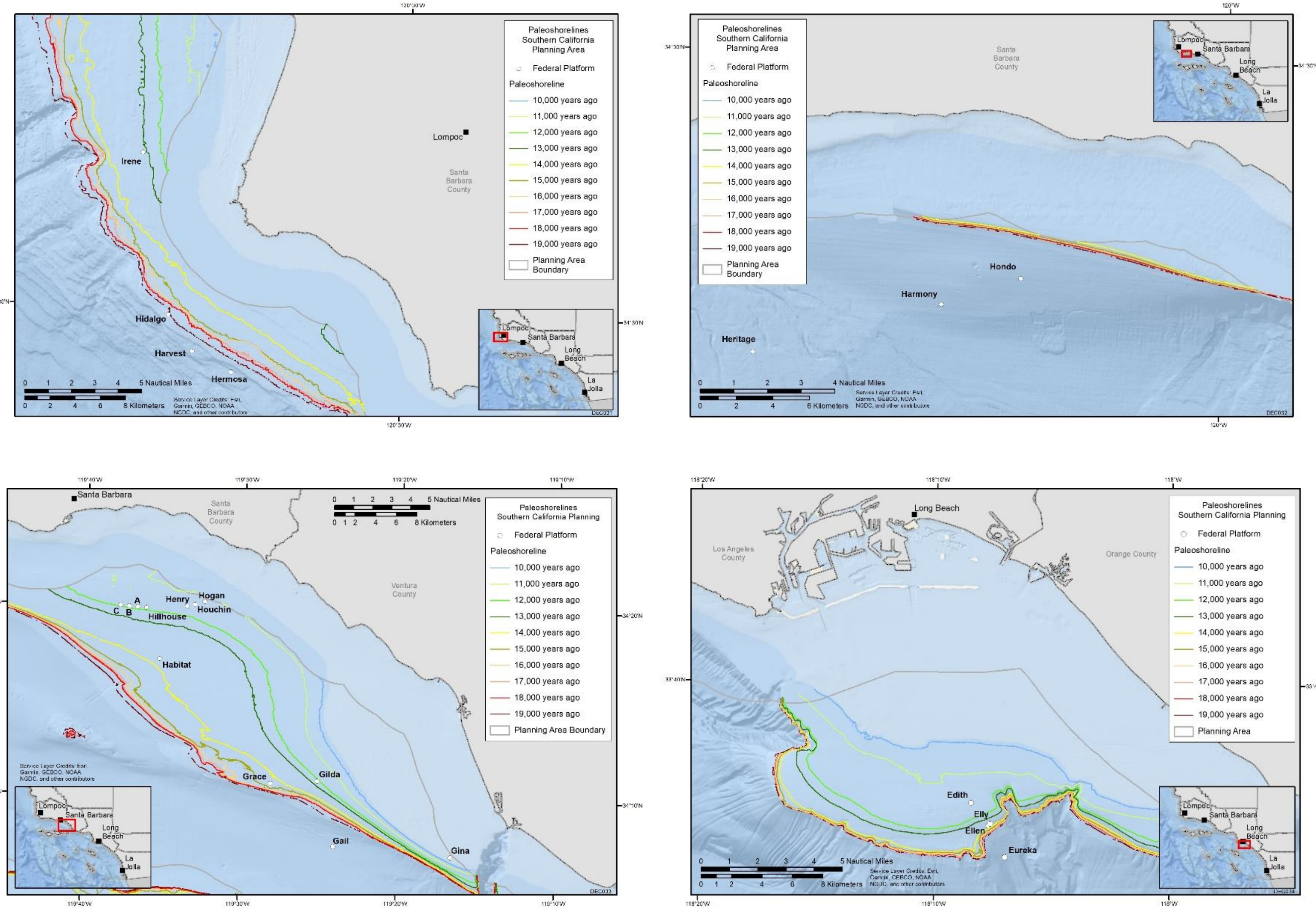

FIGURE 3.12-1 Extent of Ancient Shorelines (paleoshorelines) since the Last Glacial Maximum 26,000–19,000 years ago, near (clockwise from upper left) Pt. Arguello, Santa Barbara Channel (SCB) West, SBC East, and San Pedro Bay. (Source: IFC et al. 2013.)

3.12.3 Offshore Oil and Gas Development History

The historical significance of offshore drilling platforms and their associated infrastructure is the subject of review under the NHPA, based on their historical association with offshore O&G development and the environmental movement and coastal preservation in California and the United States.

Naturally occurring O&G seeps are found throughout the world in oil-rich regions, both onshore and offshore. Southern California is one of the richest oil regions in the United States and the products of oil seeps have been used by people throughout human occupation of the area. Precontact and historic Native Americans collected asphaltum or asphalt — a hard, often brittle, natural petroleum product — from natural seeps for use as adhesives, sealants, and caulk. Native Americans used the asphalt to waterproof food and drink containers, caulk canoes, mend broken items, and fasten items to one another (White 1970). Later European and Mexican occupants used asphalt in similar ways. In the 1850s, when production of kerosene from crude oil gained in popularity, residents began exploiting natural seeps to produce kerosene (Love 2019).

Oil drilling began in California in the 1860s. The first commercial land-based well was not drilled until 1876, after which production quickly intensified. Accounts suggesting the presence of buried oil deposits offshore. Offshore drilling began in the state between 1895 and 1897, with the drilling of and successful production from a well off a pier at Summerland in Santa Barbara County (Love 2019; Marine Mammal Commission undated; Michael 2019; Nash 1970) (Figure 3.12-2).

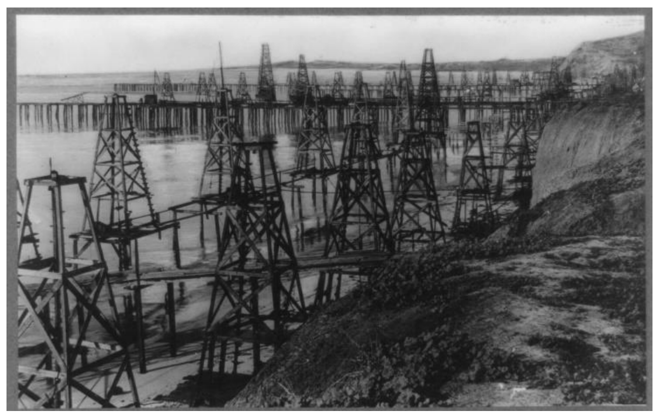

FIGURE 3.12-2 Summerland Oil Derricks.

As oil developers moved farther offshore so that direct connection to land was no longer feasible (i.e., cost-prohibitive), some companies began developing the first drilling platforms — such as the Indian Petroleum Company platform built in 1932 off present-day Rincon Beach — while others constructed manmade islands to host multiple wells. Island Monterey, located 2.4 km (1.5 mi) off Seal Beach, was built between 1952 and 1954 by Monterey Oil Company.

Standard Oil constructed Platform Hazel in 1958 about 3.2 km (2 mi) offshore of Summerland (Love 2019). Both platform and drilling island development, including associated infrastructure such as pipelines and transmission cables, continued with Island Rincon, built in 1958 off Mussel Shoals and La Conchita by Atlantic Richfield Company; Island Esther, built off Seal Beach in 1964 by Standard Oil; Islands Chaffee, Freeman, Grissom, and White, built off Long Beach in 1967 by a consortium known as THUMS, consisting of Texaco, Humble, Union Oil, Mobil, and Shell; and Platform Hogan in 1967, the first platform constructed off California in federal waters (Adcock and Trujillo 1993; Love 2019; Michael 2019; Santa Barbara Independent 2020; see Figure 1-1, Table 1-1). Platform Hogan was built in 1967 and is the oldest extant drilling platform in federal waters off southern California. It may be eligible for listing in the NRHP under Criterion A for its role in the expansion of O&G production beyond California state waters.

Several other platforms and their associated infrastructure were constructed in federal waters following Platform Hogan (see Figure 1-1 and Table 1-1). Offshore oil development halted in January 1969 when Platform A, built by Union Oil in 1968, experienced a massive blowout, spilling up to 3 million gallons of crude oil, fouling 56 km (35 mi) of coastline, and killing thousands of animals. At the time, it was the worst oil spill in U.S. history. The 1969 spill in part catalyzed support for environmental conservation, which prompted the enactment of new federal and state laws in 1970, including the National Environmental Policy Act and the California Environmental Quality Act (Hamilton 2019; *Los Angeles Times* 2019; Love 2019; Mai-Duc2015). The POCS O&G facilities will be reviewed for historical significance under the NHPA. The result of that review may have impacts on the decommissioning of these facilities, which will be considered more fully in future site-specific reviews for individual decommissioning applications.

3.13 VISUAL RESOURCES

This section describes the affected visual environment where potential changes to scenic resources could result from the implementation of Proposed Action. The platforms on the POCS fall within the Zone of Theoretical Visibility[15] (ZTV) for many of the numerous coastal communities of the five coastal counties (San Luis Obispo, Santa Barbara, Ventura, Los Angeles, and Orange), for some of the communities and recreational areas more inland, within portions of the Transverse Range, and for coastal and offshore parks and recreation areas (e.g., Channel Islands National Park) (Figure 3.13-1).

[15] The Zone of Theoretical Visibility (ZTV) or Viewshed Analysis establishes an area of potential visibility within which a project (e.g., platform) could be seen from a given location.

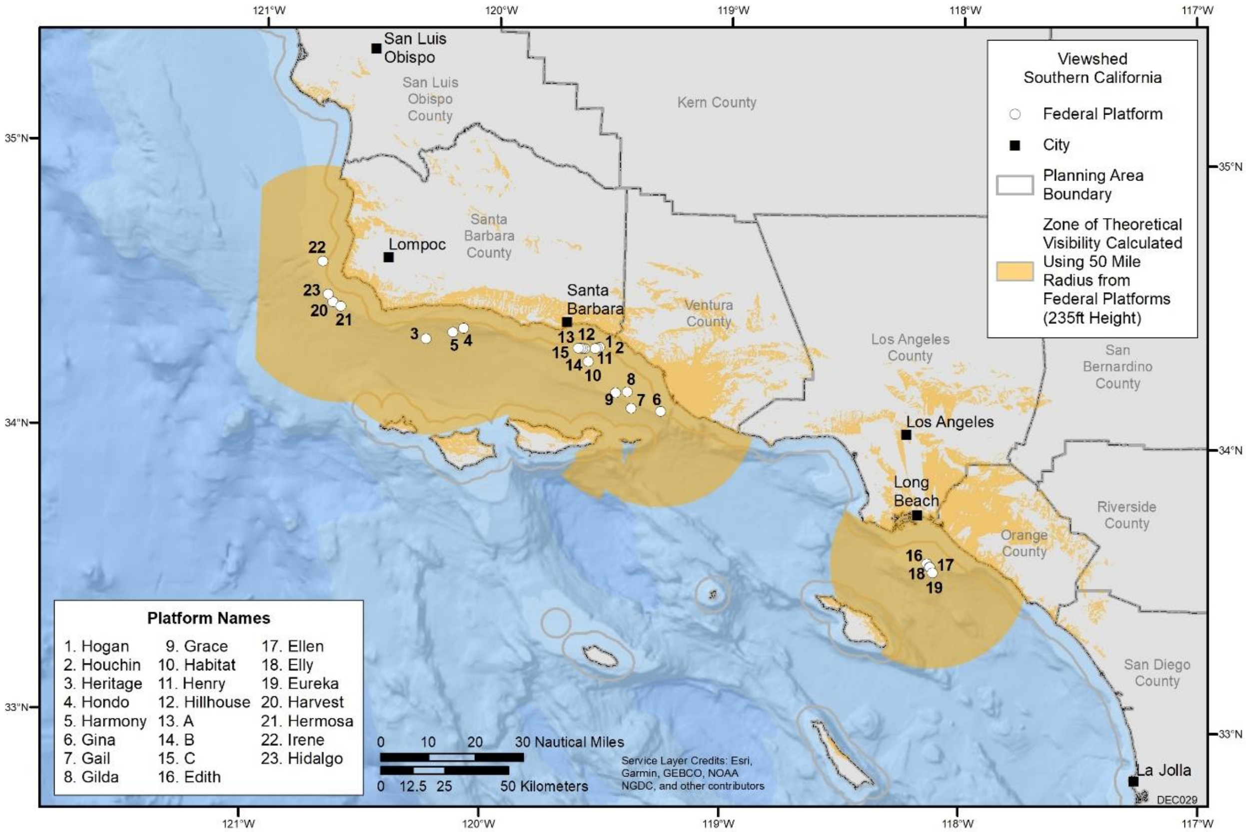

FIGURE 3.13-1 Zones of Theoretical Visibility along the Southern California Planning Area (6,379 mi^2).

Many of these areas are highly valued for their scenic and historic attributes and have long been popular destinations for international, regional, and local tourists, as well as for year-round and seasonal residents of local communities. The visual and other sensory linkages of land and water at these areas are a draw, along with the high degree of "naturalness" of these areas with the surrounding ocean, seascape, and landscape. Due to this high degree of "naturalness," the historical character, the compatibility of existing development, and the scenic character within the ZTVs from many of these areas are mostly visually intact.

Perceptual attributes that contribute to the visual experience of landscapes/seascapes from these areas include:

- Scenic quality: landscapes/seascapes that are known to have broad appeal to aesthetic senses;

- Rarity: natural or cultural elements that are unique or in short supply;

- Recreation: places where recreational activities occur or are available;

- Experiential: wildness, tranquility, solitude; and

- Associations: places where historic figures or events occurred.

An important part of the landscape/seascape and ocean character is identifying how land and shoreline units are visually tied/connected to the open sea unit. While the offshore Project components will not directly change physical conditions on land-based character areas, they may change the visual experience to the extent that they are visually connected.

Physical factors that influence landscape/seascape character and visual experience include:

- Landform: geology, soils, landform, drainage ways;

- Land cover: vegetation (natural and human-influenced), sand bars, barren areas (beaches, rock);

- Edge conditions: shorelines, bays, cliffs, riprap, outcrops, built environments;

- Horizontal and vertical expanse: open ocean, horizon, as well as sky; and

- Land uses: built environments, industrial buildings, towns, agricultural fields, edges, conserved lands.

Landscapes and seascapes have a combination of elements that influence perception, including the visual connectivity/relationship between land and sea. Development, or lack of development may diminish or increase the scenic value of adjacent or visually connected units.

The identification of visual resources that could be affected under the Proposed Action follows BOEM’s guidance for Assessment of Seascape, Landscape and Visual Impacts of Offshore Wind Energy Development on the Outer Continental Shelf of the United States (Sullivan 2021). The California Scenic Highway Project (CHSP) (California Streets and Highways Code 260 et seq.) and the Scenic Highways Element Comprehensive Plan (Santa Barbara County 2009) were also considered in the identification of potentially affected visual resources.

A Viewshed Analysis was conducted to identify potential visibility within which POCS platforms could be seen and where a level of Visual Change could occur under the Proposed Action. Factors that influence visibility are distance, earth curvature, atmospheric conditions, topography, and screening by other projects (i.e., Offshore Oil platforms), as well as screening from vegetation and buildings. The viewshed analysis was used to assess visibility of the project, and to better understand viewer experience within the landscape. For example, roadway travelers may experience intermittent views where topography is variable, and more prolonged views where topography is flat.

3.13.1 Landscape and Seascape Character Areas

Landscape/seascape/ocean character areas (LCA, SCA, and OCA, respectively) are made up of a combination of unique elements and features that together make seascapes, landscapes, and ocean scenery distinctive. They also affect how the landscape is perceived, experienced, and valued by people. The following landscape character types are described for their individual aesthetic attributes but integrated as Character area units to understand how the scenery of one character type contributes to the aesthetic character of another.

The ZTVs associated with the POCS platforms contain several OCAs, LCAs, and SCAs. Landscape/seascape/ocean character types found in these areas include:

- Open Ocean;
- The Santa Barbara Channel;
- Ocean Beach;
- Dunes;
- Coastal Scrub;
- Coastal Bluffs;
- Villages, Towns, and Residential Communities;
- Agricultural Fields/Meadows; and
- Parks/Developed Recreation Areas.

Open Ocean. The open ocean is the most extensive dominant character type within the project area of the Proposed Action (Figure 3.13-2). The dominant visual characteristics include flat expanse of blue- or gray-colored water, reflecting the sky; smooth to choppy texture of the water surface; and the horizon line and sky above the horizon. Scenic integrity is high with few visual intrusions. Scene elements within the open ocean include the POCS O&G platforms, regular commercial ship traffic (including service vessels attending to the platforms), commercial and recreational aircraft (including platform-related helicopter traffic), and recreational boat traffic.

FIGURE 3.13-2 Open Ocean.

Santa Barbara Channel. The Santa Barbara Channel is visible from mainland coastal communities and recreation areas of Santa Barbara and Ventura counties (Figure 3.13-3). The channel is a very busy shipping lane for cargo ships and oil tankers. Fifteen of the 23 O&G platforms on the POCS are located in the channel, between the mainland and the Channel Islands. The platforms can be seen on clear days and nights (due to navigational lights, aircraft warning lights, operational lighting, and occasional flaring)

FIGURE 3.13-3 Santa Barbara Channel.

from many viewpoints along the coast, as well as from the islands. Recreation activities in the channel include ferry traffic between the mainland and the Channel Islands National Park, motorized recreation fishing and pleasure boating, non-motorized sea kayaking, and surfing.

Ocean Beaches. These beaches are strong attractions for recreational users, including year-round residents, seasonal residents, and tourists (Figure 3.13-4). The beaches are strongly visually connected to the inland dunes, coastal bluffs, residential communities, and scenic highways that abut them, and to the open ocean from near shore extending to the horizon line. Views from many of these beaches are similar to those from other coastal/shoreline areas of the Santa Barbara Channel. Depending on location, some stretches of beach afford little or no views of buildings or development when looking inland, while others have views to residential and commercial buildings.

FIGURE 3.13-4 Ocean Beach.

Coastal Dunes. Open and grassy low-stature dunes border beaches and the residential neighborhoods and adjacent agricultural fields (Figure 3.13-5). Much of the dune area is partially covered by grasses and native shrubs. They are visually linked to the interior scrub, beaches, coastal highways, residential neighborhoods, and open ocean. Dunes are flat to rounded forms, with a tan to green to seasonal vegetation color, and a fine patchy texture.

FIGURE 3.13-5 Coastal Dune.

Coastal Scrub. Coastal scrub brush vegetation matrix of stunted pine, oak, shrubs, sage, and grassland (Figure 3.13-6). The terrain is gentle, flat to slightly rolling, with low hills and shallow depressions found on drier south-facing slopes behind the dunes or at the top of coastal bluffs. The vegetation can be dense and difficult to traverse where there are no defined trails or roads. As the terrain and vegetation density varies depending on location, POCS platforms may be seen from some locations but not from others.

FIGURE 3.13-6 Coastal Scrub.

Coastal Bluffs. The bluffs rise steeply to 30 m (100 ft) or more (Figure 3.13-7). They are strongly connected to the open sea, allowing far vistas from high viewpoints. Experiencing the views from them is a popular activity for residents and visitors alike. Scenic integrity is very high, and can include historic buildings, lighthouses, and the shingled restaurant. Because of the elevation, POCS platforms may be readily observed from most locations.

FIGURE 3.13-7 Coastal Bluff.

Villages, Towns, and Residential Communities. Villages, towns and residential communities found within the ZTV range from rural and suburban to highly urbanized communities (Figure 3.13-8). The aesthetic character of these areas is highly valued for both their physiographic location along the California Coastline, their historic features integrated into the modern character of the build environment, and the natural backdrop of the Santa Ynez Mountains. Architecture varies in style and age, but buildings typically do not exceed five stories. Visual integrity is mostly very high, as these areas are dominated by modern and historic buildings, with strong linkages to the sea. However, views out from the urbanized centers of many of these areas to the open ocean are limited, and in some cases non-existent, due to the build structures. For example, views of the coastline and open ocean (as well as the POCS platforms) are very limited or non-existent from many locations in downtown Santa Barbara.

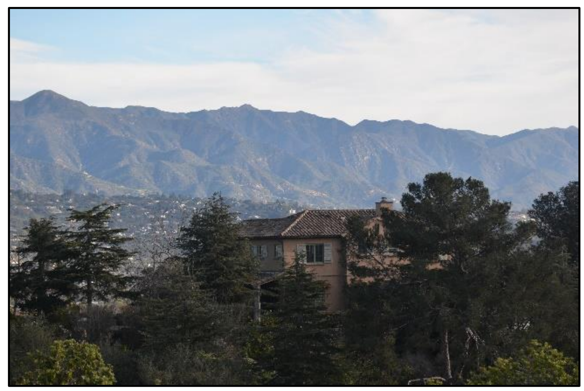

FIGURE 3.13-8 Residential Community.

Agricultural Fields and Meadows. Fields and meadows are limited in extent (Figure 3.13-9). Work has gone into preserving remnant farms through conservation easements or land purchases. Remaining farms often have a historic character and are located between towns, villages, between sandy dunes, and the base of the mountains. Distant views to the open ocean (and possibly some of the POCS platforms) are available in a few limited locations, where the terrain is relatively high.

FIGURE 3.13-9 Agricultural Fields.

Developed Parks and Designated Scenic Overlooks. Many of the POCS platforms are visible from the numerous parks, recreation areas, and designated scenic overlooks along the coast (Figure 3.13-10). The parks and recreation areas include beaches for daytime recreation as well as beaches and parks that support oceanside camping, from which some of the platforms are visible day and night. Platforms are readily visible in views from all five islands of the Channel Islands National Park eastward to the coast.

FIGURE 3.13-10 Coastal Park.

3.13.2 Viewer Groups and Visual Sensitivity

Viewers are the people who ultimately see the existing POCS platforms and who will experience the effects of the change to the visual conditions during and following platform decommissioning. Other receptors may include locations of historical importance. Viewers associated with the viewing areas described in Section 3.9.3 include recreational users, tourists, year-round and seasonal residents, and workers, and they experience scenic panoramic views of the open ocean. On clear days, views extend to the horizon and include one or more platforms as well as recreational and commercial vessels in the ocean.

Viewer sensitivity may range from low to high depending on viewer position, the type of activity the viewer is engaged in, and the level of exposure they may have to platforms. The variability character and the quality of the setting for where the viewer is seeing the platforms is a defining factor in how the viewer perceives the visual qualities and character found within landscape/seascape setting.

Residents and Other Landowners. The residential viewer group includes all permanent and seasonal residents within coastal and inland regions with views of one or more of the POCS platforms, some of which could be highly sensitive to changes in views. These viewers generally experience views within the context of panoramic views of the Santa Barbara Channel and the Pacific Ocean from publicly accessible viewpoints along the coastline. The views maybe affected by existing oil platform, commercial shipping traffic, or recreational activities along the near shore.

Motorists and Cyclists. Residents, commuters, recreationists, and freight haulers represent both local and regional traffic passing along the coast on the scenic Pacific Highway 101. At standard roadway speeds, motorists' views of individual parcels along roadways are of moderate duration. Views for cyclists would be of greater duration within visually scenic surroundings. Motorists on smaller, local roadways would have slightly longer views of the surrounding landscape due to slower travel speeds. Motorists and cyclists could be sensitive to changes in ocean views during and following platform decommissioning as the passing landscape may be more familiar to users of the local road network.

Tourists and Recreationists. Visitors and local and regional residents come to the southern California coast for purposes of recreation and tourism. These viewer groups take part in numerous activities, such as wine-tasting, beach-going, boating, bicycling, hiking, horseback riding, cultural events, surfing, nature-based experiences, and visiting the Channel Islands National Park. Conduct of many of these activities will include views of one or more of the POCS platforms, depending on the location and activity.

3.13.3 Selection of Key Observation Points

Key observation points (KOPs) represent both common and sensitive views that fall within a ZTV, as determined through a Viewshed Analysis (Sullivan 2021). These KOPs are used to assess potential changes to landscape/seascape character that could result under the Proposed Action. The KOPs for the project area includes a broad selection of view types, which represent views from multiple angles, distances, vantages, and viewers (residents, tourists, and economic interests).

The KOPs are assessed for potential visibility to the Project and analyzed using the following criteria:

- Distance to the nearest Project feature;
- View exposure (degree of foreground screening);
- Level of use;
- Iconic views;
- Sensitivity of users to view change;
- How well the site may represent additional typical views;
- Historic or cultural importance of the site;
- Tourism importance of the site;
- Uniqueness;
- Type of viewpoint: stationary (i.e., designated point, historic site), area-based (i.e., beach, town), and corridor (i.e., trail, scenic road);
- Topography: Include high points, low points, common elevations;
- Public interest; and
- Viewer experience.

The locations of the KOPs evaluated in this PEIS are shown in Figure 3.13-11, and KOP descriptions are provided in Table 3.13-1.

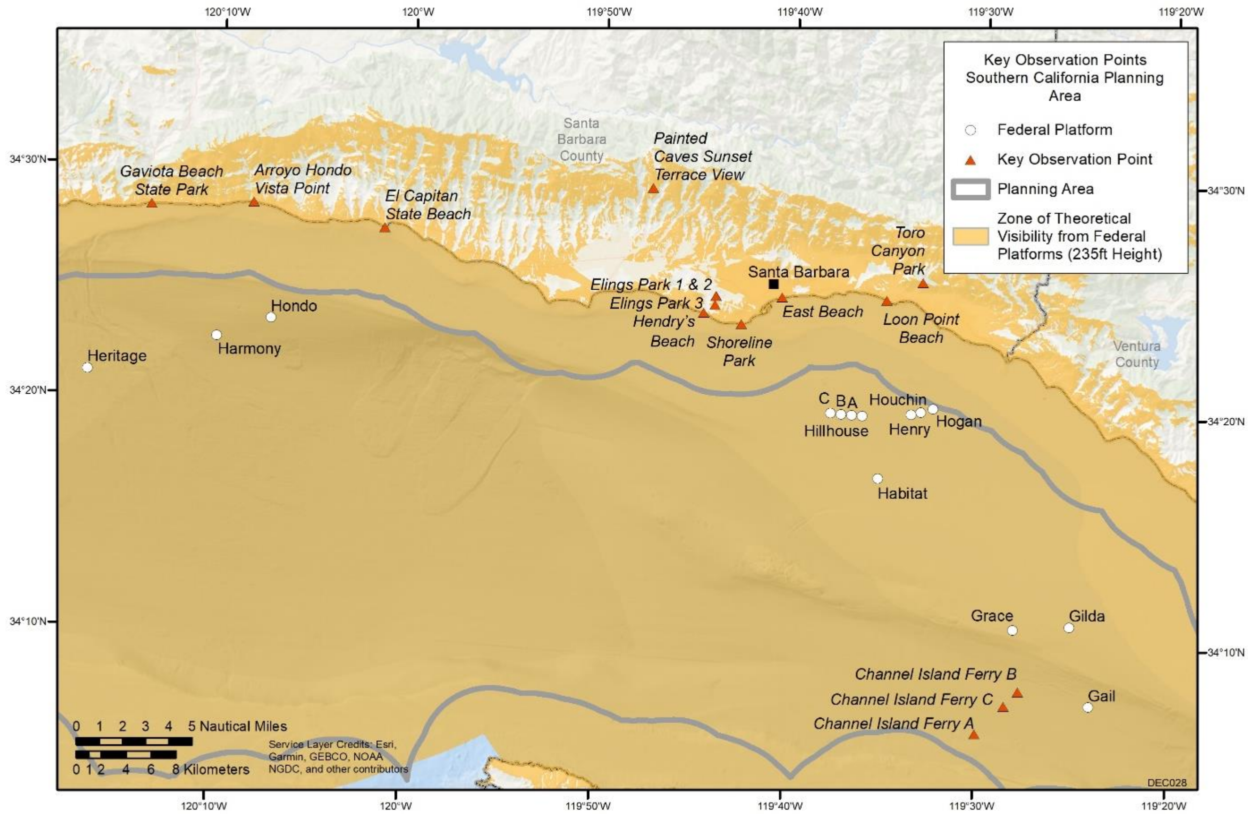

FIGURE 3.13-11 Key Observation Points (KOPs) Evaluated along the Southern California Planning Area (see Table 3.13-1 for KOP descriptions).

TABLE 3.13-1 Descriptions of Key Observation Points

Key Observation Point	Description
Gaviota Beach State Park, California State Parks and Recreation	The coastal bluffs at Gaviota State Park rise to 500 ft above sea level. There are extensive offshore and inland petroleum oil reservoirs within this area's rock sequence. The state park offers overnight camping and day use parking, picnic tables, and restroom facilities. It is also a popular spot to launch small private boats used to access a surf wave west of the beach that is not accessible off public roads.
Arroyo Hondo Vista Point, California State Department of Transportation Highway 101 Rest Area	Arroyo Hondo Vista is a rest area located between the Pacific Ocean and Highway 101. The rest area is managed by the California Department of Transportation. There are trails from the rest area accessing a beach below the steep coastal cliff and the old highway bridge that spans over Arroyo Hondo Creek gully. This site is a very remote and quiet place to enjoy unencumbered views of the Santa Barbara County coastline. It provides interpretive panels educating visitors to natural, pre-settlement, and settlement history of the area.
El Capitan State Beach, California State Parks and Recreation	El Capitan is a popular California State Beach offering day use amenities and overnight camping facilities. The curvilinear beach is rocky with patches of sand. Trails guide visitors through the stands of sycamore, oak, and eucalyptus trees to broad, picturesque vistas of the Pacific Ocean and the mountains of the Channel Islands. Picnic areas containing wooden tables and barbeque amenities are scattered throughout the park and along the paths above the beach. Recreational activities include camping, fishing, surfing, and birdwatching.
Painted Caves Sunset Terrace View, California State Parks and Recreation	Painted Caves Sunset terrace is located along the entry road to the Painted Caves State Park. The winding road traverses the steep slopes of the foothills of the Santa Ynez mountains, providing a comprehensive view overlooking the landscape and ocean below. Locals and tourists flock to this site to take advantage of the picturesque sunset over the undeveloped landscape of Gaviota Channel Islands, and the Pacific Ocean.
Hendry's Beach, Arroyo Burro Beach County Park	Hendry's Beach is a very popular, centrally located destination for locals and tourists. Access is located between pristine, steep cliffside terrain separating extensive curvilinear beaches along Shoreline Park to the west and Mesa Lane Beach to the east. Geologic formations can be seen within the walls of the cliffs along the beach. Amenities include parking, beach front restaurant, viewing stations, and public restrooms.
Elling's Park, an independent non-profit park managed by the Elling's Park Association	Elling's Park is the largest community-supported non-profit park in America. The Park was partially developed on a landfill site. Reclamation included covering and capping the landfill, revegetating and restoring the ecology of the site, and developing recreation fields, dog parks, trails, and paths, including the installation of art and sculpture within the park. A short walk up the single-track trails leads to a vast mesa with panoramic views of the Channel Islands and the Pacific Ocean. There is vast parking and immediate access from neighboring residential communities that make this park a popular destination for the local community. The Park officially closes at sunset.
Shoreline Park, City of Santa Barbara Community Park	Shoreline Park offers intimate views of the Channel Islands and the Straight of Santa Barbara. Wooden stairs lead visitors down to the beach. The Park offers developed recreation amenities such as picnic tables, restrooms, play areas, and walking paths. Marine mammals such as gray whales and dolphins can be spotted from the park overlook. It is a popular surfing spot for the local community.
East Beach, City of Santa Barbara Community Park	East Beach is a very popular tourist destination due to its proximity to downtown shopping and hotels. East and West Beach are separated by Steam's Wharf. East Beach is well-known for its dramatic views and world-famous beach volleyball courts and tournaments.
West Beach, City of Santa Barbara Community Park	West Beach runs between Steam's Wharf in downtown Santa Barbara and the Bellosguardo Foundation property on the boarder of Montecito. A pedestrian bike path separates the beach from a major roadway leading to commercial shopping, restaurants and hotels, making it a popular location for tourists and local visitors.

TABLE 3.13-1 (Cont.)

Key Observation Point	Description
Toro Canyon Park, Santa Barbara County Parks and Recreation	Toro Canyon Park is located off the beaten path in the mountains above the City of Carpinteria. The park offers develop trails and park amenities that can be reserved for private events. This relatively hidden location makes it optimal as a destination for local residents. Short hikes lead to expansive panoramic views of the Pacific Ocean and Channel Islands. Expansive views of the backcountry, including citrus and avocado plantations, are nestled into the residential neighborhoods within the Santa Ynez Mountains.
Loon Point Beach, Santa Barbara County Parks and Recreation	Loon Point is located at the eastern edge of Summerland along Pedro Lane near the community of Carpinteria. The beach known for as one of the only beaches in Santa Barbara County to allow horseback riding. It is also a popular location for surfing, beach walking, and exploring the tide pools below Loon Point.
Prisoner’s Harbor, Santa Cruz Island, NPS	Prisoner’s Harbor is located on the middle of Santa Cruz Island, offering access to both national parks and Nature Conservancy Lands. The NPS provides limited seasonal access to the island, offering guided hiking and interpretive talks and basic backcountry amenities. Designated trails provide access to campsites on NPS lands. The island is famous for birdwatching, specifically the Coastal Scrub Jay. 1,915 ha (4,733 ac), or 24%, of Santa Cruz Island, is managed by the NPS.
Trail Pelican Cove, Santa Cruz Island, The Nature Conservancy (TNC)	TNC owns 76% of Santa Cruz Island and manages more than 1,000 species of plants and animals. The TNC lands make up the island’s high peaks, deep canyons, pastoral valleys, and 124 km (77 mi) of dramatic coastline. Public access is limited to Pelican Bay Trail from Prisoner’s Cove or through prearranged tours.
Channel Island Ferry	Island Packers Cruises provides transportation from Ventura to Scorpions and Prisoner’s Harbors. Transportation across the Strait of Santa Barbara provides a recreational, tourist, and interpretive experience. Dolphins and whales are seen while crossing. Oil platforms are also seen at a close distance and visible in detail.

3.14 ENVIRONMENTAL JUSTICE

Executive Order (E.O.) 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (E.O. 12898, 59 FR 7630, Section 1-101) (CEQ 1997) requires federal agencies to incorporate environmental justice as part of their missions. Specifically, it directs these agencies to address, as appropriate, any disproportionately high and adverse human health or environmental effects of their actions, programs, or policies, including those affecting minority and low-income communities (E.O. 12898).

A description of the geographic distribution of minority and low-income groups within the region of influence (ROI) was based on demographic data from the Census Bureau (U.S. Census Bureau 2022a,b,c). The following definitions were used to define minority and low-income population groups:

- **Minority.** Persons are included in the minority category if they identify themselves as belonging to any of the following population groups: (1) Hispanic; (2) Black (not of Hispanic origin) or African American; (3) American Indian or Alaska Native; (4) Asian; or (5) Native Hawaiian or Other Pacific Islander. Persons may classify themselves as having multiple racial origins (up to six racial groups as the basis of their racial origins).

- **Low-Income.** Individuals who fall below the poverty line are classified as low-income. The poverty line takes into account family size and age of individuals in the family. For any given family below the poverty line, all family members are considered as being below the poverty line for the purposes of the analysis without consideration of individual income variations within the family.

The Council on Environmental Quality (CEQ) (1997) guidance states that low-income and minority populations should be identified where either (1) the low-income or minority population of the affected area exceeds 50%, or (2) the low-income or minority population percentage of the affected area is meaningfully greater (20 percentage points or more) than the low-income or minority population percentage in the general population or other appropriate unit of geographic analysis.

Decommissioning of offshore platforms has the potential to create adverse impacts on minority and low-income populations (Table 3.14-1) through the effects from the transportation and processing of scrap materials from decommissioning at, or close to, a California port, such as the Port of Los Angeles and the Port of Long Beach (both in Los Angeles County) and Port Hueneme (in Ventura County). Depending on the amount and size of scrap material, scrap processing could be undertaken at multiple facilities — at existing scrap facilities in port areas where industrial transportation activities already occur, or at new facilities in similar locations. Potential impacts include impacts on air quality, noise, property values, and road congestion in the vicinity of port and scrap metal facilities. Barge transportation also has the potential to affect subsistence fishing along barge routes and in the vicinity of ports. More detailed analysis of the characteristics and location of minority and low-income populations that may be affected will be undertaken in individual environmental assessments (EAs) for decommissioning specific platforms, and the scrap material processing sites they will use, when decommissioning applications with disposal plans are submitted to BSEE.

Two levels of geographic analysis were used to present data on low-income and minority population groups that could potentially be affected by the transportation and disposal of scrap materials from decommissioned platforms. Table 3.14-1 shows the minority and low-income composition within a four-county ROI based on Census Bureau data. At 67.8%, the total minority population (those not listed as White alone, not Hispanic or Latino) in the ROI exceeds 50%; however, it is not meaningfully greater (20 percentage points or more) than the statewide average (65.3%). The percentage of persons below the poverty level in the ROI does not exceed 50% and is also comparable to the statewide level (Table 3.14-1).

TABLE 3.14-1 Minority and Low-Income Population Percentage for the Four-County Region of Influence in 2020

	County				
Population Category	Los Angeles	Orange	Santa Barbara	Ventura	California
Black or African American alone	7.6	1.5	1.4	1.6	5.4
American Indian and Alaska Native alone	0.2	0.2	0.4	0.2	0.4
Asian alone	14.7	21.9	5.7	7.5	15.1
Native Hawaiian and Other Pacific Islander alone	0.2	0.2	0.1	0.2	0.3
Two or more races	3.1	3.9	3.7	3.9	4.1
Hispanic or Latino	48.0	34.1	47.0	43.3	39.4
White alone, not Hispanic or Latino	25.6	37.6	41.2	42.8	34.7
Persons below poverty level (2019, all races)	14.9	10.9	13.5	8.9	13.4

Sources: U.S. Census Bureau (2022a,b).

Table 3.14-2 shows the minority and low-income composition of a ROI that includes census tracts located within 3.2 km (2 mi) of the port facilities likely to be used for scrap disposal. At Los Angeles/Long Beach, the ROI consists of 63 census tracts, and includes the communities of San Pedro, Wilmington, West Side, and Waterfront. The total minority population (those not listed as White alone, not Hispanic or Latino) in this ROI exceeds 80% but is not meaningfully greater (20 percentage points or more) than the Los Angeles County average (74.1%). The number of persons below the poverty level in the ROI does not exceed 50% and is not meaningfully greater (20 percentage points or more) than the countywide average (Table 3.14-2). At Port Hueneme the ROI consists of 9 census tracts and includes the communities of Channel Islands Beach and Hollywood Beach, in addition to Port Hueneme itself. The total minority population (those not listed as White alone, not Hispanic or Latino) in the ROI is 77% and is meaningfully greater (20 percentage points or more) than the Ventura County average (55.1%). The number of persons below the poverty level in the ROI does not exceed 50% and is not meaningfully greater (20 percentage points or more) than the countywide average (Table 3.14-2).

TABLE 3.14-2 Minority and Low-Income Population Percentage within 3.2 km (2 mi) of Port Facilities in 2020

Population Category	Ports of Los Angeles/ Long Beach	Port Hueneme
Black or African American alone	8.4	2.4
American Indian and Alaska Native alone	0.1	0.2
Asian alone	8.5	2.9
Native Hawaiian and Other Pacific Islander alone	0.5	0.1
Two or more races	2.3	2.0
Hispanic or Latino	60.3	69.0
White alone, not Hispanic or Latino	19.7	23.0
Persons below poverty level (2019, all races)	18.4	17.8

Sources: U.S. Census Bureau (2022b,c).

Languages other than English spoken in the four-county area are Spanish (35.9% of the population), Chinese (3.3%), Tagalog (2.2%), Korean (2.0%), Vietnamese (1.9%), Armenian (1.3%), and Persian (0.8%) (U.S. Census Bureau 2022d). English is spoken less than very well by 21.5% of the four-county population (U.S. Census Bureau 2022e).

3.15 SOCIOECONOMICS

Socioeconomic data are presented for an ROI comprising Los Angeles, Orange, Santa Barbara and Ventura counties. The ROI captures the area within which any potential impacts of offshore decommissioning would be most likely to be experienced by human populations, the area within which existing workers and those involved in decommissioning would spend their wages and salaries, and the location of many of the vendors that would supply materials, equipment, and services under any of the proposed decommissioning alternatives. The ROI is used to assess the impact each alternative would have on the socioeconomic wellbeing of the populations in the ROI, including changes in population, business related to tourism, employment, income, and housing.

3.15.1 Population

In 2020, the population within the four-county ROI was almost 17.8 million people (Table 3.15-1). During the period 2010 to 2020, population increased in each county in the ROI, with average annual growth rates ranging from 0.2% in Los Angeles County and Ventura County to 0.6% in Orange County and Santa Barbara County. Population in California as a whole increased at an average annual rate of 0.6% during this time. Languages other than English spoken in the four-county area are Spanish (35.9% of the population), Chinese (3.3%), Tagalog (2.2%), Korean (2.0%), Vietnamese (1.9%), Armenian (1.3%) and Persian (0.8%) (U.S. Census

Bureau 2022c). English is spoken less than very well by 21.5% of the four-county population (U.S. Census Bureau 2022e).

TABLE 3.15-1 Population within the Region of Influence

Location	Population 2010	Population 2020
Los Angeles	9,818,605	10,014,009
Orange	3,010,232	3,186,989
Santa Barbara	423,895	448,229
Ventura	823,318	843,843
California	37,253,956	39,538,223

Source: U.S. Census Bureau (2022f).

3.15.2 Employment and Income

Table 3.15-2 presents the average civilian labor force statistics for the ROI in 2019. Almost 9.3 million people were employed and 533,543 were unemployed. Unemployment rates ranged from 4.6% for Orange County to 6.1% for Los Angeles County and for California as a whole (Table 3.15-2). Wage and salary employment (i.e., not including self-employed persons) by industry for 2019 is provided in Table 3.15-3. Almost 5.4 million people in the ROI were employed in services (61.0%), with 6,415 (0.1%) persons employed in mining, quarrying, and O&G extraction.

TABLE 3.15-2 Average Civilian Labor Force Statistics for 2019

Location	Civilian Labor Force	Employed	Unemployed	Unemployment Rate
Los Angeles County	5,249,298	4,929,863	319,435	6.1%
Orange County	1,669,327	1,592,151	77,176	4.6%
Santa Barbara County	226,585	213,438	13,147	5.8%
Ventura County	438,092	415,752	22,340	5.1%
California	19,790,474	18,591,241	1,199,233	6.1%

Source: U.S. Census Bureau (2022g).

TABLE 3.15-3 Wage and Salary Employment by Industry within the Region of Influence, 2019

	County					
Sector	Los Angeles	Orange	Santa Barbara	Ventura	ROI Total	Share of ROI Total (%)
Agriculture, forestry, fishing and hunting	19,015	8,378	18,748	22,007	79,739	1.0
Mining, quarrying, and O&G extraction	3,088	1,110	687	937	6,415	0.1
Utilities	28,741	8,426	874	2,746	51,840	0.6
Construction	292,507	93,305	12,302	24,439	518,163	5.9
Manufacturing	457,164	194,930	14,552	40,738	853,650	9.9
Wholesale and retail trade	666,996	221,505	24,345	55,039	1,169,784	13.5
Transportation and warehousing	270,654	50,084	5,610	12,211	392,271	4.7
Finance, insurance, and real estate services (FIRE)	296,339	136,401	9,911	30,441	571,031	6.6
Services, not incl. FIRE	2,734,093	832,495	117,667	206,123	4,779,974	54.4
Other	296,339	136,401	9,911	30,441	473,092	6.6
Total	4,929,863	1,592,151	213,438	415,752	7,151,204	100.00

Source: U.S. Census Bureau (2022h).

Table 3.15-4 details personal income in the ROI for 2020. Per-capita annual income ranged from $67,226 for Ventura County to $74,146 for Orange County and was $69,890 for California as a whole.

TABLE 3.15-4 Personal Income in 2020 in the Region of Influence

Location	Total Personal Income ($ billions)	Per-Capita Income
Los Angeles County	678.8	67,788
Orange County	236.3	74,146
Santa Barbara County	30.2	67,354
Ventura County	56.7	67,226
California	2,763.3	69,890

Source: U.S. Department of Commerce (2022).

3.15.3 Housing

Table 3.15-5 details the housing characteristics within the ROI in 2019. There were a total of 6,303,197 housing units, of which 5,896,469 were occupied. Homeowner vacancy rates ranged from 0.8% to 1.1%, and rental vacancy rates from 2.6% to 3.6%.

TABLE 3.15-5 2019 Average Housing Characteristics for the Region of Influence

	Housing Units			Vacancy Rate	
County	Total	Occupied	Vacant	Homeowner	Rental
Los Angeles	3,542,800	3,316,795	226,005	1.0	3.4
Orange	1,100,449	1,037,492	62,957	1.0	3.6
Santa Barbara	157,161	145,856	11,305	0.8	2.6
Ventura County	288,896	271,040	17,856	1.1	3.6

Source: U.S. Census Bureau (2022i).

3.15.4 Recreation and Tourism

The Pacific coastline is an outstanding natural resource, providing an important recreational asset and contributing to the economic success of the region's tourist industry. Many of its parks, reserves, sanctuaries, and marine protected areas are preferred destinations for residents and visitors. Recreation and tourism activities in the coastal zone include beach recreation, surfing, sightseeing, diving, and recreational fishing (BOEMRE 2010). Most of these activities occur near established shoreline park, recreation, beach, and public-access sites.

Dean Runyan Associates (2021) provided annual analyses of the economic impacts of travel to and through the counties of California. As shown in Table 3.15-6, visitor spending in the four coastal counties adjacent to the Southern California Planning Area totaled $54.4 billion in 2019. As in previous years, visitor expenditures were concentrated in Los Angeles County ($26.3 billion in 2019) and Orange County ($12.7 billion). Travel also results in fiscal impacts in the form of State and local tax revenue. Tax receipts from travel in the four coastal counties totaled $4.6 billion in 2019.

TABLE 3.15-6 Economic Impacts of Travel in Counties ($ billion), 2019

County	Visitor Spending at Destination	Total Direct Tax Receipts (State and Local)
Los Angeles	26.3	3.0
Orange	12.7	1.2
Santa Barbara	2.0	0.2
Ventura	1.6	0.2
Total	42.6	4.6

Source: Dean Runyan Associates (2021).

Based on data compiled from the U.S. Bureau of Labor Statistics, the NOAA Coastal Services Center (NOEP 2022) estimates employment and wages in the ocean-related sectors in which recreation and tourism occur (Table 3.15-7). In the four coastal counties, these wages totaled $6.5 billion in 2018, the most recent year for which data are available. Employment is concentrated in Los Angeles County (54,726 in 2018). The ocean-related recreation and tourism employment for all coastal counties was 234,701 in 2018.

As indicated by Tables 3.15-6 and 3.15-7, tourism is a major economic force for coastal counties along the southern Pacific coast, and any negative changes in tourism would be of major concern. Although few tourism activities are coast-dependent (i.e., cannot occur without access to the coast), the majority are coast-enhanced, with the coastal orientation of the counties contributing to the sense of place and the general ambiance that is highly valued by visitors to the area.

TABLE 3.15-7 Employment and Wages in Ocean-Related Recreation and Tourism Sectors, 2018

County	Employment	Wages ($ billions)
Los Angeles	54,726	1.6
Orange	47,831	1.3
Santa Barbara	16,306	0.4
Ventura	15,287	0.3
Total	234,701	6.5

Source: NOEP (2022).

3.16 COMMERCIAL NAVIGATION AND SHIPPING

California's ports and harbors handle almost 31% of all U.S. ocean trade. These ports and harbors are an interdependent system of centralized large and decentralized small deepwater ports and small craft harbors (CMNAC 2021). The large centralized deepwater ports on San Francisco Bay and San Pedro Bay contain massive terminals for the latest generations of container ships, supertankers, and large bulk carriers. For the functions provided by these large ports to meet demand, other functions are accommodated in surrounding decentralized smaller deepwater ports and small craft harbors (such as the Port of Hueneme).

The decentralized small deepwater ports and harbors serve as collection and distribution points for petroleum products, minerals, grain, forest products, and general cargo (CMNAC 2021). California's port and harbor system includes 7 small- and medium-sized deep-draft and harbors 25 shallow-draft harbors at decentralized coast and estuary sites as well as small craft facilities in all the deep-draft harbors. Decentralized small craft harbors support commercial fishing, marine construction, mineral extraction, ocean research, recreational boating and public safety. The POCS platforms are located in one of the busiest maritime shipping areas along the west coast of North America. This area includes a major north–south shipping lane, which passes through the Santa Barbara Channel, as well as one of the world's busiest harbor complexes (Figure 3.16-1). A detailed discussion of vessel traffic off of southern California and especially in the vicinity of the POCS platforms is provided in Appendix E.

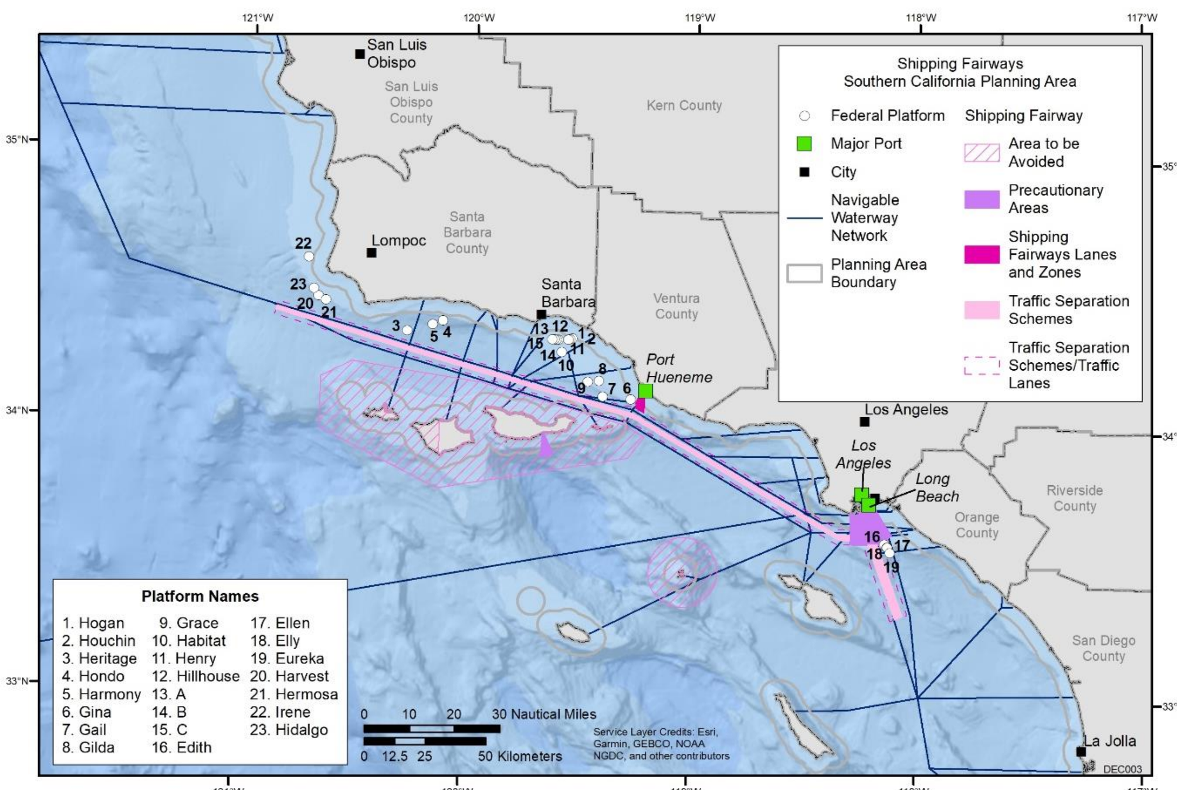

FIGURE 3.16-1 Shipping Fairways, Safety Designations, and Major Ports on the Southern California POCS.

All commercial vessel traffic on the Southern California POCS follows established shipping safety fairways,[16] traffic lanes,[17] and traffic separation schemes (TSSs)[18] to the extent feasible when traveling to, from, and between ports. Under the authority of the Ports and Waterways Safety Act (PWSA—33 U.S.C. 1223), the USCG) has designated safety fairways with traffic lanes, fairway anchorages, and TSSs to provide unobstructed approaches to the Southern California ports and safe transit through the Santa Barbara Channel. The USCG provides listings of these designated fairways, TSSs, and Precautionary Areas[19] for the Santa Barbara Channel at 33 CFR 167.451 and 167.452, and for the Port of Los Angeles (POLA) and the Port of Long Beach (POLB) at 33 CFR 167.501, 167.502, and 167.503. No POCS platforms are located within designated vessel traffic lanes or Precautionary Areas. No POCS platforms are located within designated vessel traffic lanes or Precautionary Areas.

The USCG is conducting a port access route study (PARS) to evaluate safe access routes for the movement of vessel traffic proceeding to or from ports or places along the western seaboard of the United States and to determine whether a Shipping Safety Fairway and/or routing measures should be established, adjusted, or modified. The PARS will evaluate the continued applicability of, and the need for modifications to, current vessel routing measures. Data gathered during this Pacific Coast PARS may result in the establishment of one or more new vessel routing measures, modification of existing routing measures, or disestablishment of existing routing measures off the Pacific Coast between Washington and California and overlaps with the Project Area. This process will take several years. The USCG collected public comment through January 25, 2022, through a *Federal Register* notice published on July 29, 2021 (86 FR 40791).

The San Pedro Bay Port Complex consists of the POLA and the adjacent POLB (Figure 3.16-2). This port complex is the busiest port in the United States by container volume and is the tenth-busiest in the world. The POLA and the POLB together handled cargo worth about $476 billion in 2019, and together currently constitute the ninth-largest shipping container port in the world (POLA 2022; POLB 2022). The two ports feature about 3,200 ha (7,800 ac) of water, occupy 3,200 ha (7,820 ac) of land, and have 47 shipping terminals that handled about 3,850 vessels in 2019. The majority of traffic in both ports consists of shipping containers carrying manufactured goods, primarily between the United States and Asia. Other traffic includes cruise ships, and cargo ships carrying automobiles, fuel and raw materials. A smaller port at Hueneme handled cargo worth $11.4 billion in 2021, primarily shipping containers and cargo between the United States and Asia and Europe (Port of Hueneme 2022a).

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[16] Shipping safety fairway or fairway means a lane or corridor in which no artificial island or fixed structure, whether temporary or permanent, will be permitted.

[17] A traffic lane means an area within defined limits in which one-way traffic is established (33 CFR 167.5 (c)).

[18] A traffic separation scheme (TSS) is a designated routing measure aimed at the separation of opposing streams of traffic by appropriate means and by the establishment of traffic lanes (33 CFR 167.5(b)).

[19] A precautionary area is a routing measure comprising an area within defined limits where ships must navigate with particular caution and within which the direction of traffic flow may be recommended (33 CFR 167.5(e)).

FIGURE 3.16-2 San Pedro Bay Port Complex Showing the Ports of Los Angeles and Long Beach (Source: Google Earth 2021a).

All vessel traffic entering and leaving the complex must operate under the procedures in the combined POLA/POLB Harbor Safety Plan (LA/LB Harbor Safety Commission 2021), compliance of which is managed by the Vessel Traffic Service (jointly operated by the USCG and the Marine Exchange, the Los Angeles Pilot Service for the POLA, and the Jacobsen Pilot Service for the POLB). This plan specifies vessel operations and reporting requirements for all commercial vessels entering and leaving the port complex The POCS platforms (and associated pipelines and power cables) closest to the port complex are Platforms Edith, Ellen, Elly, and Eureka.

Port of Los Angeles. The POLA is a department of the City of Los Angeles. It is the busiest port in the United States, the 19th-busiest container port[20] by container volume in the world, the highest ranked container port in the Western Hemisphere, and the 10th-busiest worldwide when combined with the neighboring POLB. The POLA is also the highest-ranked freight gateway in the United States when ranked by the value of shipments passing through it. The cargo coming into the port represents approximately 20% of all cargo coming into the United States. The POLA includes 69 km (43 mi) of waterfront and has a channel depth of 16 m (53 ft). The port has 25 cargo terminals, 82 ship-to-shore container cranes, 7 container terminals, and extensive on-dock rail (POLA 2020). In 2019, the port's container volume was 9.3 million

20 A container port or container terminal is a facility where cargo containers are transferred between different transport vehicles (e.g., from a container ship to a train or truck) for further transport.

20-ft equivalent units (TEU),[21] while total arrivals of all vessel types numbered 1,867. It is the most cargo moved annually by a Western Hemisphere port.

Port of Long Beach. The POLB, together with the POLA, comprise the San Pedro Bay Port Complex (Figure 3.16-2). The POLB annually handles approximately 8.1 million TEUs and receives about 2,000 vessel calls. The port has 10 piers with 80 berths, 72 gantry cranes, 22 shipping terminals, and extensive in-dock rail (POLB 2020).

Port of Hueneme. The Port of Hueneme (Figure 3.16-3), located approximately 60 mi northwest of Los Angeles, is the only deep-water port between the POLA and the Port of San Francisco and is the only Navy-controlled (operated by Naval Base Ventura County) harbor between San Diego Bay and Puget Sound, Washington (Port of Hueneme 2022a). The POCS platform (and associated pipelines and power cables) closest to the Port of Hueneme is Platform Gail. The port is a shipping and receiving point for a wide variety of goods including agricultural products.

FIGURE 3.16-3 The Port of Hueneme, Oxnard, CA (Source: Google Earth 2021b).

The port includes two terminals, the 49 ha (120 ac) Port Terminal operated by the Oxnard Harbor District, and a 14 ha (34 ac) Navy Terminal, which is a joint-use property. The port includes two commercial cargo wharfs with five berths totaling 975 linear m (3,200 linear ft) of

[21] The TEU is an inexact unit of cargo capacity, often used for container ships and ports. It is based on the volume of a 6.1-m (20-ft) intermodal container, a standard-sized metal box that can be easily transferred between different modes of transportation, such as ships, trains, and trucks. The container is defined by its length, although the height is not standardized. Forty-foot containers have found wider acceptance, and it is common to designate a 12.2-m (40-ft) container as 2 TEU.

berths, one wharf with a single 305 m (1,000 ft) joint-use berth that can be used for commercial cargo, three additional wharfs under license agreement with the U.S. Navy, a 97-m (320-ft) shallow-draft berth supporting the commercial squid fishery, and four berths with 183 m (600 ft) of floating docking for small craft use (Port of Hueneme 2022a). The port can accommodate vessels with lengths up 244 m (800 ft) and depths up to 10 m (35 ft). A typical ship for the Port of Hueneme is one with about 2,500 TEU capacity. The port also includes 19 km (12 mi) of rail and a 3.2-ha (8-ac) railyard.

Port of San Diego. The Port of San Diego (POSD), with its natural deep-water harbor is the fourth-largest port in California and one of 17 Military Strategic Ports in the United States. The port has two cargo terminals: the Tenth Avenue Marine Terminal (TAMT), a 39-ha (96-ac), eight-berth facility in San Diego; and the National City Marine Terminal (NCMT), a 55-ha (135-ac), four-berth facility in National City (Figure 3.16-4).

FIGURE 3.16-4 San Diego Harbor and the Port of San Diego (Source: Google Earth 2021c).

The POSD is ranked as one of the top 30 U.S. container ship ports, bringing in nearly 3 million metric tons (3,000,000 long tons; 3,300,000 short tons) of cargo per year through the two terminals. The port is also the third-busiest cruise ship port in California, and includes two dedicated, adjacent, cruise ship terminals, the B Street Cruise Terminal and Broadway Pier, each with five berths (Figure 3.16-4).

Commercial Fishing Traffic. In addition to the thousands of commercial vessels that pass through the Santa Barbara Channel and the use these ports every year, a smaller number of commercial fishing vessels use not only the large ports but also the many smaller ports, harbors, and marinas of the area on a daily basis. For example, nearly one-third of California's total annual squid catch transits the Port of Hueneme (Port of Hueneme 2022b), and four commercial fisheries operate out of the Ventura Port District (https://venturaharbor.com/commercial-fisheries/). Between 2010 and 2021, about 3,500 commercial boat licenses were issued annually for all of California, a portion of which were for vessels in the Southern California area.

4 ENVIRONMENTAL CONSEQUENCES

Four alternatives are considered in this PEIS, the Proposed Action (Alternative 1), two other action alternatives, (Alternatives 2 and 3), and a No-Action Alternative (Alternative 4) against which the impacts of the action alternatives are compared (Section 2.2). Sub-alternatives Alternatives 1a, 2a, and 3a incorporate an analysis of explosive, rather than mechanical, severance.

The environmental consequences discussed in this chapter address the potential impacts of each phase of decommissioning (pre-severance, severance, and disposal) under each of the three action alternatives. The evaluations characterize the anticipated type, intensity, geographic range, and duration of potential environmental effects associated with specific activities during each decommissioning phases. Effects are changes to the human environment from the proposed action or alternatives. Evaluations of geographic range consider whether a potential effect would be localized (e.g., around a platform), contained within the Southern California POCS Planning Area, or would extend beyond the planning area. Evaluations of duration consider whether a potential effect would be short-term (hours, days, or weeks) or long-term (months, years, or longer).

Decommissioning activities and associated impacts during the pre-severance phase would be similar among Alternatives 1–3. Pre-severance activities would include onsite mobilization support vessels and barges, preparation of the target platform for severance, and the removal of conductors; see Section 2.2.2 for additional details regarding pre-severance activities. For the purposes of this PEIS, it is assumed that all wells at a platform would have been decommissioned under separate permitting prior to entering the pre-severance phase. While pre-severance activities would be similar among Alternatives 1–3, activities associated with the severance phase would vary among the alternatives. Severance under Alternative 1 includes the complete removal of a platform's topside, conductors, and the platform jacket to BML, and associated pipelines and power cables. Alternatives 2 and 3 would also include complete topside and conductor removal but only partial removal of the platform jackets (namely the submerged portion to a depth of at least 26 m [85 ft]) and pipelines would be abandoned in place. Thus, there would be relatively less environmental disturbance under Alternatives 2 or 3 during the severance phase than under Alternative 1, which would include additional seafloor disturbance and habitat loss during complete jacket and pipeline removal.

During the disposal phase, Alternative 1 would use land disposal of platform topside, jacket, and pipeline materials. Alternative 2 would also use onshore disposal of platform topside and of the upper jacket materials, with the remaining jacket portions (below a depth of 26 m [85 ft]) and associated pipelines being abandoned in place. Material disposal under Alternative 3 would be the same as under Alternative 2, except that the upper portion of the platform jackets that have been removed to a minimum depth of 26 m (85 ft) below the sea surface would be used for artificial reef creation. Thus, Alternative 1 would employ the greatest amount of onshore disposal and Alternative 3 the least, while Alternatives 2 and 3 would leave major portions of platform jackets abandoned in place. These differences in material disposition and disposal would have associated differences in disturbance and other effects under Alternatives 1–3.

Under the No Action Alternative (Alternative 4) there would be no federal action on decommissioning applications. Following lease termination all wells would have been permanently plugged (30 CFR 250.1710) and pipelines decommissioned (30 CFR 250.1750–1754). For the purposes of this Draft PEIS, it is assumed that all such well plugging and pipeline decommissioning would have been previously completed. Pipeline decommissioning would have been accomplished by complete removal or by abandonment-in-place, and in either case the pipelines would have been pigged and flushed prior to final removal or abandonment. Under Alternative 4, the platforms and any remaining associated pipelines would be maintained by the platform owners (with oversight from the Bureau of Safety and Environmental Enforcement's (BSEE's) inspection program) in compliance with ongoing regulatory and statutory requirements for managing platforms and pipelines in order to maintain safety (e.g., lighting for aircraft and navigation safety in the vicinity of the platforms) and protect the environment. Thus, none of the impacts identified for Alternatives 1–3 would be expected under Alternative 4. While the eventual removal of the platforms would realistically be required at some point in the future, Alternative 4 serves as a baseline against which the environmental effects of the action alternatives are compared in the current analysis.

4.1 ASSESSMENT APPROACH

The evaluation of environmental consequences presented in this PEIS characterizes potential effects of decommissioning activities on socioeconomic systems, natural and cultural resources. Evaluations identify impact-producing factors (IPF), or stressors, produced by decommissioning activities and the resources or systems that may be affected by proposed actions. These evaluations then weigh the nature, degree, and persistence of potential effects on resources and systems against their capacity to absorb or recover from them. Environmental consequences of a proposed action are covered below with adequate disclosure and consideration of those potential impacts. Resource-specific adverse impact levels were determined based on scientific literature and best professional judgment, as well as considerations of potential mitigation measures.

In accordance with previous 1978 National Environmental Policy Act (NEPA) regulations (40 CFR 1508.27), this PEIS evaluates project impacts based on the criteria of context and intensity. Accordingly, evaluations consider the spatial extent (e.g., localized around platforms or affecting a much larger portion of the POCS), magnitude (e.g., small vs. large increase in air pollutants, individual biota or populations affected), and duration (e.g., short term [hours, days or weeks] or long term [months or longer]) of any potential effects. Short term effects would end after the action is completed.

To cover the range of effects of decommissioning platforms and associated pipelines on the POCS, evaluations consider the range of the size and weight, distance from shore, and water depth of the platforms. POCS platforms occur in waters ranging in depth from 29 to 365 m (95 to 1,198 ft) and at distances from 6 to 17 km (3.7 to 10.5 mi) from shore (Table 1-1). Topside weights range from 447 to 9,839 tons while jacket plus pile removal weights range from 1,594 to 47,430 tons. The length of pipelines and cables similarly vary among the platforms (Table 1-1).

Water depth will influence the duration, difficulty, and impacts of decommissioning activities as related to the length and weight of submerged portions of platform jackets, the ability to raise these jacket portions, and the requirements of working in deep water. The decommissioning activities will also be affected by the volume of the topside and/or jacket portions of the platforms. These volumes will affect the duration of activities, the size of vessels and equipment required to conduct many of the decommissioning activities, and the volume of wastes produced requiring disposition and disposal.

Natural and sociocultural resources and systems similarly vary with water depth or distance from shore. For example, marine habitats and biota vary by depth and distance from shore and may be quite different between platforms in more shallow, nearshore areas than those in more distant and deeper waters. Similarly, platforms in more nearshore waters are more visible from shore than platforms in more distant locations.

In the absence of platform-specific decommissioning plans or site-specific design details, this Draft PEIS analyzes impacts typical of decommissioning activities, regardless of where an activity may occur. For example, jacket severance will generate underwater noise which may disturb marine species and biota, but the level and duration of the noise will depend on the specific nature of the severance methods being employed, while the transmission and potential effects of the underwater noise will differ between shallow and deep waters and by the nature of the biota present at the decommissioning location, which may also vary with water depth and distance from shore. Analysis of site-specific impacts would be performed or refined in future environmental reviews supporting applications for platform removals.

To perform evaluations of impacts (such as air emissions or socioeconomic impacts) that are measured on an annual basis, the analyses evaluated the peak-year activities for decommissioning the largest platform, Platform Harmony. Since as many as eight platforms may be decommissioned within the next 10 years in an initial campaign (InterAct PMTI 2020), or almost one per year on average, and experience in the Gulf of Mexico (GOM) has shown that decommissioning can take 2 years or more for a single platform (Pipe Exchange 2021), several platforms might be in some stage of decommissioning simultaneously. However, it is expected that continuous, peak-year, activities at Harmony would be representative of high-end annual emissions and decommissioning activities in general for the purposes of annual impacts. Focusing on the peak year for the largest platform is a method for more clearly discussing annual impacts but is not the most conservative estimate for impacts on all resources.

4.1.1 Impact-Producing Factors

Impact assessment involves identifying IPFs associated with decommissioning activities that potentially affect environmental resources. Decommissioning activities have the potential to affect natural resources as well as sociocultural resources and systems. Accordingly, this PEIS identified IPFs related to decommissioning activities that would occur under the Proposed Action and alternatives and the potentially affected resources or systems.

Natural (biotic and physical) resources that could be affected include air, water; the acoustic environment; and marine and coastal biota and their habitats. IPFs affecting biotic, physical, and sociocultural resources and conditions are related to noise, air emissions, turbidity and sedimentation, seafloor disturbance, lighting, vessel strikes, habitat loss, sanitary wastes/wastewater and trash and debris, visual intrusions, and space-use conflicts. Table 4.1-1 details the IPFs that may affect natural resources under the action alternatives, and Table 4.1-2 details the IPFs that may affect sociocultural resources and conditions.

TABLE 4.1-1 Impact-Producing Factors (IPFs) Potentially Affecting Biotic and Physical Resources during Platform Decommissioning[a]

Impact-Producing Factor and Associated Activities	Associated Decommissioning Phase[b]	Potentially Affected Resources: Air Quality	Water Quality	Marine Invertebrates and Habitats	Marine Fish and EFH[c]	Sea Turtles	Marine and Coastal Birds	Marine Mammals
Noise								
Vessel and Truck Traffic	P, S, D				x	x	x	x
Equipment Operation	P, S, D				x	x	x	x
Mechanical/Abrasive Severance	S				x	x	x	x
Explosive Severance	S			x	x	x	x	x
Air Emissions								
Vessel and Truck Traffic	P, S, D	x						
Equipment Operation	P, S, D	x						
Turbidity and Sedimentation								
Vessel Anchoring	P, S, D		x	x	x	x		x
Conductor Severance and Removal	P		x	x	x	x		x
Jacket Footer/Pilings Removal	S		x	x	x	x		x
Pipeline/Cable Removal or Abandonment	S		x	x	x	x		x
Shell Mound Removal	S		x	x	x	x		x
Site Clearing (Seafloor Trawling)	D		x	x	x	x		x
Rigs-to-Reef (RtR) Jacket Disposal	D		x	x	x	x		x
Seafloor Disturbance								
Vessel Anchoring	P, S, D		x	x	x			
Jacket Footer/Pilings Removal	S		x	x	x			
Pipeline/Cable Removal or Abandonment	S		x	x	x			
Shell Mound Removal	S		x	x	x			
RtR Jacket Disposal	D		x	x	x			
Site Clearing (Seafloor Trawling)	D		x	x	x	x		
Lighting								
Platform Lighting	P, S, D						x	
Vessel Lighting	P, S, D						x	
Vessel Strikes								
Support Vessel Traffic	P, S, D					x		x

TABLE 4.1-1 (Cont.)

Impact-Producing Factor and Associated Activities	Associated Decommissioning Phase[b]	Potentially Affected Resources: Air Quality	Water Quality	Marine Invertebrates and Habitats	Marine Fish and EFH[c]	Sea Turtles	Marine and Coastal Birds	Marine Mammals
Loss of Platform-based Habitat								
Conductor Removal	S			x	x	x	x	x
Jacket Removal	S			x	x	x	x	x
Sanitary Waste/Wastewater/Trash and Debris								
Support Vessel Discharges	P, S, D		x	x	x	x	x	x
Platform Wash-off	P		x	x	x	x	x	x

[a] An x identifies the specific resource category that could be affected by each IPF and its associated decommissioning activities. An x does not imply either the nature (e.g., negative, positive) or level of effect or resulting impact. In some cases, the effect and impact may be negligible or beneficial.

[b] P = Pre-severance; S = Severance; D = Disposal.

[c] EFH = essential fish habitat.

TABLE 4.1-2 Impact-Producing Factors (IPFs) Potentially Affecting Socio-Cultural Resources and Systems During Platform Decommissioning[a]

		Potentially Affected Resources						
IPF and Associated Activity	Associated Decommissioning Phase[b]	Commercial and Recreational Fisheries	Areas of Special Concern	Archeological and Cultural Resources	Visual Resources	Environmental Justice	Socioeconomics	Navigation and Shipping
Noise								
Vessel and Truck Traffic	P, S, D	x	x			x		
Equipment Operation	P, S, D	x						
Mechanical/Abrasive Severance	S	x						
Explosive Severance	S	x						
Air Emissions								
Vessel and Truck Traffic	P, S, D		x			x		
Equipment Operation	P, S, D							
Turbidity and Sedimentation								
Vessel Anchoring	P, S, D	x	x					
Conductor Severance and Removal	P	x						
Jacket Footer/Pilings Removal	S	x						
Pipeline/Cable Removal or Abandonment	S	x						
Shell Mound Removal	S	x						
Site Clearing (Seafloor Trawling)	D	x						
Rigs-to-Reef Jacket Disposal	D	x						
Vessel Anchoring	P, S, D	x						
Seafloor Disturbance								
Vessel Anchoring	P, S, D	x	x	x				
Conductor Severance and Removal	P	x		x				
Jacket Footer/Pilings Removal	S	x		x				
Pipeline/Cable Removal or Abandonment	S	x		x				
Shell Mound Removal	S	x		x				
Site Clearing (Seafloor Trawling)	D	x						
Rigs-to-Reef Jacket Disposal	D	x		x				
Lighting								
Platform Lighting	P, S, D				x			
Vessel Lighting	P, S, D				x			

TABLE 4.1-2 (Cont.)

		Potentially Affected Resources						
IPF and Associated Activity	Associated Decommissioning Phase[b]	Commercial and Recreational Fisheries	Areas of Special Concern	Archeological and Cultural Resources	Visual Resources	Environmental Justice	Socioeconomics	Navigation and Shipping
Space-Use Conflicts								
Vessel Traffic	P, S, D	x						x
Sanitary Waste/Wastewater/Trash								
Support Vessel Discharges	P, S, D	x						
Platform Wash-off	P	x						
Visual Clutter from Vessels	P, S, D				x			

[a] An x identifies the specific resource category that could be affected by each IPF and the associated decommissioning activities or resultant conditions. It does not imply either the nature (e.g., negative, positive) or level of effect or resulting impact. In some cases, the effect and impact may be negligible or beneficial.

[b] P = Pre-severance; S = Severance; D = Disposal.

The application of the IPFs considered a range of effects according to platform size, water depth, and location on the POCS, and accounted for the various activities that contribute to them at each phase of decommissioning, as well as the location, magnitude, and duration of the activities as they relate to potential environmental effects.

4.1.2 Mitigation Measures

The application of mitigation measures to the IPFs identified in Section 4.1.1 would reduce impacts to the extent practicable. Mitigation measures could include physical and engineered barriers, work practices, work timing, monitoring, and administrative measures for limiting impacts. Table 4.1-3 lists mitigation measures for the IPFs identified in Tables 4.1-1 and 4.1-2. The mitigation measures listed are typical for decommissioning of offshore O&G facilities in the GOM and in foreign waters and were compiled from those required in the GOM (MMS 2005) and from generally accepted good practice. BSEE will require specific mitigations in platform decommissioning applications. BSEE Notice to Lessees NTL No. 2020-P02 issued in August 2020 requires applicants to provide plans to protect marine life and the environment, as well as for protecting archaeological and sensitive biological features during removal operations (e.g., jetting, seafloor clearance), including mitigation measures to minimize impacts of removal. Those plans could include the mitigation measures listed here as well as additional site-specific mitigations. Mitigations for the potential impacts of explosive severance considered in Sub-alternatives 1a, 2a, and 3a for the protection of marine mammals and other marine life would be developed in consultation with the National Marine Fisheries Service (NMFS).

TABLE 4.1-3 Typical Mitigation Measures for Offshore Decommissioning of Oil and Gas Platforms and Related Structures

IPF	Stages[a]	Description of Mitigation Measure
Noise from Vessels and Equipment	P,S,D	Measures to limit impacts from noise from equipment and vessels: • Ensure engines on equipment and vessels have properly functioning mufflers. • Use shrouds or enclosures to reduce noise emanating from equipment. • Avoid evening and, especially, overnight hours for noisy activities.
Explosive shock wave or noise from nonexplosive severing (cutting) tools Shock Wave	S	Measures to limit impacts of explosives use on marine life: • In collaboration with NMFS, determine a radius of impacts meeting NMFS impact thresholds for the intended charge size or cutting tool, use BML or AML, water depth, and marine protected species (MPS) possibly present. • Conduct visual monitoring within the impact radius prior to detonation or cutting. • Avoid detonation or cutting when MPS are present. • Conduct surveys after detonation or cutting to evaluate effectiveness of monitoring. • Apply seasonal avoidance according MPS migration patterns.
Air Emissions	P,S,D	Measures to control air emissions: • Use equipment permitted by county air boards • Ensure functioning emission controls on diesel and gasoline engines on equipment. • Ensure functioning emission controls on diesel engines in vessels. • Use of ultra-low sulfur diesel fuel in vessels. • Use cleaner-engine vessels (e.g., Tier 4 marine engines with selective catalytic reduction [SCR] system and diesel particulate filter [DPF]) if available and feasible. • Ensure degassing of equipment and utilizing existing platform flares to minimize ROG fugitive emissions.

TABLE 4.1-3 (Cont.)

IPF	Stages[a]	Description of Mitigation Measure
Turbidity and Sedimentation	P,S,D	Measures to reduce production of turbidity and sedimentation: • Limit jetting, dredging, and excavation of pilings and other bottom-founded installations to the minimum necessary to perform function. • Consider turbidity production in the selection of severance methods.
Seafloor Disturbance	P,S,D	Measures to limit seafloor disturbance and impacts on potentially affected resources and facilities from support vessel mobilization/demobilization: • When using “jack up” vessels in removal operations, buoy all existing pipelines and other potential hazards located within 150 m (490 ft) of operations, including all anchor lines. • If lease blocks proximal to operations have not been surveyed for archaeological resources, conduct necessary surveys/reporting prior to mobilizing on site and conducting any seafloor disturbing activities. • Abide by all avoidance mitigation and anchor restrictions for an installation, if designated. • On the location plat required in removal applications, show all nearby structures, pipelines, archaeological resources, sensitive biological features, and anchor patterns. • If progressive transport, i.e., jacket hopping, activities are performed, obtain prior written approval for such activities from the BSEE Regional Supervisor; provide a separate location plat in the removal application for each “set-down” site, showing pipelines, anchor patterns, archaeological resources, and sensitive biological resources, if any; provide a map of the transport route to each set-down site in the application; conduct any required or necessary surveys of archaeological resources, and sensitive biological resources in any potentially impacted lease block prior to mobilizing on site and conducting any seafloor disturbing activities. • During site clearance and verification, provide trawling contractors with a hazards plat identifying all known benthic, archaeological, and infrastructure resources that could be damaged by or snag trawling nets; use trawl nets with mesh size no smaller than 4 inches; abide by trawl times of 30 min, allowing for the removal of any captured sea turtles; resuscitate and release any captured sea turtles; report the number and condition or any sea turtles captured, resuscitated, released for killed by trawling nets. • Use dynamically positioned vessels when practicable when bottom disturbance impacts are of concern.
Lighting Effects	P,S,D	Measures to limit impacts on biological and visual resources from lighting used in removal activities: • Limit amount of lighting used to that necessary to perform activities. • Use down-facing lighting shields for focused directional lighting to reduce glare and impacts on night skies.
Vessel Strikes	P,S,D	Measures to limit impacts of vessel strikes on sea turtles, marine mammals and other MPS • Impose speed limits on vessels used in removal activities. • Where feasible, confine vessels routes to approved navigation corridors. • Use observers on vessels to identify MPS. • Use vessels efficiently to reduce the number of vessel trips required.
Loss of Platform-based Habitat	S	Measures to mitigate the impacts of loss of platform-based habitat: • Dispose of platform jackets in an artificial reef if available and approved. • Perform partial removal of platform jackets if approved. • Leave shell mounds in place if approved. • Decommission pipelines in place if approved.

TABLE 4.1-3 (Cont.)

IPF	Stages[a]	Description of Mitigation Measure
Wastewater, Trash and Debris	P,S,D	Measures to reduce impacts from discharged sanitary and industrial wastewater, trash, and debris from work vessels and platforms: • Abide by U.S. Coast Guard regulations for discharge of sanitary wastes from vessels. • Implement pollution prevention and control measures on platforms and vessels. • Provide waste receptacles in work areas. • Tie down or secure objects that may be wind blown into the ocean. • Discourage littering.
Space-Use Conflicts	P,S, D	Measures to reduce space-use conflicts between decommissioning-related vessel activities and commercial shipping and navigation: • Where feasible, decommissioning vessels will operate within the established vessel traffic lanes. • Where feasible, decommissioning-related vessel traffic will follow direct voluntary traffic lanes from the Port of Los Angeles (POLA)/Port of Long Beach (POLB) to the platforms. • At all times, decommissioning-related vessels will operate using the highest level of navigational safety and in accordance with International and U.S. Coast Guard (USCG) regulations and guidelines. • All decommissioning work vessels at a platform will display the appropriate “day shapes” specifying the vessels are engaged in activities and have limited maneuverability. • Post notices at all harbor master offices and marinas that describe the proposed decommissioning activities along with a map of the ocean area to be affected and provide contact information for all decommissioning-related vessels and their responsible personnel. • Submit to the U.S. Coast Guard a Local Notice to Mariners (NTM) at least 15 days prior to in-water activities, specifying vessel and personnel contact information, the scope of the proposed decommissioning actions, location, and the anticipated duration of the decommissioning activities.

[a] Decommissioning stages potentially affected: P=Pre-severance, S = Severance D = Disposal

4.1.3 Impact Levels

Impact levels consider the duration, magnitude, and geographic scope of the impacts on a resource, as well as the degree to which potential impacts are avoidable or may be mitigated, and the ability of the affected resource to recover from an impact. With respect to the ability to recover, population-level impacts are evaluated for biota, rather than on impacts on individuals.

Table 4.1-4 presents the impact levels used in the characterization of potential impacts on biological (e.g., marine and coastal biota and habitats) and physical resources (e.g., water and air quality) from decommissioning activities considered under the Proposed Action and alternatives.

Table 4.1-5 presents the impact levels used for characterizing the potential impacts on sociocultural resources and systems (e.g., archaeological and cultural resources, tourism and recreation, environmental justice) under the Proposed Action and alternatives.

TABLE 4.1-4 Impact Levels for Biological and Physical Resources

Impact Level	Definition
Negligible	• No measurable impacts.
Minor	• Most impacts could be avoided with feasible mitigation. • Impacts would not disrupt the normal or routine functions of the affected resource. • If impacts occur, the resource will recover completely without mitigation once the impact-producing factor ceases.
Moderate	• Impacts on the resource are unavoidable. • Feasible mitigation would reduce impacts substantially during the life of the project • The viability of the resource is not threatened, although some impacts may be irreversible. • The affected resource would recover completely if feasible mitigation were applied once the impact-producing factor ceases.
Major	• Impacts on the resource are unavoidable. • The viability of the affected resource may be threatened. • The affected resource would not fully recover even if feasible mitigation is applied during the life of the project or a remedial action is implemented once the impacting stressor is eliminated.

TABLE 4.1-5 Impact Levels for Socioeconomic Resources and Conditions

Impact Level	Definition
Negligible	• No measurable impacts.
Minor	• Adverse impacts on the affected activity, community, resource could be avoided with feasible mitigation. • Impacts would not disrupt the normal or routine functions of the affected activity or community. • Once the impact producing factor is eliminated, the affected activity or community will, without any mitigation, return to a condition with no measurable effects.
Moderate	• Impacts on the affected activity, community, or resource are unavoidable. • Feasible mitigation would reduce impacts substantially during the life of the Proposed Action. • A portion of the affected resource would be damaged or destroyed. • The affected activity or community would have to adjust somewhat to account for disruptions due to impacts of the project. • Once the impact producing factor is eliminated, the affected activity or community will return to a condition with no measurable effects if feasible remedial action is taken.
Major	• Impacts on the affected activity, community, or resource are unavoidable. • Feasible mitigation would reduce impacts somewhat during the life of the project. • The affected activity or community would experience unavoidable disruptions to a degree beyond what is normally acceptable. • Once the impact producing factor is eliminated, the affected activity or community may retain measurable effects for a significant period of time or indefinitely, even if remedial action is taken.

4.1.4 Cumulative Impacts

The Council on Environmental Quality defines cumulative impacts as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts can result from individually minor but collectively significant actions that take place over a period of time.

The analysis of potential cumulative effects in the following resource discussions considered the incremental effects of activities that could be permitted under the Proposed Action on marine and coastal resources, in combination with the effects of other past, ongoing, or foreseeable future activities on the same resources. Chapter 3 characterizes the current condition of the affected environment within the project area as affected by past and present actions, and Chapter 4 evaluates the potential direct and indirect impacts of the decommissioning activities that could be permitted under the Proposed Action and alternatives. The cumulative impacts analysis in the resource discussions below consider the current condition of, and stresses on, the affected resource, along with the resilience and sustainability of that resource.

Table 4.1-6 identifies the past, current, and reasonably foreseeable future activities on the Southern California POCS that were considered in the assessment of the cumulative impacts of Alternative 1 Proposed Action: offshore wind energy development, offshore military training, commercial shipping and navigation, commercial and recreational fisheries, and aquaculture.

The Bureau of Ocean Energy Management's (BOEM's) Office of Renewable Energy Programs (OREP) oversees the development of offshore renewable energy on the OCS. Offshore wind energy development is reasonably foreseeable on the POCS. To date, there are two designated wind energy areas on the POCS, the Humboldt Wind Energy Area (WEA) offshore northern California, and the Morro Bay WEA located between Monterey and Morro Bay off the central California coast. BOEM is currently in the process of conducting NEPA reviews in preparation for conducting two to six lease sales within the two WEAs. Offshore wind speeds considered to be viable for commercial wind energy development occur on the POCS west of Gaviota and northwest of the Channel Islands (see Figure 2-1). No projects have been developed or proposed in California to date.

A variety of military use areas (airspace and water areas) and installations occur in coastal and offshore areas of Southern California, and some of the POCS platforms are located within or near these areas and installations. Among these are danger zones (water areas used for target practice, bombing, rocket firing, or other especially hazardous operations, normally for the armed forces) and restricted areas (water areas designated for the purpose of prohibiting or limiting public access in order to provide security for government property and/or protection to the public from the risks of damage or injury arising from the government's use of that area).

TABLE 4.1-6 Past, Present, and Reasonably Foreseeable Actions in the POCS and Adjacent Coastal Areas

Project	Location	Project Description	Summary of Impacts	Project Timeframe Past	Present	Future
Fiber Optic Communications Undersea System Replacement	Naval Air Systems Command Sea Range, Point Mugu, California.	U.S. Navy to replace the existing fiber optic communications undersea system between Naval Base Ventura County (NBVC) Point Mugu and NBVC San Nicolas Island (SNI) and the microwave communications system link between NBVC Point Mugu with a single new system connecting these facilities via new undersea fiber optic cables.	Temporarily disturbance of local wildlife, including threatened and endangered species at Point Mugu and SNI.			X
Modifications to the Port of Hueneme Deepening Project	Port Hueneme, Ventura, CA	The main approach channel to Port Hueneme would be dredged to 13.4 m (44 ft) mean lower low water (MLLW), and the entrance channel and turning basin would be dredged to -12.2 m (-40 ft) MLLW. These areas would be dredged; the bulk of the dredged sand would be placed onto Hueneme Beach and smaller amounts into the nearshore or disposed of on the existing confined aquatic disposal site within the harbor. If necessary, approximately 14,000 tons of stone would be placed along the eastern slope of the entrance channel to stabilize the slope.	Temporary localized impacts on water quality, certain bird species, air quality, and to benthic communities from dredging and relocation of sediment. Steps would also be in place to avoid the spreading of an invasive seaweed species.	X		
Navy Hawaii-Southern California Training and Testing (HSTT)	Includes the sea off Southern California and at select Navy pierside and harbor locations, and overlaps with a portion of the Point Mugu Sea Range	The Navy has evaluated impacts from past as well as present training and testing activities. The Navy uses these analyses to support incidental take authorizations under the Marine Mammal Protection Act (MMPA). In addition, the detonation of a maximum of 170,105 explosives was evaluated over the 5-year period, 58% of which were Explosive Class 1 (0.1–0.25 lb.).	Negligible to no impacts have been observed to populations of marine mammals, sea turtles, birds, marine vegetation, marine invertebrates, and fish from acoustic, energy, physical disturbance and strike, entanglement, ingestion, and other secondary stressors associated with Navy training and testing activities.	X	X	X

TABLE 4.1-6 (Cont.)

				Project Timeframe		
Project	Location	Project Description	Summary of Impacts	Past	Present	Future
U.S. Coast Guard (USCG) Mission and Training Activities	USCG District 11, California. For Southern California, this includes facilities at Los Angeles/ Long Beach and San Diego.	The USCG performs maritime humanitarian, law enforcement, and safety services in estuarine, coastal, and offshore waters. Equipment used by the Southern California USCG includes vessels ranging in size from 7.6 to 26.5 m (25 to 87 ft), as well as HH-60 helicopters. Training events include search and rescue, maritime patrol, boat handling, and helicopter and surface vessel live-fire training with small arms.	Mission and training activities contribute vessel noise and could result in collisions with marine mammals and sea turtles. Sonar detection systems may affect marine mammals, but only short-term, minor, adverse effects are expected as the high frequency is similar to common commercial fish finder systems. Gunnery activities could contribute military expended material to the benthic environment.	X	X	X
Extended Range Cannon Artillery II Test Activities	Vandenberg Space Force Base (VSFB) and PMSR	The U.S. Army is proposing to conduct extended range cannon artillery II (ERCA) testing at VSFB. Major components of ERCA include the cannon, gun mount, artillery projectile, and propelling charges and would be sited at an existing site on VSFB. The proposed activities would include testing ERCA II by firing projectiles over the Pacific Ocean from the shoreline of VSFB onto and over the PMSR.	During active testing commercial and recreational fishing and boating activities would be prohibited in the area. Potential impacts similar to those that could occur offshore Navy weapons testing and training.			X
Federal O&G Leasing Programs	Southern California Planning Area of the Federal POCS	Twenty-three O&G production facilities are located off the coast of Southern California (15 of which are currently active) and an associated 213 mi of pipeline. Part of the Southern California Planning Area for this program intersects with the Point Mugu operating area. Eight of these platforms have been shut down and will be entering decommission. There have been no new federal lease sales on the POCS since 1984, and the current 2017–2022 National Leasing Program includes no new federal lease sales on the POCS.	Potential impacts associated with federal O&G production on the POCS include those associated with noise, traffic, waste discharges, sediment disturbance, and risk of accidental spills. These impacts are generally assumed to be negligible due to the dispersed and relatively small footprint of normal operations. Also, production activities are anticipated to decline in the future. However, in the event of small to catastrophic spills, impacts grow increasingly detrimental to marine life.	X	X	X
State of California O&G Leasing Programs	State waters: POCS, 0 to 3 miles offshore of California	There are 11 active leases and four offshore wells operating in California state waters, located offshore of Orange County and Santa Barbara County, bordering the federal POCS. In 1994, the state legislature placed the entirety of California's coast off-limits to new O&G leases.	Impacts similar to those identified above for the federal O&G leasing programs on the POCS.	X	X	X

TABLE 4.1-6 (Cont.)

Project	Location	Project Description	Summary of Impacts	Project Timeframe Past	Present	Future
Commercial Wind Energy Development	POCS federal waters	Both the Bureau of Ocean Energy Management (BOEM) and the State of California are planning for potential leasing for offshore wind in federal waters, no projects have been developed or proposed in California to date. BOEM has established the Morro Bay Wind Energy Area, which is located in the Southern California Planning Area.	Impacts similar to those identified above for the federal O&G leasing programs on the POCS, but no risks of potential oil spills.			X
Commercial Fishing	POCS and state waters	Southern California supports a diverse commercial fishing fleet. The National Marine Fisheries Service issues fishing vessel, dealer, and commercial operator permits, and fishing authorizations as required under the various Federal Fishery Regulations. The California Department of Fish and Game issue similar permits for commercial fishing in state waters.	Potential impacts include benthic habitat degradation, overfishing, bycatch of vulnerable species, and entanglement of sea turtles, sea birds, and marine mammals.	X	X	X
Recreational Fishing	POCS and state waters	Recreational fishing is significant in California. For example, there were over 1.5 million recreational fishing in 2020 (NMFS, 2020a).	Impacts may include bycatch of vulnerable species as well as entanglement of sea turtles and marine mammals.	X	X	X
Aquaculture	Southern California coastal waters	There are mussel farms in the Santa Barbara Channel and off Long Beach, with a permit (now withdrawn) for significant expansion of mussel farming off the coast of Ventura. The National Oceanic and Atmospheric Administration (NOAA) is currently evaluating southern California for potential Aquaculture Opportunity Areas, which if identified could lead to increased aquaculture development in those areas (NOAA 2022).	Potential impacts include degradation of water quality, seafloor disturbance, and entanglement of sea turtles, sea birds, and marine mammals.	X	X	X
Commercial Shipping	Southern California waters	Commercial shipping (e.g., shipping container vessels) traveling to and from Port Hueneme, the San Pedro Bay Port Complex, the Port of San Diego, and numerous smaller harbors.	Impacts may include collisions with sea turtles and marine mammals.	X	X	X

Two major military facilities are located along the Southern California POCS: Naval Base Ventura County (NBVC) and Vandenberg Space Force Base (VSFB). NBVC is a U.S. Navy base in Ventura County, California, composed of three main locations: Point Mugu, just south of Port Hueneme; Port Hueneme, in Oxnard; and San Nicolas Island. At Point Mugu, the NBVC operates two runways and the 93,000-km^2 (36,000-mi^2) Point Mugu Sea Range anchored by San Nicolas Island. At Port Hueneme, the NBVC operates the only deep-water port between Los Angeles and San Francisco, dedicated access for on- and off-loading of military freight for the various branches of service. The port is the west coast homeport of the U.S. Navy Seabees.

The Point Mugu Sea Range supports the testing and tracking of weapons systems in restricted air- and sea-space without encroaching on civilian air traffic or shipping lanes (Point Mugu Sea Range 2022). The U.S. Coast Guard (USCG) also conducts mission and training activities within the sea range, including monitoring of safety zones and conducting observations of marine mammals and sea turtles. The range can be expanded through interagency coordination between the U.S. Navy and the Federal Aviation Administration.

The VSFB, which, in addition to conducting military space launches and missile testing, conducts launches for civil and commercial space entities (e.g., NASA and Space-X). The U.S. Army is proposing to conduct Extended Range Cannon Artillery II (ERCA) testing at VSFB; the proposed activities would include testing ERCA II by firing projectiles over the Pacific Ocean from the shoreline of VSFB (Point Mugu Sea Range 2022).

POLA and POLB represent two of the largest ports in the United States, and annually receive about 4,000 commercial and cruise vessel arrivals, many of which come through the Santa Barbara Channel (see Section 3.13). For the period 2000–2020, the POLA was ranked the top port in the Western Hemisphere. It is reasonably foreseeable that these ports will continue to serve as major ports for commercial shipping, and vessel traffic will increase into the future.

There is extensive commercial and recreational fishing on the Southern California POCS, as well as aquaculture in coastal waters, and the levels of all three are reasonably foreseeable to continue and likely increase into the future. During 2019 (the most recent year for which final commercial fisheries data is available for the applicable reporting blocks), landings of more than 84 million lb. of fish and invertebrates—with a value of approximately $35 million—were reported for the Santa Barbara reporting area and more than 25 million lb.—worth approximately $19 million—were reported for the Los Angeles reporting area (see Table 3.6-1). Currently, aquaculture facilities that produce food products are located up and down the coast, and in ponds and tanks inland (California Sea Grant 2022). For example, oysters are grown in Humboldt, Tomales, Morro, and San Diego Bays, and in Agua Hedionda Lagoon just north of San Diego. There are mussel farms in the Santa Barbara Channel and off Long Beach.

4.1.5 Incomplete or Unavailable Information

The Bureaus used the best available scientific information in the preparation of this PEIS. In the following analyses of physical, environmental, and socioeconomic resources, there remains incomplete or unavailable information related to the decommissioning activities evaluated in this programmatic analysis as well as gaps in science for specific resources or impacts. For the Proposed Action and alternatives being evaluated on a programmatic basis, there remains incomplete or unavailable information (e.g., specific severance method to be used for jacket removal) that may only be known when there is a platform-specific decommissioning permit application.

Existing and new information is included in the description of the affected environment and impact analyses throughout the PEIS. Where necessary, the subject matter experts extrapolated from existing and available information, using accepted methodologies, to make reasoned estimates and develop conclusions regarding the current baselines for resource categories and expected impacts from a proposed action. The subject matter experts who prepared this PEIS conducted a diligent search for pertinent information, and the evaluations of impacts presented in this PEIS are based upon approaches or methods generally accepted in the scientific community. All reasonably foreseeable impacts are considered.

The Bureaus acknowledge that there remain gaps in information relevant to the resources of the POCS (e.g., the timing and occurrence of individual marine mammal species in the vicinity of each platform grouping). The subject matter experts determined, in the analyses within this Draft PEIS, that none of the incomplete or unavailable information was essential to a reasoned evaluation of the nature, extent, and magnitude of consequences that could be incurred under each of the four alternatives that are evaluated. Similarly, the subject matter experts determined that none of the incomplete or unavailable information was essential to a reasoned choice among the alternatives by the Bureaus.

As decommissioning applications are submitted in the future, BSEE will address the impacts of future site-specific actions in subsequent NEPA evaluations (40 CFR 1501.11) using a tiering process based on this programmatic evaluation. For these reasons, the Bureaus have met their NEPA obligations in this PEIS, namely to (1) use the best available science and information relevant to the alternatives and the impact analyses; (2) consider the extent to which incomplete or unavailable information affected the analyses of potential impacts; and (3) consider the extent to which incomplete or unavailable information affects the ability of the Bureaus to decide among the alternatives.

4.2 ENVIRONMENTAL CONSEQUENCES

4.2.1 Air Quality

The IPFs that could potentially affect air quality during decommissioning include emissions from mobile sources, such as tugboats or crew and supply boats, and stationary sources, such as generators. Table 4.1-1 presents the various decommissioning activities that produce these IPFs. Mitigation measures for relevant IPFs are presented in Table 4.1-3 and the definitions of impact levels are presented in Table 4.1-4. The following sections describe and evaluate the potential consequences of the IPFs under the decommissioning alternatives on air quality.

As no decommissioning plans are currently available for any platform within the POCS that could serve as a basis for estimating air emissions from decommissioning, the current analysis constructs a case study involving the complete decommissioning of a large deep-water platform within 20 months. This case study is assumed to represent a high-end level of decommissioning activities that is unlikely to be exceeded in any given year for the purpose of estimating annual air emissions. It should be noted that the majority of actual emissions from decommissioning would ultimately occur in federal waters off of Santa Barbara County, in which 15 of the 23 platforms on the POCS are located.

During decommissioning, the number of vessels and equipment and resulting air emissions would depend on platform-specific characteristics, such as location, water depth, and the size and complexities of infrastructure. Consequently, air emissions at different platforms would vary according to the different types and sizes of equipment, lift cranes, barges, and tugboats required, some with varying levels of emission control systems. The local air districts will regulate air emissions from stationary sources, and the California Air Resources Board (CARB) will regulate air emissions from marine vessels. CARB's requirements will include propulsion engine operation monitoring, recordkeeping, and reporting, as well as the use of ultra-low sulfur diesel (ULSD) fuel with a sulfur content of 15 ppm or less (see Section 3.2.6). Operators will also be required to comply with CARB standards for new and modified engines.

Section 176(c) (42 U.S.C. 7506) of the Clean Air Act (CAA) requires federal agencies' actions to conform to any applicable state, tribal, or federal implementation plans (SIP, TIP, FIP, respectively) for attaining and maintaining the National Ambient Air Quality Standards (NAAQS). These general conformity determinations will be issued when the decommissioning campaigns are defined, and when reasonable determinations can be made as to whether the de minimis levels of direct and indirect contaminants will be emitted.

The largest and deepest platforms, e.g., Platforms Harmony and Heritage, would produce the highest emissions due to the increased amount of time and effort required to remove the larger topsides and longer jackets. Accordingly, Platform Harmony, one of the largest and deepest platforms, was selected for impact analysis as a reasonably high case in the following analysis, unless otherwise noted. Decommissioning total days under all alternatives are more than a year: a total of 591 days under Alternative 1 and a total of 422 days under Alternatives 2 and 3, which include 290 days for a conductor removal phase. To estimate peak annual emissions, emissions from a portion of the conductor removal phase (64 days) and emissions from all ensuing phases (301 days) are combined in a single year, i.e., a peak year. These timeframes are based on using non-explosive severance for conductors and submerged portions of platform jackets. Timeframes would be reduced if explosive severance is used. Air quality impacts under explosive severance are analyzed below as sub-alternatives to the action alternatives.

The primary source of air emissions from decommissioning would be internal combustion engines (ICEs) in the form of diesel engines, associated with heavy equipment (compressors, generators, cranes, etc.), crew and supply boats, tugboats used to transport cargo barges and other barges, and propulsion and generator engines associated with derrick barges. Thus, emissions of nitrogen oxides (NO_x), which is one of the primary pollutants produced during high-temperature combustion, are of primary concern during various decommissioning phases. In particular cargo, barge, and tug combinations produce the most emissions. NO_x is a strong oxidizing agent and plays a major role in the atmospheric reactions with reactive organic gases (ROGs) that produce ozone (smog) on hot and sunny days.

NO_x is also a major precursor of both fine inhalable particles of less than or equal to 2.5 microns in aerodynamic diameter ($PM_{2.5}$) and acid depositions along with sulfur oxides (SO_x). Nitrate particles (mostly $PM_{2.5}$) produced from NO_x can impair visibility and cause regional haze. In addition, carbon monoxide (CO) is produced during incomplete combustion and its emissions are second highest among criteria pollutants, followed by PM_{10}/$PM_{2.5}$ emissions. Note that high-temperature combustion generates predominantly fine particles, so PM_{10} emissions are almost the same as $PM_{2.5}$ emissions for ICEs. SO_x represents the smallest emissions due to introduction of the ULSD. In addition, during the pre-severance phase, there would be some releases to air from equipment and pipeline cleaning (i.e., purging of hydrocarbons).

Diesel-fueled ICEs of onroad and nonroad vehicles and equipment, such as trucks, cranes, and gantries, emit a complex mixture of air pollutants, including both gaseous and solid materials. The solid material is known as diesel particulate matter (DPM). DPM is typically composed of carbon particles (“soot,” also called black carbon) and numerous organic compounds, including over 40 known cancer-causing organic substances (such as polycyclic aromatic hydrocarbons, benzene, formaldehyde) and gaseous pollutants, such as VOCs and NO_x, which are precursors in $PM_{2.5}$ and ozone formation (CARB 2022). DPM is a primary concern because it represents a significant threat to air quality and human health. DPM is classified as carcinogen by the World Health Organization (WHO) and the California Environmental Protection Agency (CalEPA), while the U.S. Environmental Protection Agency (EPA) characterized DPM as “likely to be carcinogenic to humans,” but carcinogenic risks from both oral and inhalation exposures have not been assessed yet (EPA 2017). The MATES V study indicated that the DPM is the predominant contributor (over 72%) to overall air toxics cancer risk from inhalation exposures in the South Coast Air Basin (SCAQMD 2021). DPM emissions from decommissioning activities would be relatively small compared with basin-wide emissions but contribute to potential impacts on air quality and human health to downwind coastal communities and areas along the roads, to some extent.

Air emissions associated with decommissioning activities were estimated using the Decommissioning Emissions Estimation for Platforms (DEEP) tool and database, which was developed specifically for decommissioning of platforms in the POCS Region (BOEM 2019a, 2019b). DEEP produces platform-specific emission estimates for five phases of decommissioning: pre-abandonment, topside removal, jacket removal, debris removal, and pipelines and power cable removal. For disposal, materials would be transported to a shore-based port on cargo barges, offloaded at the ports, cut and sectionalized, and hauled to recycling or disposal facilities. Platform jacket and deck modules would primarily be recycled as scrap at Los Angeles area scrap/recycling yards, such as SA Recycling, or transported to GOM or foreign locations via barges. Conductors, power cables and pipelines might be transported from the offloading sites to disposal sites near Bakersfield, California, or similarly transported to GOM or foreign locations via barges. The only emissions not analyzed herein are from transport of disassembled materials from the California ports to foreign ports due to uncertainty in their locations (BOEM 2019a). In the DEEP tool, the pre-abandonment phase is the same as the pre-severance phase in the current analysis, while the next four phases combined represent the severance phase and the disposal phase combined.

In the DEEP tool, year 2025 is assumed as the first year of decommissioning and the POLA is selected as the demobilization port for topsides and jackets. The POLA is also selected for barge origins, except derrick barges from the GOM. Onshore conceptual decommissioning requirements would be subject to state and local authorization and permits.

4.2.1.1 Alternative 1

Alternative 1 involves the complete removal of platforms to BML and removal of all associated pipelines and cables. Non-explosive cutting is assumed for all severances. Explosive severance is analyzed below as Sub-alternative 1a.

For the Platform Harmony study case, Table 4.2.1-1 presents estimated uncontrolled air emissions for Alternative 1 for work phases defined in the DEEP model, which roughly correspond to the PEIS work phases. Note that air emissions in this table include only those that occur within the jurisdictions of the Santa Barbara County Air Pollution Control District (SBCAPCD), the Ventura County Air Pollution Control District (VCAPCD), or the South Coast Air Quality Management District (SCAQMD). For this deep-water platform, jacket removal produces the greatest emissions (about 51–56% of the total emissions) due to the extensive use of tugboats and the large derrick barge required. Air emissions from pipelines and power cable removal would be about 20% of total emissions. Emissions from pre-abandonment and topside removal activities would be about 15% and 8%, respectively, of total emissions, while those from debris removal would represent about 4%. Air emissions from jacket removal for shallower platforms would be a relatively lower fraction of total emissions and those from other activities a relatively higher fraction.

TABLE 4.2.1-1 Total Estimated Annual Uncontrolled Air Emissions by Phase for Platform Harmony for Non-Explosive Severance under Alternative 1[a,b]

	Total Air Emissions (tons, except metric tons for GHG)						
Phase	ROG	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$	GHG
Pre-Abandonment	9.9	37	122	0.06	10.3	10.3	5,365
Topside Removal	6.5	18	81	0.03	5.9	5.9	2,795
Jacket Removal	39.6	118	498	0.19	36.9	36.9	18,030
Debris Removal	2.8	9	35	0.01	2.7	2.7	1,380
Pipelines and Power Cable Removal	12.2	49	166	0.07	13.4	13.4	7,250
Total	71.0	232	904	0.36	69.2	69.2	34,819

[a] Sources: BOEM (2019a,b).

[b] Emissions in this table include only those that occur within the SBCAPCD, VCAPCD, or SCAQMD.

Table 4.2.1-2 presents estimated emissions for Alternatives 1–3. For the Platform Harmony example, among criteria pollutants and their precursors for Platform Harmony, NO_x emissions would be highest, about 3.4% of Santa Barbara County total[1] and 0.68% of the four-county total, as shown in Table 4.2.1-2. The $PM_{2.5}$ emissions are less than one-tenth of NO_x emissions, but their contributions are highest at about 4.8% of Santa Barbara County total and 0.30% of four-county total. Air emissions for other pollutants would be up to 1.3% of Santa Barbara County total and up to 0.12% of four-county total. Accordingly, potential impacts on ambient air quality associated with decommissioning activities under Alternative 1, assumed to occur within a 12-month period, would be minor and temporary in nature.

TABLE 4.2.1-2 Total Estimated Annual Uncontrolled Air Emissions by Alternative for Platform Harmony[a] for Non-Explosive Severance[b]

Alternative[c]	Total Air Emissions (tons except metric tons for GHG)[d]						
	ROG	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$	GHG
1	71.0 (0.7%; 0.05%)	232 (0.9%; 0.05%)	904 (3.4%; 0.68%)	0.36 (0.04%; 0.005%)	69.2 (1.3%; 0.12%)	69.2 (4.8%; 0.30%)	34,819 (100%)
2	33.3 (0.33%; 0.03%)	124 (0.46%; 0.03%)	422 (1.6%; 0.32%)	0.19 (0.02%; 0.003%)	34.7 (0.6%; 0.06%)	34.7 (2.4%; 0.15%)	18,188 (52%)
3	33.3 (0.33%; 0.03%)	124 (0.46%; 0.03%)	422 (1.6%; 0.32%)	0.19 (0.02%; 0.003%)	34.7 (0.6%; 0.06%)	34.7 (2.4%; 0.15%)	18,188 (52%)

[a] Emissions in this table include only those that occur within the Santa Barbara, Ventura, or South Coast Air Districts.

[b] Sources: BOEM (2019a,b).

[c] No air emissions would be anticipated under Alternative 4 (No Action).

[d] First numbers in parentheses for criteria pollutants are percentages of annual emissions for Santa Barbara County, while second numbers are those for four-county totals (see Table 3.2-2). Note that a considerable portion of emissions would be vessel traffic, which would occur also in Ventura or South Coast Air Districts, so percentages to Santa Barbara County total might be lower than those in the table. Decommissioning total days under all alternatives are more than a year, so maximum annual emissions (part of pre-severance plus all ensuing activities) are presented in the table. For GHG emissions, numbers in parentheses are percentages of total GHG emissions with respect to those for Alternative 1.

The total emission levels discussed above assume the use of unregulated engines for most equipment except engines controlled at their current levels under permits (platform cranes and crew and supply boats). A contemporaneous increased availability of cleaner engine tugboats on

[1] Note that a considerable portion of emissions would be from vessel traffic, which would occur also in Ventura or South Coast Air Districts, so percentages to Santa Barbara County total might be lower than those in the table.

the west coast could allow for a substantial reduction in emissions levels from the uncontrolled case (BOEM 2019a). The availability and use of clean engine technology on existing boats in operation aids these mitigation strategies. Should the large scale of the decommissioning efforts justify the commissioning of specific clean diesel equipment, emissions could be lower than estimated here and potential impacts further reduced.

Potential impacts of decommissioning-related activities on ambient air quality in neighboring coastal communities and on air quality-related values (AQRVs), such as visibility or acid depositions, in Federal Class I areas, depend primarily on emission sources and rates and on meteorological conditions, notably wind patterns and distance from emission sources.

In Southern California, the most frequent wind direction is from the northwest near Point Arguello, and from the west in the Santa Barbara and Santa Monica Basins (BOEM 2019c). Wind patterns are altered by topography and coastline orientation, which leads to local and diurnal sea/land breeze circulation when prevailing winds are weakened. For example, southwesterly winds occur as often as northeasterly winds at the Santa Barbara Harbor, while southeasterly winds occur as often as westerly winds at the Santa Barbara Airport, and southerly winds as often as northwesterly winds at Long Beach.

Because decommissioning activities would occur around the clock, air emissions could have more impact on air quality in coastal communities from late morning to late afternoon, when the sea breeze is most active. However, considering a long distance to the coastal communities of more than 6 mi (10 km) and a strong wind speed of sea breeze on the order of 11 mph (5 m/s) or higher, air emissions from decommissioning activities could be diluted considerably in the nearby coastal communities.

Considering the relative magnitude of air emissions and the predominance of northwesterly and westerly winds around the Platform Harmony, potential impacts of these activities would be minor on ambient air quality and AQRVs, such as visibility or acid deposition, at the nearest federal Class I Area, San Rafael Wilderness Area, which is located about 48 km (30 mi) northeast of Platform Harmony.

Estimates of GHG emissions for Alternatives 1–3 are presented in Table 4.2.1-2, which compares emissions as fractions of Alternative 1 (CEQ 2016), assuming all material disposal would occur within California. Estimated GHG emissions for decommissioning Platform Harmony are 34,819 metric tons (MT) CO_2 equivalent (CO_2e) under Alterative 1. Alternatives 2 and 3 are each estimated to produce about 52% of Alternative 1 GHG emissions.

If a port in the GOM is selected as the demobilization port for the topside of Platform Harmony (over 9,800 tons), additional GHG would be approximately 26,574 MTCO_2e. This increase equates to be about 76% of total GHG emissions for Alternative 1, when assuming that all materials would be disposed of within California.

Sub-alternative 1a. Under Sub-alternative 1a, explosive severance would be used for underwater cutting of conductors and jacket sections and for BML severance of jackets and pilings. Air emissions would be reduced under this alternative mainly through decreased barge time and no requirement for support equipment for cutting (MMS 2005). For conductor removal, because the majority of emissions are from supply and disposal vessels and a minor fraction from severance equipment (BOEM 2020), and schedules are dominated by pulling and sectioning conductors, emission reductions using explosive severance would be modest. Jacket severance and sectioning using explosive severance would reduce emissions compared to non-explosive severance largely from reduced barge time on site. Such savings would vary with the depth of the platforms and the difficulty of severance by non-explosive means. Explosive severance has high reliability and more predictable schedules compared to non-explosive severance. Severance times are reduced as non-explosive severance addresses one target at a time, while explosive severance can sever multiple targets simultaneously (MMS 2005).

Air emissions may occur from use of underwater explosives after the byproducts carbon dioxide, carbon monoxide, nitrogen gas, hydrogen gas, and ammonia percolate though the water column (MMS 2005). In shallow explosions most of the detonation by-products are introduced into the air. However, in very deep explosions (relative to charge size), such as for Platform Harmony, most are retained in the water column (O'Keeffe and Young 1984). Air emissions related to detonations would be minor (MMS 2005).

4.2.1.2 Alternative 2

Under Alternative 2, topside platform removal would occur in a manner similar to Alternative 1. However, under this alternative, only the upper portion of the platform jacket to a depth of at least 26 m (85 ft) below sea surface would be removed and transported to onshore locations for processing, recycling, and/or land disposal (partial disposal onshore). Also, in contrast to Alternative 1, pipelines would be abandoned in place on the sea floor rather than removed. Accordingly, compared to Alternative 1, fewer supply and utility vessels and barges would be required under Alternative 2 and vessel traffic along the pipelines and power cable routes would be limited to pipeline plugging and burial of the plugged pipeline ends.

Total emission estimates for Alternative 2 are presented in Table 4.2.1-2 for the Platform Harmony analysis case. Estimated emissions for criteria pollutants and ROGs are about 50% of those for Alternative 1, as this platform would require about 71% of the decommissioning time as would Alternative 1, due mainly to reduced time required for jacket removal for this deep-water platform. Because of their shorter jackets, air emissions under Alternative 2 would be only moderately lower for shallow water platforms, compared to emissions under Alternative 1. Estimated GHG emissions of 18,188 MT CO_2e are about 52% of those for Alternative 1. For this alternative, decreases in GHG emissions compared to Alternative 1 would be due to decreases in total weights of materials to be processed and associated vessel traffic and emissions from cargo and derrick barges from only partial jacket removal and abandonment-in-place of pipelines.

Thus, potential emissions from these activities would be roughly half of those under Alternative 1 and would have minor impacts on ambient air quality and AQRVs.

Sub-alternative 2a. Emissions under Sub-alternative 2a employing explosive severance would be less than under Alternative 2 employing non-explosive severance. Emission reductions would be relatively less than under Sub-alternative 1a due to fewer severances required for partial jacket removal.

4.2.1.3 Alternative 3

Under Alternative 3, topside platform removal would occur similarly to Alternatives 1 and 2. However, upper portions of platform jackets would be towed to an existing artificial reef site or reef planning area offshore of southern California. Estimated total air emissions for this Alternative are presented in Table 4.2.1-2.

Potential impacts on ambient air quality and AQRVs would be similar to those identified for Alternative 2 and less than Alternative 1, with lesser volumes of decommissioned infrastructure requiring disposal.

Sub-alternative 3a. Emissions under Sub-alternative 3a employing explosive severance would be less than under Alternative 3 employing non-explosive severance. Emission reductions would be similar to those under Sub-alternative 2a, as both would require about the same number of explosive severances.

4.2.1.4 Alternative 4 – No Action

Under Alternative 4, there would be no acceptance or authorization of decommissioning applications. As there would be no pre-severance, severance, or disposal activities undertaken, no decommissioning-related air quality impacts are anticipated. Platforms would remain in place, but no O&G production activities would be occurring. However, periodic platform and pipeline inspection or maintenance would continue to occur, as would any associated air emissions from inspection/maintenance vessels or helicopters occasionally visiting the platforms. Thus, impacts on ambient air quality and AQRVs under Alternative 4 would be negligible.

4.2.1.5 Cumulative Impacts

Future activities in the region include the development of offshore wind energy (e.g., in the Morro Bay Wind Energy Area and potential projects in state waters), increased offshore military training, and increased commercial vessel traffic and commercial fishing. Constructing wind facilities would involve additional vessel traffic and heavy equipment use, which would contribute emissions to the air basin. Typically, total weights of wind turbines in an offshore wind farm are lower than those for platform infrastructure. Wind farm air emissions would be far lower during operation, with limited vessel traffic for inspection, maintenance, or repairs. Military and commercial vessel traffic would further contribute emissions in the region.

Once O&G production stops, reservoir pressures are expected to increase and may result in an emission increase in ROG from natural fractures throughout the area, and not localized/isolated at any single platform location (Lorenson et al. 2011). ROG emissions could increase ozone formation and could also increase ambient concentrations of hazardous air pollutants (HAPs) such as benzene. However, less than 10% of the gas seepage is ROG and some fraction of hydrocarbons are absorbed into seawater (Lorenson et al. 2011). In addition, ROG seepage is some distance from NO_x-rich coastal areas, allowing for dilution and conversion to more stable forms before reacting with NO_x to form ozone. Thus, effects of increases in ROG emissions from increasing reservoir pressure on ozone formation and human health are anticipated to be minor.

When combined with other ongoing or possible future emissions, the minor incremental impacts of the analyzed alternatives are not expected to result in any cumulative effects on ambient air quality and AQRVs.

4.2.2 Acoustic Environment

This section discusses potential noise contributions to the acoustic environment of the POCS associated with various decommissioning activities under the Proposed Action and three Alternatives. Later sections of this chapter analyze the effects of such noise on resources such as marine mammals, fishes, birds, and their habitats.

The IPFs that could potentially affect the acoustic environment during decommissioning include noise from vessels and equipment use, vessel traffic, and decommissioning activities (e.g., pressure wave and acoustic properties [underwater sound] generated by explosive removal). These activities would generate both airborne and underwater noise. Table 4.1-1 presents the various decommissioning activities that produce these IPFs. Mitigation measures for relevant IPFs are presented in Table 4.1-3 and the definitions of impact levels are presented in Table 4.1-4. The following sections describe and evaluate the potential consequences of noise sources on the acoustic environment under the decommissioning alternatives.

During decommissioning, the number and size of vessels and equipment required for a given platform would depend on platform-specific characteristics, such as location, water depth, and the size and complexities of infrastructure. Consequently, noise levels and duration at different platforms would vary according to the different types and sizes of equipment, lift cranes, barges, and tugboats required in their decommissioning. To address the upper end of potential noise levels across platforms, the following analyzes potential noise impacts of decommissioning Platform Harmony, the largest deep-water platform.

4.2.2.1 Alternative 1

Under Alternative 1, sources of noise include impulsive (sounds that are brief and rapid, can occur in repetition or single event [explosives]) and non-impulsive (continuous) noise. Examples of continuous sounds associated with decommissioning activities would be diesel engines on work vessels, including tugboats and barges with lift cranes used in complete removal of platforms, pipelines, and power cables. Noise levels produced from these large sources were analyzed to determine the distances from noise sources within which noise levels would exceed criteria for impacts on marine mammals, the receptors of greatest concern on the POCS. The following discusses sources, source levels, sound transmission, and potential impacts of continuous underwater and airborne sound.

Underwater Sound. Underwater sound propagation can vary depending on several factors, including vertical profiles of temperature, salinity, pressure, seafloor substrate, and water depth. Situated within 6.0 to 16.9 km (3.7 to 10.5 mi) of the nearest coastline and lying in a similar meteorological regime, vertical profiles of temperature, salinity, and pressure would be similar among all POCS platform locations. Seafloor substrates may affect sound as follows: soft substrates (e.g., mud, sand) absorb or attenuate sound more readily than do hard substrates (e.g., rock), which may reflect the acoustic wave. Water depths around the platforms range from 29 m (95 ft) at Platform Gina to 366 m (approximately 1,200 ft) at Platform Harmony.

Screening-level modeling (considering spherical spreading only) of underwater sound propagation was performed for tugboats and barges used for topside or jacket removal at Platform Harmony. A 2,250-hp tug and barge traveling at 18 km/h (11 mph) produces a broadband source level of 171 dB re 1 μPa-m in the frequency range of 45–7,070 Hz (Greene and Moore 1995). This source level was adjusted to 177 dB re 1 μPa/m for 8,200-hp tug and barge, which was assumed to be used for decommissioning (BOEM 2019b). Modeling estimated the maximum distances from Platform Harmony required for sound pressure levels to fall below thresholds established by NMFS corresponding to Level A (threshold sound levels for onset of a permanent threshold shift [PTS]) and Level B (behavioral disruption) harassment for marine mammals (see Table 3.3-2). The estimated Level A (onset of a PTS) threshold of 199 dB as SEL_{cum} for low-frequency cetaceans extended to only a few meters around the noise source. The estimated Level B (behavioral disturbance) threshold of 120 dB_{rms} extended to 677 m (about 2,222 ft) around the platform. Thus, potential impacts of continuous underwater sound could cause behavior disturbance of marine mammals within this radius but would not cause potential injury outside of a radius of a few meters of the source. Assuming marine mammals would avoid close approach of intense underwater noise sources, impacts would be expected to be localized and minor and of an expected duration of up to 20 months (under Alternative 1) at Platform Harmony, but shorter at other platforms. Since Platform Harmony is among the largest and deepest platforms and thus would require the largest and greatest number of vessels and longest duration for decommissioning, underwater maximum distances to the National Marine Fisheries Service (NMFS) noise thresholds and duration of impacts at other platforms would be somewhat shorter.

Sound transmission in shallow water is highly variable and site-specific due to strong influences of the acoustic properties of the seafloor and surface as well as variations in sound speed within the water column (Malme 1995). In deep water, variations in temperature, salinity, and pressure with depth cause refraction of sound rays downward or upward. Refraction of sound in shallow water can result in either reduced or enhanced sound transmission. Upward refraction in colder months reduces bottom reflections and the resulting bottom losses; downward refraction in warmer months results in the opposite effect. Platforms with shallower depths than Platform Harmony would incur more reflections between soft seafloor substrate and the ocean surface, which would increase the rate of sound attenuation with distance, assuming conditions similar to Platform Harmony except for water depth.

Airborne Sound. In general, the dominant airborne noise source from vessel traffic and heavy equipment is a diesel engine without adequate muffling. To estimate noise levels associated with decommissioning activities, 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, non-harbor seal pinnipeds and harbor seals (see Section 3.3.6), 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. In addition, this noise level would be attenuated to the Santa Barbara County noise limit of 65 dBA CNEL (County of Santa Barbara 2021) within about 2.2 km (1.4 mi) and to the EPA guideline level of 55 dBA L_{dn} for residential areas (EPA 1974) within about 5.0 km (3.1 mi). Other attenuation mechanisms that would be in effect (e.g., atmospheric absorption) and enclosures around the noise sources would further reduce noise levels.

For the Platform Harmony example introduced above, the distance from Platform Harmony to the nearest shore is about 10.3 km (6.4 mi) and the estimated noise levels in the coastal communities are generally below the criteria or guideline levels. Noise from the platforms or along the sea route of tugboats and barges would not be heard in most cases. However, these noises could be barely audible in the coastal communities, depending on meteorological conditions and low background noise levels (e.g., during nighttime hours). As with underwater sound, the generation of airborne sound during decommissioning activities would be temporary and thus would not result in any long-term increase in airborne noise levels on the POCS. Therefore, potential airborne noise impacts of decommissioning on marine mammals and coastal communities are anticipated to be minor, localized (a maximum distance 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.

During pre-severance, activities would include: (1) mobilization of cranes, barges, and crews; (2) conductor removals; (3) platform removal preparations; and (4) presetting anchors. Noise impacts would be from vessels and equipment and severance removal of conductors.

During severance, activities would include: (1) topside removal; (2) jacket removal and seafloor clearing; and (3) pipeline and power cable removal and decommissioning. Potential noise impacts would be from diesel engines powering vessels, lift cranes, and equipment, as well as from mechanical severance of jacket and topside sections, which would occur for a major portion of overall decommissioning. Explosive severance, if used, would occur within a period of at most a few days, or perhaps in a single occurrence.

During disposal, activities would include the shipping and disposal of platform equipment and infrastructure at onshore locations as presented in Section 4.2.1. Once delivered to the port location, removed material would be dismantled and either processed for recycling or transported for disposal. Materials that can be recycled, primarily steel structural components, would either shipped to recycling locations at other ports or loaded into trucks for transport to local recycling locations, such as the SA Recycling facility located at POLA/POLB. For dismantling at the ports, equipment requirements may include translift mobile cranes, crawler transporters, rough terrain cranes, and forklifts, as well as welding and cutting equipment. Transport by truck would also be needed if materials are to be hauled offsite to inland recycling centers. Loading into barges at the ports would also occur if materials were to be transported offshore to foreign or other destinations (BOEM 2019a).

SA Recycling has translift crawler cranes for offloading materials (BOEM 2019a). They have a lifting capacity over 1,000 tons, are powered by 400–500 hp diesel engines, and would be the strongest noise sources at the recycling facility. Based on the diesel engine power rating, the sound power level of such cranes would be about 125 dBA (Wood 1992). For daytime operations, the predicted noise level would be attenuated to the Santa Barbara County noise limit of 65 dBA CNEL (County of Santa Barbara 2021) within about 450 m (1,480 ft) and to the EPA guideline level of 55 dBA L_{dn} for residential areas (EPA 1974) within about 150 m (490 ft). These distances fall well within the POLB, and the sound levels at the nearest residences from this source are predicted to be well below the background level around the city. For trucks with a payload capacity of 20 tons, bout 3,600 truckloads would be needed to haul 72,549 tons of materials comprising Platform Harmony to the recycling or disposal site. This equates to about six round trips per day (or less than one round trip per hour), assuming the work occurs during the 591 working days needed for offshore removal activities for Harmony. Noises from truck transport would not noticeably increase existing traffic noise. Therefore, potential impacts on residences or communities along the traffic routes would be negligible.

Sub-alternative 1a. Noise levels and impacts were analyzed for impulsive noise from potential use of explosives for severance. Whereas vessel noise would be continuous and lasting the full duration of activities, impulsive explosive noise would be infrequent, intermittent, and of very short duration. The following qualitatively analyzes the potential impacts of explosive severance.

Under Sub-alternative 1a, specialized contractors would deploy explosive cutting tools to conduct required seabed (BML) and water column (AML) severances of well conductors (MMS 2005) and jacket sections. Appendix A presents a summary of explosive cutting tools and methods. Platform jackets for the 23 platforms on the POCS include a total of 254 jacket sections and 818 conductors, for which explosive severance could be performed under Sub-alternative 1a (Table 2-2).

Underwater explosions are the strongest manmade point sources of sound in the sea (Greene and Moore 1995). The underwater pressure signature of a detonating explosion is composed of an initial shock wave, followed by a succession of oscillating bubble pulses (if the explosion is deep enough not to vent through the surface) (Staal 1985; Greene and Moore 1995). The shock wave is a compression wave that expands radially out from the detonation point of an explosion. High-explosive detonations have velocities of 5,000–10,000 m/s, with pulse rise times of about 20 μsec and short pulse durations of 0.2–0.5 ms (CSA 2004). Although the wave is initially supersonic, it is quickly reduced to a normal acoustic wave (TSB 2000). The broadband source levels of charges measuring 0.5–20 kg are in the range of 267–280 dB re 1 μPa/m, with dominant frequencies below 50 Hz (Greene and Moore 1995; CSA 2004).

If decommissioning activities employ the short-term use of explosives, behavioral reactions, and hearing effects of marine species to sounds are difficult to predict. Whether or how an animal reacts to a given sound depends on factors such as the species, hearing acuity, state of maturity, experience, current activity, reproductive state, time of day, and weather. For example, if a marine mammal reacts to a sound by changing its behavior or moving a short distance, the impacts may not be significant to the individual, stock, or species as a whole. However, if a sound displaces marine mammals from an important feeding or breeding area for a prolonged period, impacts could be significant (CSA 2004). Mitigation and monitoring measures will be required and applied as conditions of approval for decommissioning permit authorizations or approvals (see Section 4.1.2).

4.2.2.2 Alternative 2

Under Alternative 2, topside platform removal would occur in a manner similar to Alternative 1. However, under this alternative, only the upper portion of the platform jacket to a depth of at least 26 m (85 ft) below sea surface would be removed and transported to onshore locations for processing, recycling, and/or land disposal. Also, in contrast to Alternative 1, pipelines would be abandoned in place on the sea floor rather than removed. Accordingly, compared to Alternative 1, fewer supply and utility vessels and barges would be required under Alternative 2 and vessel traffic along the pipeline routes would be limited to pipeline plugging and burial of the plugged pipeline ends.

Although this Alternative would require less decommissioning time due to a reduced time required for jacket removal, noise levels would be similar to those for Alternative 1, however, of lesser duration.

During pre-severance, noise levels under Alternative 2 and associated maximum distances to underwater and airborne thresholds for marine mammals and airborne guideline levels for coastal communities would be almost the same as those for Alternative 1.

During severance, the scope of operations from the cargo and derrick barges would be substantially reduced because of the reduced level of activity associated with reduced jacket removal. Noise levels and associated maximum distances to underwater and airborne thresholds for marine mammals and airborne guideline levels for coastal communities would be similar to those for Alternative 1 but of shorter duration. No explosive severance would be used under Alternative 2.

During disposal, decommissioning activities under Alternative 2 would be similar to or less than those for Alternative 1 but of lesser duration with lesser volumes of decommissioned infrastructure requiring disposal.

Sub-alternative 2a. Sub-alternative 2a would employ explosive severance for partial jacket removal and for severing conductors, whereas Alternative 2 would use non-explosive severance. Impacts from explosive shockwaves to potentially impacted marine life from conductor and jacket severances would occur under Sub-alternative 2a that would not occur under Alternative 2.

4.2.2.3 Alternative 3

Under Alternative 3, topside platform removal would occur similar to Alternatives 1 and 2. However, platform jackets would be disposed of via reefing, either being partially or entirely toppled in place, or towed to existing reef sites or reef planning areas offshore of southern California.

During pre-severance, noise levels and associated maximum distances to underwater and airborne thresholds for marine mammals and airborne guideline levels for coastal communities would be the same as those for Alternative 2. Thus, potential noise impacts on marine mammals and coastal communities would be similar to those identified for Alternatives 1 and 2.

During severance, noise levels and associated maximum distances to underwater and airborne thresholds for marine mammals and airborne guideline levels for coastal communities would be similar to or smaller than those for Alternative 2. Thus, potential noise impacts on marine mammals and coastal communities would be similar to those identified for Alternative 2 and somewhat less than Alternative 1.

During disposal, decommissioning activities would be similar to those for Alternative 2. Thus, potential noise impacts would be similar to those identified for Alternative 2 and less than Alternative 1, with smaller volumes of decommissioned infrastructure requiring disposal.

Sub-alternative 3a. Sub-alternative 3a would employ explosive severance for partial jacket removal or toppling and for severing conductions, whereas Alternative 3 would use non-explosive severance. Impacts from explosive shockwaves to potentially impacted marine life from conductor and jacket severances would occur under Sub-alternative 3a that would not occur under Alternative 3.

4.2.2.4 Alternative 4

Under Alternative 4, there would be no acceptance or authorization of decommissioning applications and therefore no pre-severance, severance, or disposal activities would be undertaken. Platforms would remain in place, but no O&G production activities would be occurring. While some noise may be generated periodically during platform and pipeline inspections or maintenance activities, the noise levels associated with these intermittent activities would be expected to be very low and short-term in duration. Noise from traffic related to such activities would be undetectable from background or average traffic in this area. Therefore, potential noise impacts on marine mammals and coastal communities would be negligible.

4.2.2.5 Cumulative Impacts

Noise is generally a local issue except for unusual cases such as high-intensity noise from underwater blasting or seismic air guns. Sound is not additive unless noise sources are at a similar level, are relatively close together (or a receptor is located at the same distance from noise sources) and occur at the same time. As discussed in Section 4.2.2.1, potential impacts on the acoustic environment (i.e., marine mammals and coastal communities) associated with the proposed activities would be minor, localized, and temporary in nature with standard noise mitigation measures in place.

Other noise sources near the project area include shipping traffic, which is a main contributor to ambient ocean noise. Shipping lanes in southern California are as close as a few miles from some platforms in federal waters. However, noise levels from shipping traffic would be minimally additive with those in the project area because of the separation distance and the nature of activities proposed for that area (with intermittent, limited noise generation). Thus, the incremental impacts of analyzed alternatives would not result in any cumulative effects on the acoustic environment in the POCS and adjacent coastal and mainland areas.

4.2.3 Water Quality

The IPFs that could potentially affect water quality during decommissioning include turbidity and sedimentation from discharges and seafloor disturbance, and sanitary wastes, wastewaters, and trash from vessels and platforms. Table 4.1-1 presents the various decommissioning activities that produce these IPFs. Mitigation measures for relevant IPFs are presented in Table 4.1-3 and the definitions of impact levels are presented in Table 4.1-4. The following sections describe and evaluate the potential consequences of the IPFs under the decommissioning alternatives on water quality.

4.2.3.1 Alternative 1

Alternative 1, the Proposed Action, would involve the complete removal of platforms and associated infrastructure, including associated pipelines and power cables, as well as seafloor clearing of all platform-related obstructions, and transport of all platform infrastructure and removed pipelines and power cables to onshore facilities for disposition. Impacts on water quality related to these activities could occur from:

- Vessel discharges including platform wash-off, wastes from mechanical or explosive severance activities;

- Seafloor disturbances related to anchoring; jetting and severance of piles, conductors, pipeline and cable removal; and site clearance activities;

- Accidental leaks or spills from vessels, pipelines, equipment, or structures; and

- Accidental release of marine trash and debris.

Vessel traffic related to mobilization of cranes, barges and crew boats would occur near platforms. Vessel discharges to marine waters may include sanitary waste or sewage; domestic waste from shipboard sinks, laundries, and galleys; bilge and ballast waste; cooling water; and deck drainage. Section 312 of the Clean Water Act (CWA) establishes sanitary waste discharge standards and is implemented jointly by the EPA and USCG. Trash and debris would be retained for disposal on shore in accordance with the Marine Plastic Pollution Research and Control Act (MMS 2005). Such regulated discharges, which would include nitrogen nutrients, would be minor and comparable to those from other commercial vessels routinely operating in the region and would not adversely impact water quality. Nutrient inputs to the SCB are dominated by natural upwelling, agricultural runoff, and discharges of municipal water treatment works (Section 3.4.2.2).

On the platforms, during the pre-severance phase, all fluids in tanks, equipment, and piping will be removed and disposed safely on shore. Pollution control measures would be used on decks to prevent wash-off of chemicals or petroleum to the ocean, but minor releases of chemicals or hydrocarbons could occur from equipment cleaning. Only minor and temporary effects on water quality near platforms would be expected from these activities.

Decommissioning activities, including conductor, piles, and subsea infrastructure removals and pipeline and umbilicals (in-place, removal, or partial removal) would introduce turbidity and sedimentation, as would abrasive cutting of conductors, piles, and pipelines and landing global positioning system (GPS) or equipment on the seafloor, and anchoring. Abrasive cuttings associated with conductors would release an estimated 1,600 kg (3,500 lb.) of iron silicate abrasive per conductor removed at platforms Grace and Gail (BOEM 2021). At the Point Arguello Unit platforms Hermosa, Harvest and Hidalgo, an estimated 399 barrels (bbl) of fully grouted abrasive fluid and 13,079 bbl of ungrouted abrasive fluid containing seawater, abrasive garnet grains, and steel cuttings would be discharged from the three platforms over 39 days to cut conductors (BOEM 2020). Abrasive solids are insoluble inert materials, which would eventually deposit on the seafloor. Platform discharges from cutting conductors would be a small fraction of the permitted annual produced water volumes of 6.6 million bbl annually for Platforms Gail and Grace combined, and 91.3 million bbl annually for Platforms Hermosa, Harvest, and Hidalgo combined under the National Pollutant Elimination System (NPDES) General Permit (BOEM 2020, 2021). Minor seafloor disturbance would occur from extracting severed conductors from the seabed, which would produce a temporary and local release of turbidity. Cleaning marine growth from the exteriors of conductors, would produce a shower of removed growth accompanied by a plume of turbidity from the falling biomass and from benthic sediments disturbed by deposition. These effects would be minor and temporary and would not be expected to produce an oxygen minimum or hypoxic zone in response to the presence of biomass (BOEM 2020, 2021).

In the severance phase, decommissioning activities that could produce discharges would include vessel and lift crane operation, topside and deck cutting and dismantlement, and jacket severance by explosive or non-explosive means. Bottom disturbance would occur from excavation of jacket legs and pilings, seafloor severance of jacket legs by explosive means, and from removal of pipelines and power cables associated with platforms. Ship and vessel anchoring, which could occur and would be more likely at platforms in shallower waters, would produce minor additional disturbance, turbidity, and sedimentation. Vessel sanitary discharges during severance would be regulated as described under pre-severance and would not degrade water quality.

Topside and jacket non-explosive severance includes several cutting options: abrasive cutters, mechanical cutters (carbide blade), arc/torch cutters, diamond wire cutter, and other cutters such as, guillotine saws, hydraulic shears, and rotary cutting tools (MMS 2005). Jacket severance under water would employ divers or remotely operated vehicles (ROVs), depending on depth and other considerations, including worker safety. Divers would use either an underwater arc cutter or an oxyacetylene/oxy-hydrogen torch (MMS 2005). Cutting activities could discharge small quantities of cutting fluids, abrasives, grit, and metal cuttings to the ocean. Such discharges would be in quantities that would dissipate close to the platform and involve mostly inert, insoluble silicate materials. Metal impurities, such as copper, lead and arsenic in copper slag sometimes used in abrasive cutting could affect water quality adjacent to the platform, while other mechanical methods would only produce metal cuttings with no effect on water quality (MMS 2005). Effects on water quality from non-explosive severance of platform jackets in multiple lifts might be roughly comparable to that of conductor removals and would similarly be expected to be minor, localized, and temporary. For example, there are approximately 254 total jacket sections and 818 conductors for the 23 platforms (Table 2-2). Assuming four leg severances per section, there would be roughly the same number of conductor and jacket cuts across all platforms. Jacket severance BML may be done using abrasive sand cutters or abrasive water jet cutters deployed inside of jacket legs, as used in conductor severance. Jacket severance AML has available the many external cutting methods listed above, many of which would not involve the use of abrasive fluids nor the discharge of abrasive cutting solids.

In explosive severance, if used, explosive charges would be deployed from above the water surface inside the pipe-leg target structure and set at a depth of 15–25 feet below the seabed (Bull and Love 2019). Effects on water quality from explosive severance would be mainly from turbidity caused by seafloor displacement following severance BML. Nitrated explosives, such as trinitrotoluene (TNT) typically used in underwater applications, would produce gaseous products including simple oxides of nitrogen and carbon that would dissolve in seawater and eventually escape to the atmosphere without causing environmental effects. Detonators containing milligram levels of lead and mercury would also have negligible environmental effects (MMS 2005).

Excavating jacket skirt piles and sleeves to 4.6 m (15 ft) BML would produce suspended sediment plumes. External excavation employing hand jetting or a suction dredge would cast aside sediment onto the seafloor to reach the minimum 4.6 m (15 ft) depth (Section 2.3.3). These excavations would produce sediment turbidity plumes that would drift with currents and gradually redeposit on the seafloor. Turbidity plumes from seafloor excavation would temporarily degrade water quality near the source and to a diminishing degree downgradient.

Internal pile excavation of jacket legs, if used, would eject sediment plugs out of the top of jacket legs to produce a sediment plume originating at the sea surface. These plugs would be a small fraction of the sediment volume involved in external pile excavation (Section 2.3.3). The turbidity plumes generated from jacket pile excavations would occur in limited areas over a period of a few days to a month and would be similar to those from sediment displacement during pipeline placement, water jetting or riserless drilling, standard practices used during initial the initial drilling of a well (MMS 2005). As for the deposition of conductor scrapings during removal, seafloor disturbance during pile excavation might temporarily reduce dissolved oxygen levels within turbidity plumes in response to the release of seafloor biomass, but it would not be expected to produce a persistent oxygen minimum or hypoxic zone.

Removal of platform-related pipelines and power cables from the seafloor would also generate suspended sediment plumes from seafloor disturbance. The source of sediment plumes would follow the progress of line removal, while plumes would drift with prevailing currents and redeposit on the seafloor within up to roughly 2 km (1.2 mi) of the removed line, the distance from platforms drilling materials have been detected (see Section 3.4.2.4). The effects of these plumes on water quality would be minor and temporary. Releases of petroleum residuals could occur during pipeline cleaning and removal (see Section 2.3.4). Such leaks would be a small fraction of pipeline volume and would not be expected to degrade water quality. Discharges of sanitary wastes from vessels performing pipeline and cable removal would be regulated and minor. Additional minor disturbance from vessel anchoring, if used, could occur. Cable removal would be simpler than pipeline removal. It would not require precleaning and would be less likely to require excavation for removal and thus would be expected to produce less turbidity than pipeline removal.

Removal of shell mounds will vary from nothing to mounds approximately 9.1 m (30 ft) in height and 76 m (250 ft) in diameter beneath and adjacent to platforms, particularly older and shallower platforms. Shell mounds are formed by the deposition of muds and cuttings from drilling wells comingled with shells (e.g., mussel and scallop shells) sloughed off or scraped from upper portions of platform jackets (see Section 3.3.2.4). Removal of these by dredging, trawling, excavating, or other means would generate turbidity from resuspension of sediments associated with the mounds, which may include adsorbed petroleum hydrocarbons, heavy metals, and chemicals from drilling muds. The effects of this turbidity on water quality would be localized and temporary. Dredging of shell mounds at the deepest platforms, if confirmed to exist, may be infeasible.

Some of the shell mounds and surrounding sediments may have drilling related chemicals including petroleum hydrocarbons and traces of metals, and PCBs (Section 3.4.2.4). Barium, a constituent of drilling muds as barite, is often present in sediments surrounding platforms and may include trace metal impurities. Cadmium and mercury impurities in barite are limited under the NPDES General Permit (EPA 2013), as is the toxicity and free oil content of platform discharges. Since barite is nearly insoluble in seawater, mercury and other trace metals are trapped in the mineral structure, blocking their dissolution in seawater and availability for bioaccumulation (MMS 2005).

Characterization of shell mound cores and sediment samples taken near Platforms A, B, C, and Hillhouse confirmed the classification of the shell mounds as non-hazardous waste (DCOR 2011) and were not found to contaminate essential fish habitat (Bemis et al. 2014) or to substantially degrade the seafloor habitat (Gillett et. al. 2020). Shell mound cores at platform Gina (MMS 2007) found levels of most contaminants analyzed below reporting levels, except for petroleum hydrocarbons and barium (see Section 3.4.2.4). Therefore, it is unlikely that releases of hydrocarbons, metals, PCBs, or other contaminants during disturbance or excavation of shell mounds or sediments around platforms would produce contaminant concentrations in the water column that would have persistent or widespread effects on marine life or the marine food chain. However, if significant quantities of toxic materials, such as oil-based drilling muds, are present in shell mounds, dredging of shell mounds could produce up to moderate, localized, and short-term impacts. Dredged materials would be tested for hazardous waste characteristics and disposed of appropriately in an onshore waste disposal facility. Mitigation measures, such as capping in place, would be implemented if dredging of shell mounds would produce unacceptable impacts from the release of toxic materials.

The USACE and EPA permit authorities under Section 404 of the CWA and Section 103 of the MPRSA include requirements to characterize sediment that would be dredged and subsequently disposed of in inland waters or nearshore state waters, or at EPA designated ocean dredged material disposal sites (ODMDS) in federal waters. For potential ocean disposal at an ODMDS, permit applicants are required to test the sediment prior to dredging in accordance with the Ocean Dumping Manual (EPA and USACE 1991). For potential nearshore or inland waters or nearshore disposal, permit applicants are required to test the sediment prior to dredging in accordance with the Inland Testing Manual (EPA and USACE 1998).

For all potential dredging and in-water disposal actions, permit applicants are required to prepare a sediment Sampling and Analysis Plan (SAP) in accordance with the EPA and USACE guidelines (EPA and USACE 2021) and obtain approval of the SAP by the Southern California DMMT prior to sampling and testing. Permit applicants are also required to prepare an SAP report (SAPR) in accordance with the Guidelines to document sediment test results; this report is also reviewed by the Dredged Material Management Team to determine whether the sediment is suitable for disposal at the applicants' proposed disposal site. For landfill disposal of dredged sediment, the applicant determines the testing requirements of the proposed landfill and furnishes the test results to the USACE.

Impacts on water quality during the disposal phase of decommissioning would result from discharges from vessels transporting dismantled infrastructure and dredged materials to onshore disposal facilities, bottom disturbance from anchoring at platform or disposal locations, and runoff to the ocean at coastal disposal facilities processing dismantled platform and pipeline materials. Point source pollution at onshore facilities would be regulated by the EPA via NPDES permits, as would stormwater discharges, while USCG enforces vessel discharge regulations (MMS 2005). Such discharges and bottom disturbances would be expected to have at most minor impacts on water quality near the platforms and pipelines and in coastal areas near disposal facilities.

Sub-alternative 1a. Under Sub-alternative 1a, explosive severance would be used to section underwater portions of platform jackets and for BML severance of jackets and conductors. Impacts on water quality from vessel anchoring and discharges would be reduced compared to Alternative 1 due to reduced work schedules afforded by explosive severance.

4.2.3.2 Alternative 2

Decommissioning under Alternative 2 would be the same as Alternative 1, except that platform jackets would be only partially removed to a depth of 26 m (85 ft) below the sea surface, and pipelines would be abandoned in place. Shell mounds would remain in place.

Pre-severance activities and resulting impacts on water quality at the platforms under Alternative 2 would be unchanged from Alternative 1. During the severance phase, however, decommissioning activities under Alternative 2 would require substantially less time and effort and results in lesser impacts on water quality from vessel discharges, while nearly all bottom disturbance would be eliminated. Impacts from abandoning pipelines in place would be less than from pipeline removal overall, but with some seafloor disturbance and accompanying turbidity resulting from capping and burying pipeline ends. Impacts on coastal waters from onshore disposal of materials would be reduced due to reduced volumes of jacket materials and fewer vessel trips.

Sub-alternative 2a. Under Sub-alternative 2a, explosive severance would be used for partial removal of platform jackets and for severing conductors. Impacts on water quality from vessel anchoring and discharges would be reduced compared to Alternative 2 due to shortened removal schedules.

4.2.3.3 Alternative 3

Impacts on water quality under Alternative 3 would be less than under Alternative 1, but more than for Alternative 2, because of the additional seafloor disturbance resulting from the placement of the upper jacket portions in an artificial reef on the seafloor. Seafloor disturbance and resulting turbidity from tow-and-place under Alternative 3 would be less than that from excavating and severing platforms BML, possibly using explosives, under Alternative 1. Vessel discharges would be similar to Alternative 2 and less than Alternative 1, as less time is needed to dismantle and remove the jackets.

Sub-alternative 3a. Under Sub-alternative 3a, explosive severance would be used for partial removal or toppling of platform jackets and for severing conductors. Impacts on water quality from vessel anchoring and discharges would be reduced compared to Alternative 3 due to shortened removal schedules.

4.2.3.4 Alternative 4

Under Alternative 4, there would be no acceptance or authorization of decommissioning applications. Because no pre-severance, severance, or disposal activities would be undertaken, no decommissioning-related impacts on water quality are expected. Platforms would remain in place, but no O&G production activities would be occurring. Platform tanks, pipes, and equipment would be emptied of chemicals and hydrocarbons. Inspections, maintenance, and pollution control measures would continue and prevent or reduce leakage of residual petroleum or chemicals that may be present in tanks and equipment and that could produce contaminated runoff from platform decks. Pipelines to shore or other platforms would be emptied of hydrocarbons, pigged, flushed, and capped under Alternative 4, and would not pose an oil spill risk.

4.2.3.5 Cumulative Impacts

Other foreseeable activities that may add to the potential impacts of the Proposed Action and alternatives include mainly the development of offshore wind energy (e.g., in the Morro Bay and Humboldt Wind Energy Areas). Vessel traffic supporting offshore wind energy developments in these areas and at ports would contribute impacts from sanitary discharges and anchoring that could add to similar impacts from platform decommissioning. Similarly, seafloor disturbance from anchoring wind turbine structures to the seafloor would contribute additional turbidity. However, these impacts would likely not occur at the same locations or at the same time as those from platform decommissioning, so impacts would increase in geographic and temporal extent, but not in intensity. While some impacts on water quality from the proposed action and alternatives would be unavoidable and would range from negligible to moderate, localized, and of short duration, they would not result in a cumulative impact when added to those from other past, present, or foreseeable actions or trends.

4.2.4 Marine Habitats and Invertebrates

The IPFs that could potentially affect marine habitats and invertebrates during decommissioning include turbidity and sedimentation, seafloor disturbance, loss of platform-based habitat, and sanitary and wastewater discharges and trash from vessels and platforms. Table 4.1-1 presents the various decommissioning activities that produce these IPFs. Mitigation measures for relevant IPFs are presented in Table 4.1-3 and the definitions of impact levels are presented in Table 4.1-4. The following sections describe and evaluate the potential consequences of the IPFs under the decommissioning alternatives on marine habitats and invertebrates.

4.2.4.1 Alternative 1

During decommissioning activities vessel discharges (sanitary waste or sewage; domestic waste from shipboard sinks, laundries, and galleys; bilge and ballast waste; cooling water; and deck drainage) and ship anchoring, if used, would be the primary disturbances to benthic and pelagic invertebrate communities. Vessel discharges are regulated and are expected to have negligible impacts on pelagic invertebrates. The turbidity generated by ship anchoring would kill and bury small and less mobile pelagic and benthic invertebrates and likely cause more mobile species to leave the affected area. However, the sediment plume would be localized and temporary and is unlikely to create population level impacts on pelagic and benthic invertebrate communities.

Anchoring, if used, would leave deep pits and furrows on the seafloor. Invertebrates would recolonize the affected areas, although the recovery time for the benthic community could range from months to years depending on factors such as water depth, scarring depth, sediment type, and community composition (Sciberras et al. 2018; Broad et al. 2020; Jamieson et al. 2022). While most anchoring impacts would be to soft sediments, natural reef is found in close proximity to some platforms like Hidalgo, Harvest, and Hermosa, where there is patchy exposed rock separated by soft bottom (BOEM 2020), therefore, impacts on natural reef habitat from turbidity and physical damage are also possible, potentially resulting in long-term impacts due to the slow recovery of these communities (Broad et al. 2020). However, impacts on hardbottom habitat can be avoided or minimized with proper avoidance and mitigation actions.

Pre-severance activities are expected to result in negligible to minor impacts on benthic and pelagic invertebrate communities, however, the impacts on these communities and habitats depend on the extent of anchoring, turbidity caused by anchoring, and vessel discharges.

During the severance phase, invertebrate communities would be affected by platform removal, pipeline cleaning and removal, shell mound removal, and the removal of other subsurface O&G related infrastructure and obstructions. During the severance phase, epibenthic invertebrate communities would first be removed from the jacket, and the seafloor would be jetted around the jacket legs to facilitate removal. The platform jacket would then be removed to at least 4.6 m (15 ft) BML. Non-explosive removals would have negligible direct effects on invertebrate populations (Barkaszi et al. 2016). Explosive removals are discussed below under Sub-alternative 1a.

Sediment resuspension resulting from severance activities would be greatest under Alternative 1 because it would remove the jacket structure below the seafloor as well as excavate and remove shell mounds and O&G infrastructure. The turbidity generated by these activities would potentially affect a larger area injuring or killing smaller and less mobile pelagic and benthic invertebrates and also causing more mobile species to leave the affected area. The sediment plume would primarily affect soft sediment communities, and given its temporary nature, it is generally unlikely to create long-term impacts on pelagic and benthic invertebrate communities. However, O&G infrastructure (including platforms, pipelines, and power cables) have a widespread footprint with some located near natural reefs. Some of these reefs, especially those elevated above the seafloor, are sensitive to turbidity. In other areas, hardbottom communities experience frequent and large natural turbidity events and are well adapted to such disturbances (Diener and Lissner 1995). Therefore, pre-disturbance surveys and mitigation measures are critical for minimizing and avoiding impacts on natural reef communities.

Drilling fluids and drill cuttings containing PCBs, hydrocarbons, and metals could be released into the water during platform and shell mound removal (Scarborough Bull and Love 2019; Love 2019). Although exposure to chemicals that may be mobilized can be expected to be localized and temporary, the release of these compounds could be toxic to benthic and pelagic invertebrates if exposure occurs at a sufficient concentration and for a sufficient duration to elicit an adverse impact. While shell mound contamination is considered minor overall, shell mounds at some, but not all, platforms may currently be releasing contaminants (e.g., nickel and PCBs) into overlying waters, where they may be expected to quickly dilute. At high levels these contaminants may have toxic effects in benthic organisms living on the shell mounds, but existing studies suggest that benthic organisms on shell mounds may not be experiencing significant toxic exposures and adverse impacts (Phillips et al. 2006; Scarborough-Bull and Love 2019; Love 2019). Therefore, it is possible that removing the shell mounds at some platforms may remove a local source of contamination. See Section 4.2.3 for a description of water quality effects of bottom disturbing activities during severance.

Following infrastructure removal, the seabed would be trawled in water depths less than 91.4 m (300 ft) as part of site clearance requirements (Section 2.3.6). Trawling may also be used for site clearance in waters greater than 91.4 m (300 ft). Trawling would kill, injure, and displace benthic and pelagic invertebrates due to physical disturbance, sedimentation, and turbidity. The trawls would be conducted in a grid pattern covering a 402-m (1,320-ft) radius surrounding the center of the platform. Given the temporary nature and small size of the disturbance, no long-term impacts on invertebrate populations are anticipated. For sensitive natural hardbottom communities, mitigation and avoidance activities could be used to reduce impacts on these habitats.

Excavation and removal activities would also leave behind depressions on the seafloor within the extensive footprint of the shell mounds, platform legs, pipelines, and power cables. As described above, prior studies indicate that these depressions may persist for an extended period (>10 years) and could infill with fine sediments resulting in a benthic community that may differ from the pre-disturbance community (Sciberras et al. 2018; Mielck et al. 2021).

The removal of power cables will eliminate a source of electromagnetic fields on the seafloor. Studies of invertebrates around power cables in southern California found no overall statistical difference in invertebrate densities between energized and unenergized submarine cables, although differences were found for some individual species depending on depth (Love et al. 2017). Consequently, the removal of power lines may provide some minor benefit for invertebrates.

Platforms and portions of pipelines have been colonized by dense communities of sessile and epibenthic invertebrates. The complete removal of the jacket and pipelines would mean a permanent loss of existing hard substrate and the associated invertebrate communities, which would be replaced by invertebrates typical of the water column and soft sediments. Where the platform once stood, there would be a local shift from a reef ecosystem and food web to a pelagic food web typical of the surrounding area. The removal of currently exposed pipelines would shift the existing benthic invertebrate community to a soft sediment benthic community. These changes could result in a loss of local species diversity and productivity. However, the habitat value of the platform and the diversity, productivity, and biomass of the benthic communities removed will differ greatly depending on the platform location (CSA 2005; Page et al. 2019). Platform habitat is only a small fraction of overall hard substrate on the POCS, and platform surveys in the Santa Maria Basin and Santa Barbara Channel found that species diversity at the platforms, while high, was less than species diversity at natural outcrops within comparable depth zones (CSA 2005). However, platforms can be important at the local scale, especially in water depths greater than 47.5 m (150 ft) where natural hardbottom habitat is scarce (Scarborough Bull and Love 2019; Love 2019). Platforms may also be a source of benthic invertebrate larvae that disperse to natural reef habitats. However, the invertebrate population connectivity of platforms to natural reefs is not well characterized, so the effects of removal are uncertain.

Marine growth attached to the platform jacket and conductors would be removed and fall to the seafloor. This action may temporarily increase turbidity in the water column from the biomass traveling to the seafloor, which could be affected by the deposition. Impacts of such biofall would vary among the platforms, being strongly affected by volume of marine growth removed, the amount of infrastructure undergoing marine growth removal, and platform depth. Recently cleaned platforms (cleaning is currently part of routine maintenance) and platforms in deeper water would likely have less impacts on seafloor communities because the biofall would be more dispersed during cleaning.

For a conductor removal project at the Port Arguello Unit platforms on the POCS, marine growth to be removed during conductor removal at Platforms Harvest (19 conductors), Hermosa (29), and Hidalgo (14) was estimated to be 34 m^3 (45 yd^3), 53 m^3 (69 yd^3), and 25 m^3 (33 yd^3), respectively, which would then be deposited onto the existing shell mounds beneath the platforms (BOEM 2020). Because the conductor pipes constitute about one-fifth or less of each existing platform’s submerged infrastructure, the amount of marine growth that would be removed with jacket and conductor removal would be greater than under conductor removal alone.

Existing seafloor species with no or limited mobility may be buried by the biofall and locally anoxic conditions could theoretically develop as the biological material degrades. Studies examining the effects of biofall from shellfish aquaculture on benthic communities have reported that biofall deposition did not create a hypoxic environment, nor did it affect benthic community structure (Grant et al. 1995; Callier et al. 2007). The biofall that would result from marine growth removal in support of platform removal would likely be no more than what is deposited during regular cleaning events that have routinely occurred at all the platforms. The biomass deposition on the seafloor from the cleaning of the platform jackets and conductors during removal is unlikely to create a hypoxic zone on the seafloor, or to adversely impact benthic communities at the platform locations.

Non-native bryozoans, amphipods, and anemones are present and spreading on platforms in the Santa Barbara Channel along with natural reef habitat (Page et al. 2006; Page et al. 2018). There is concern that platforms may currently facilitate the spread of invasive species by acting as steppingstones for planktonic larvae, facilitated by periodic platform cleaning and hull fouling (Simons et al. 2016; Page et al. 2018). Prior to severance, the platform biofouling community would be removed, and any associated non-native invertebrates would be deposited on the seafloor along with the rest of the biofouling community. Therefore, the existing non-native species could continue to reproduce and spread depending on species and seafloor conditions. However, complete platform removal could also potentially reduce the future spread of invasive species by reducing the hard substrate available for these species to colonize (Page et al. 2018).

Shell mound communities are different from surrounding soft bottom habitats and the removal of shell mounds would result in the loss of a unique, diverse, and productive benthic community of sessile and mobile invertebrates, including commercially important crabs and shrimp (Goddard and Love 2008). Shell mounds in deeper water may also have value as thermal refugia as ocean temperatures rise (Goddard and Love 2008). Existing research suggest shell mounds can have a greater biomass and diversity of invertebrates compared to surrounding soft-bottom areas, and shell mounds may serve a role similar to natural reefs especially in deeper water (Page et al. 2005; Krause et al. 2012; Love 2019). The ecological significance of shell mound removal will vary locally because the value of shell mounds as benthic habitat and biodiversity hotspots differs by platform location (Goddard and Love 2008). For example, surveys across shell mounds under 15 platforms in the Santa Maria Basin, Santa Barbara Channel, and San Pedro Bay found megabenthic invertebrate taxa richness increased over the depth range of the platforms surveyed (64 to 225 m [210 to 738 ft]) and that shell mounds in San Pedro Bay had the lowest species richness perhaps due to their proximity to a heavily urbanized coastline (Goddard and Love 2008). Following removal, the existing shell mound invertebrate community would be replaced by softbottom invertebrate species that would colonize the area over time.

The area potentially affected by seafloor disturbance would be a small fraction of overall seafloor habitat. The loss of platform and shell mound habitat and the associated invertebrate communities would be locally significant given the potential reduction in invertebrate biomass and the replacement of sessile invertebrates with water column species. This is especially true for areas where natural hardbottom is scarce. However, platforms represent a small amount of hard habitat offshore southern California, so the loss of these communities and habitats are unlikely to result in significant long-term or regional changes in invertebrate populations. Overall, impacts on invertebrates and benthic habitat associated with severance activities are expected to be moderate.

Under the Alternative 1 disposal phase, the O&G infrastructure would be shipped on vessels to onshore locations for processing, recycling, and/or land disposal, and is expected to have negligible effects on invertebrate communities.

Sub-alternative 1a. Under Sub-alternative 1a, explosive severance would be used to section underwater portions of platform jackets and conductors. Explosive removal of the jacket would result in temporary noise impacts that could kill or stun benthic and pelagic invertebrates or displace them from the area of the explosion (Barkaszi et al. 2016), an impact that would not occur under Alternative 1 using non-explosive severance. While there is little data on the impact of explosive noise on invertebrates (Brand 2021), the effects of explosive removal would be spatially and temporally limited and would not be expected to result in population level impacts on invertebrate communities. Impacts on marine habitats and invertebrates from continuous noise from work vessels and from vessel anchoring and discharges would be reduced compared to Alternative 1 due to reduced work schedules afforded by explosive severance.

4.2.4.2 Alternative 2

For Alternative 2, impacts on benthic marine habitat and invertebrate communities from pre-severance activities are anticipated to be similar in kind to those described for Alternative 1 although they would be less severe and of shorter duration because only the upper sections of the platform and jacket would be removed. Pre-severance activities are expected to result in negligible to minor impacts on invertebrate communities, depending on the extent of vessel anchoring. Pipelines would be cleaned, capped, and buried below the seafloor. Impacts from pipeline decommissioning would be similar in kind to Alternative 1 (e.g., sediment plumes, potential contaminant release, and loss of pipeline associated invertebrate communities).

Platform depth ranges from 29 to 365 m (95 to 1,198 ft). Partial jacket removal to at least 26 m (85 ft) below the waterline would preserve most of the existing benthic communities (except for platforms in shallow water). However, platform invertebrate communities display vertical zonation, and shell producing invertebrates like mussels, barnacles, and scallops are usually dominant in the upper 26 m (85 ft) of the platform, suggesting these species would be most affected by removal (CSA 2005; Page et al 2019; Meyer-Gutbrod 2019). While these organisms also exist below 26 m (85 ft), non-shell forming invertebrates like calcareous worms, anemones, and sponges are usually dominant. Therefore, while the remaining jacket would continue to serve as an attachment site for invertebrate communities, the overall platform community may change dramatically.

Under Alternative 2, shell mounds would be left in place. However, the removal of the upper jacket along with a large fraction of shell producing species would likely reduce inputs to shell mound communities surrounding the platform. The potential decrease in biofall could decrease the species richness and abundance of benthic invertebrates (CSA 2004; Page et al. 2005; Meyer-Gutbrod et al. 2019). Invertebrate shell mound communities are currently dominated by predators and scavengers that consume biofall from the platform. A substantial reduction in biofall from the remaining platform jacket may shift the shell mound community to one dominated by omnivorous, suspension feeding, and deposit feeding species (Goddard and Love 2008). However, the effects of partial platform removal will likely vary by platform location and species due to their differential reliance on platform subsidies as well as local currents and sedimentation rates and the magnitude of the reduction in mussel production (Page et al. 2005 Claisse et al. 2015; Meyer-Gutbrod et al. 2020). In addition, any community changes would be very gradual as suggested by the fact that shell mounds and their associated invertebrate communities persisted at locations where platforms were completely removed 30 years prior (Page et al. 2005; Krause et al. 2012).

Non-native invertebrates present on the upper 24 m (79 ft) of several platforms in the Santa Barbara Channel would be deposited on the seafloor during jacket cleaning prior to removal, where they could potentially continue to reproduce and spread. Platform surveys for invasive species are incomplete, so the effect of partial removal on invasive species is uncertain

(Page et al. 2006, 2018). Because only part of the jacket would be removed, the remaining platform infrastructure could potentially continue to provide an attachment site for non-native invertebrate species (Page et al. 2018). Modeling studies suggest the potential for a platform to facilitate the spread of invasive species varies greatly by platform location and the life history of the invasive species. Species with planktonic larval durations of 24 hours or less can disperse further from offshore platforms than nearshore platforms and dispersal to some platforms would require intermediate attachment sites or hull transport (Page et al. 2018). Overall, planktonic dispersal depends on a variety of physical and biological factors and must be assessed on a platform-by-platform basis.

For Alternative 2, impacts on invertebrates associated with severance activities are expected to be moderate, although they are anticipated to be of lesser magnitude compared to Alternative 1 because, in most cases, significant portions of the platforms and shell mounds would remain in place.

Under Alternative 2, impacts on invertebrate communities from disposal activities would be the same as under Alternative 1, although fewer vessel trips will be required because only part of the platform would be removed. Impacts from disposal would be negligible.

Sub-alternative 2a. Explosive severance for partial removal of platform jackets and severance of conductors under Sub-alternative 2a could kill or stun benthic and pelagic invertebrates or displace them from the area of the explosion, an impact that would not occur under Alternative 2 using non-explosive severance. Such impacts would be reduced compared to Sub-alternative 1a due to reduced jacket severance under Sub-alternative 2a.

4.2.4.3 Alternative 3

For Alternative 3, impacts on invertebrate communities from pre-severance activities are anticipated to be similar to those identified for Alternative 2 (negligible to minor) and impacts on invertebrate communities from severance activities are anticipated to be similar to those identified for Alternative 2 (moderate).

The impacts on invertebrate communities from most disposal activities would be similar to Alternative 2. However, for Alternative 3, after the removal of the upper platform jacket, the jacket will be placed on the seafloor. The benthic organisms beneath the jacket fall area would be affected within the footprint in which the severed portion of the jacket is placed. Once in place, the jacket would act as an artificial reef and invertebrate communities are likely to rapidly develop. The composition of the community and its habitat value would vary significantly with depth and location on the POCS but would likely be similar to natural hardbottom communities found at that depth.

Sub-alternative 3a. Explosive severance for partial removal or toppling of platform jackets and severance of conductors under Sub-alternative 3a could kill, or stun benthic and pelagic invertebrates on the seafloor and in the water column in the vicinity of the explosion, an impact that would not occur under Alternative 3 using non-explosive severance. Such impacts would be reduced compared to Sub-alternative 1a due to reduced jacket severance under Sub-alternative 3a, and similar to those under Sub-alternative 2a.

4.2.4.4 Alternative 4

Under Alternative 4, there would be no authorization of decommissioning applications. Since no decommissioning activities would be undertaken, no decommissioning-related impacts are expected to marine invertebrates and benthic habitats. Platforms and wells would be shut-in and left in place and continue to serve their current function as an artificial reef supporting benthic invertebrate populations, including serving as habitats for non-native species. The associated shell mounds would continue to receive shell and organic matter inputs from the platform jacket. Overall, impacts would be negligible.

4.2.4.5 Threatened and Endangered Invertebrate Species

Black Abalone. The black abalone is a marine mollusk found in rocky intertidal and shallow subtidal marine habitats. Impacts on black abalone are expected to be negligible for Alternative 4. For Alternative 1 sediment plumes generated by bottom disturbing activities would occur around the platform, shell mounds, pipelines, and power cables, and for Alternatives 2 and 3 around power cables. These plumes could potentially reach rocky shorelines along the mainland coast and the Channel Islands where black abalone are present. However, the plumes would only occur briefly during the severance period and they are not expected to permanently affect the habitat of black abalone or individuals of this species. Therefore, the impacts from decommissioning are negligible for each alternative.

White Abalone. White abalone live on rocky substrates on offshore islands, submerged banks, and some locations along the mainland at depths up to 55 m (180 feet). Impacts on white abalone are expected to be negligible for Alternative 4. For Alternative 1, pre-severance, severance, and disposal activities would generate turbidity in the disturbed areas around the platform, shell mounds, pipelines, and power cables, and for Alternatives 2 and 3, around power cables. Given its depth and habitat preferences, there is the potential that white abalone could be affected by turbidity plumes which would disturb these hardbottom areas. There are few surveys of abalone associated with POCs O&G infrastructure. During targeted surveys for the ExxonMobil Santa Ynez Unit One, no abalone were observed (Sanders 2012). Given the short duration of bottom disturbing activities and the rarity of this species, white abalone are not likely to be affected by decommissioning activities. Historic overfishing and poaching, together with as well as ongoing low population density (not O&G operations) are considered to be responsible for the decline and lack of recovery of the white abalone (Stierhoff et al. 2012). Overall, the alternatives are expected to have a negligible effect on the white abalone.

4.2.4.6 Cumulative Impacts

Cumulative impacts on invertebrate communities could result from the combination of the Alternatives along with past, present, and reasonably foreseeable future activities that affect invertebrate communities. These include O&G production (including accidental oil spills), sediment dredging and disposal, anchoring, fishing/trawling, vessel traffic, and pollutant inputs from point and non-point sources. In addition, several major classes of invertebrates could be affected by the environmental changes predicted to result from climate change.

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). These changes could affect individuals and habitat forming invertebrates like corals, as well as facilitate the range expansion of non-native invertebrate species into the POCS.

Platform decommissioning activities will primarily affect benthic and lower water column invertebrate species and habitat. However, impacts from decommissioning activities would generally be of a short-term and temporary nature with no more than minor effects on invertebrate communities, although, due to the permanent changes in invertebrate communities, platform and shell mound removal would result in moderate impacts on invertebrates. Therefore, the effects of decommissioning activities on invertebrates would be similar to the effects of existing activities alone, representing a small incremental addition to past and ongoing impacts on invertebrates.

4.2.5 Marine Fishes and Essential Fish Habitat

The IPFs that could affect marine fishes and essential fish habitat (EFH) during decommissioning are presented in Table 4.1-1 and include seafloor disturbance and resulting turbidity and sedimentation from anchoring, jacket footer jetting/excavation, shell mound excavation, pipeline removal, and site clearing. Marine fish could be disturbed by noise from vessels and equipment, and some may be killed if explosive severance is used to section platform jackets. Removal of jackets would result in loss of platform-based habitat, while discharges or spills from vessels or platforms could impact local fish and EHF locally. Mitigation measures for relevant IPFs are presented in Table 4.1-3 and the definitions of impact levels are presented in Table 4.1-4.

4.2.5.1 Alternative 1

Disturbance to fishes and EFH during pre-severance activities would primarily result from vessel noise and ship anchoring (which may be used instead of GPS positioning). Noise from vessel traffic has the potential to disturb pelagic fish by inducing movement from the affected area (De Robertis and Handegard 2013). Anchoring would generate temporary turbidity and sedimentation, potentially killing small bottom dwelling fish and temporarily displacing more mobile species in the vicinity of the disturbance. Seafloor EFH would also be left with anchor scars. Damage to natural reef habitat EFH from anchoring is possible, but this can be avoided or minimized with feasible mitigation such as pre-disturbance surveys for EFH, avoidance of EFH, and using dynamic positioning rather than anchoring. The impacts from vessel traffic and anchoring would be localized and temporary, and pre-severance activities are expected to result in negligible to minor impacts on fish and EFH depending on the spatial and temporal extent of anchoring.

During the severance phase, EFH and benthic and pelagic fish communities could be affected by vessel anchoring, platform removal, pipeline cleaning and removal, anchoring (if used) and the removal of power cables and shell mounds.

Non-explosive removal of the platform (to at least 4.5 m [15 ft] BML) would have negligible to minor direct effects on fish populations although any jetting near the jacket footings would cause temporary turbidity that would kill or displace individual fish. However, fish could incur localized, temporary, moderate impacts from noise and moderate impacts from sediment resuspension.

The amount of seafloor EFH that would be disturbed by the removal of all POCS platforms, pipeline, and power cables are presented in Table 4.2.5-1. The potential disturbance area within each EFH category was calculated using a geographic information system (GIS) by overlaying the platform footprint and corridors centered on each pipeline/power line onto the EFH boundaries to get estimates of seafloor EFH that could be affected by pipeline and power cable removal. The analysis assumed a 610-m (2,000-ft) buffer around the federal platforms and a 76.2-m (250-ft) wide corridor along and centered on the associated pipelines and cables. The area disturbed includes post-severance site clearing trawling, used in water shallower than 91.4 m (300 ft) and potentially used in waters deeper than 91.4 m (300 ft), which would extend to a 402-m (1,320-ft) radius surrounding the center of the platform. Pacific groundfish and coastal pelagic EFH would be most affected by bottom disturbing activities during decommissioning, followed closely by highly migratory species EFH. No pacific salmon EFH would be affected by decommissioning activities. As shown in the table, the amount of EFH that would be disturbed by the decommissioning of all 23 POCS platforms represents 0.05% or less of any specific EFH type present on the southern California POCS.

Seafloor jetting and the removal of shell mounds and O&G infrastructure would generate temporary, but significant sediment resuspension and leave deep depressions in the seafloor that could persist for a significant period of time (See Section 4.2.4). Sediment resuspension would be greatest under Alternative 1. The sediment plume generated by these activities would degrade water column EFH and may kill, injure, or displace fish from the affected area, with the greatest impacts on small, less mobile species. However, the sediment plume is expected to be temporary and not result in permanent impacts on fish populations.

Toxic chemicals such as polychlorinated biphenyls (PCBs), hydrocarbons, and metals could be released into the water due to sediment disturbance during pipeline cleaning, O&G infrastructure removal (including jetting) and shell mound removal (Phillips et al. 2006). The potential for contaminant release would be greatest under Alternative 1 because it would remove shell mounds and the jacket structure below the seafloor. While disturbing sediments around the platform could expose some fish to toxic levels of chemicals, especially smaller fish, the effects of chemical mobilization on fish would be localized and temporary, and any chemicals would be quickly diluted.

TABLE 4.2.5-1 Area (acres) of EFH That Could Be Disturbed by Decommissioning of All POCS Platforms, Pipelines, and Power Cables.

EFH Type	Total Acres of EFH Disturbed by Decommissioning of All Platforms (% of total available EFH habitat)	Total Acres of EFH in the Southern California POCS
Groundfish EFH[a]	13,542 (0.05)	24,410,821
Groundfish HAPC[a]	79 (<0.01)	3,592,328
Groundfish EFH[a] Conservation Area	3,433 (0.02)	13,998,440
Groundfish EFH DECA[a]	0 (0)	42,565,504
Coastal Pelagic EFH[b]	13,542 (0.02)	68,452,241
Highly Migratory Species EFH[b]	13,151 (0.02)	68,452,234
Pacific Salmon EFH[a]	0	0

[a] HAPC = habitat area of particular concern. Source: NOAA (2021a).

[b] Source: NOAA (2021b).

Although shell mound contamination is considered minor overall, shell mounds at some, but not all, platforms may currently be releasing contaminants or contaminating organisms consumed by fish (Phillips et al. 2006; Scarborough Bull and Love 2019; Love 2019). The overall benefit to fish communities from removing shell mounds may be marginal, as natural burial and hydrocarbon weathering following platform decommissioning would likely diminish any ongoing contaminant release from the shell mounds over time (Bemis et al. 2014).

The complete removal of the platform and pipelines will result in a loss of existing fish habitat and structure-oriented fish communities. The area of the platform would revert to open water EFH with fish species typical of the water column. Currently, exposed pipelines would, in most cases, revert to soft bottom seafloor EFH with fish communities typical of the surrounding soft bottom habitat. Fish surviving platform removal would disperse to new reef habitats, although they may experience greater fishing pressure at natural reefs compared to the platforms (Scarborough Bull and Love 2019). Thus, platform removal would dramatically change local fish diversity, composition, and food web structure. The platform and pipeline habitats are only a small fraction of overall hard habitats in southern California. However, these habitats can be significant at the local scale especially in deep water exceeding 45.7 m (150 ft), which is where hard bottom habitat typically scattered, and consists of low-elevation rocky outcrops (Scarborough Bull and Love 2019; Love 2019). Consequently, the loss of habitat may be locally significant to structure-oriented fish species.

While platforms are not considered EFH, the Pacific Coast Fisheries Management Council has recommended that thirteen of the 23 offshore platforms in federal waters be designated as Habitat Areas of Particular Concern (PFMC 2005). The platforms recommended for Habitat Area of Particular Concern (HAPC) designation were Platform A, Platform B, Platform C, and Platforms Edith, Gail, Gilda, Grace, Habitat, Harvest, Hermosa, Hidalgo, Hondo, and Irene (PFMC 2005). Although the HAPC designations were not approved by the National Oceanic and Atmospheric Administration (NOAA), the recommendation suggests the high ecological value of some platform habitats. In assessing the effects of platform removal, it is important to consider the value of artificial reef habitats compared to natural reefs, more specifically whether reefs contribute significantly to the production of fish rather than simply attracting fish. Claisse et al. (2014) found platforms to have the highest secondary production per unit of seafloor of any marine habitat. Several studies have also found that platforms contribute significantly to the production of certain fish species in California, namely rockfish, which often have higher densities on platforms than natural reefs (Love et al. 2012). Similarly, several studies of individual platforms have shown that rockfish grow as fast or faster at platforms compared to natural reefs, although for other species platforms are not considered to make a substantial contribution to the regional stocks (Love 2019). In one of the few modeling studies, the removal of Platform Gail was estimated to be equivalent to removing between 12.6 and 29 hectares (31 and 72 acres) of natural habitat for bocaccio and cowcod (Scarborough Bull and Love 2019). In addition, larval dispersal studies indicate that platforms are important local recruitment sites for some rockfish species in areas where there is little natural reef habitat, providing up to 20% of average recruitment for some species (Scarborough Bull and Love 2019). However, the connectivity of fish populations between offshore platforms and natural reefs is not well understood for most species, so it is difficult to assess the consequences of platform removal for larval dispersal and recruitment.

Because fish density and diversity vary significantly by platform depth, location, and platform structure, the consequences of platform decommissioning for local or regional fish populations must be analyzed on a platform specific basis (Love and Nishimoto 2012). Generally, species density and productivity are not clearly related to depth but may instead reflect local population sources and recruitment patterns (Love and Nishimoto 2012; Love et al. 2015). Large-scale biogeographic patterns are important, as surveys indicate platforms north of Point Conception have fish species composition that reflects the platform location within the California Current in contrast to the warmer water fish species occupying platforms in the Santa Barbara Channel or San Pedro Basin (Love and Nishimoto 2012). Platform structure also has significant bearing on fish communities, with more complex jacket crossbeam structure associated with higher fish densities (Love et al. 2019).

Meyer-Gutbrod et al. (2020) modeled fish production loss for 24 platforms off California and estimated that the complete removal of the platforms and shell mounds would result in an average loss of 96% and 95% of the fish biomass and somatic production, respectively, across all of the surveyed platforms. The loss varied between platforms but was greater than 90% for most platforms. If all platforms were removed, the total estimated fish biomass loss was more than 28,000 kg (61,729.4 lb.), along with a loss of over 4,000 kg/yr (8,818.5 lb.) of fish production in the SCB (Meyer-Gutbrod et al. 2020). Overall, the removal of an individual platform may have little effect on the regional fish abundance and population dynamics, but it is possible that the removal of multiple platforms could cumulatively affect fish populations.

Under Alternative 1, shell mounds will be removed as part of severance activities, resulting in a loss of associated fish communities, especially small benthic fish and juvenile stages of platform associated species for which the shell mounds serve as nursery grounds (Meyer-Gutbrod et al. 2019). Shell mounds support more fish than the adjacent soft-bottom areas and can have habitat values similar to deep natural reefs (Krause et al. 2012). The loss of fish production and biomass from shell mound removal would vary between platforms and would be greatest for platforms with the largest shell mounds (13 to 76% loss of fish production) and lowest for small and dispersed mounds (0.3 to 0.5% loss of production) (Claisse et al. 2015). In addition, fisherman currently avoid shell mound areas, and the complete removal of the platform and shell mounds may increase trawling and fish catch in the area (Meyer-Gutbrod et al. 2019).

The removal of power cables under Alternative 1 will eliminate a source of electromagnetic fields (EMF) on the seafloor, which have been of significant environmental concern. Studies of southern California fish communities around energized and unenergized submarine power cables found that EMFs declined to background levels about one meter from the cable (Love et al. 2017). No statistically significance difference was found in fish assemblages along the energized and unenergized cables, and total fish densities were significantly higher around both energized and unenergized cable communities compared to reference habitat. Overall, the removal of power cables may provide a limited benefit to fish species that are sensitive to EMF, such as elasmobranchs (Love et al. 2017).

Impacts on fish communities associated with severance activities are expected to be moderate. The loss of platform-associated fish and their habitat may be locally significant given the potential reduction in existing fish biomass and productivity, especially for some rockfish species. However, platforms represent a small amount of hard habitat in southern California, and fish could disperse to other hard habitats including natural reef. Similarly, most severance activities would have only minor and temporary effects on EFH and, while valuable habitat, platforms are not considered EFH so their removal would not affect currently designated EFH or HAPC.

Under the Alternative 1 disposal phase, the O&G infrastructure would be shipped on vessels to onshore locations for processing, recycling, and/or land disposal. These activities are expected to generate temporary vessel noise, but they are expected to have negligible effects on fish communities and EFH.

Sub-alternative 1a. Explosive severance of platform jackets would result in localized and temporary moderate noise impacts that could kill, injure, or displace fish on the seafloor and in the water column in the vicinity of the explosion that would not occur under Alternative 1 using non-explosive severance. Prior explosive removals in southern California resulted in large fish kills (Barkaszi et al. 2016; Scarborough Bull and Love 2019). Fish with swim bladders would be most susceptible to injury from the explosion, although the physical force of the blast could also kill fish without swim bladders if they were located close enough to the explosion (CSA 2004). The current criteria for impulsive (explosive) noise threshold for fish are presented in Appendix D, Table D-4. Explosive noise impacts would be of greatest duration for the largest platforms with the deepest jacketing. However, the effects of explosive removal would be spatially limited, with the greatest effects likely extending approximately 100 m (328 ft) of the explosion to potentially hundreds of meters from the explosion (CSA 2004; Barkaszi et al. 2016).

Any fish mortality from explosive removal is not expected to result in population level impacts on fish communities in the POCS.

4.2.5.2 Alternative 2

Impacts on EFH and fish communities from pre-severance activities are anticipated to be the same under Alternative 2 as those identified for Alternative 1, although they may be of shorter duration because only the upper sections of the platform would be removed. Pre-severance activities are expected to result in negligible to minor impacts on fish communities depending on the extent of vessel anchoring.

Under Alternative 2, the platform jacket would be removed to at least 26 m (85 ft) below the waterline. Explosive severance and jetting around the platform legs would not be used. Pipelines would be cleaned, capped, and buried below the seafloor. Impacts from pipeline decommissioning and clearance of other submerged O&G infrastructure would be similar in kind to those under Alternative 1 (e.g., sediment plumes, potential contaminant release). The amount of seafloor EFH disturbed by the pipeline decommissioning would be similar to Alternative 1.

Partial jacket removal to at least 26 m (85 ft) below the waterline would preserve some existing fish habitat and communities depending on the platform depth, which ranges from 29 to 365 m (95 to 1,198 ft). Platform fish communities display distinct depth zonation, in which fish densities are typically highest at the jacket base, followed by the midwater and shell mound areas of the platform (Meyer-Gutbrod et al. 2020). Species densities are lowest in the upper platform. Species like the blacksmith (*Chromis punctipinnis*) that inhabit the shallow portions of platforms would be most affected by removal and they would have to move lower on the platform or move to another location. Rockfish abundance and recruitment is greatest below 26 m (85 ft), so the platforms would continue its current function as rockfish habitat (Claisse et al. 2015). Thus, rockfish production loss would be less under Alternative 2 compared to Alternative 1, because the platform would retain its most productive sections and continue to provide a nursery function (Scarborough Bull and Love 2020; Claisse et al. 2015).

Impacts from partial jacket removal will also vary by platform. Based on modeling data from 24 platforms, partial removal to 26 m (85 ft) depth resulted in an average of 10% reduction in fish biomass and an 8% reduction in somatic production. Across the 23 platforms, fish biomass loss ranged from 0% to 44% and from 0% to 48% for somatic fish production (Meyer-Gutbrod et al. 2020). As expected, the differences between the platforms are related to depth and structural configuration, with the shallowest platforms experiencing the greatest losses and platforms in deeper water retaining most of the fish assemblage. Therefore, while there would be a loss of fish residing in the upper portions of the platform structure, they are generally a small portion of the total fish community, most of which reside near the platform bottom (Claisse et al. 2015; Meyer-Gutbrod et al. 2020). Consequently, most fish would not be affected by the removal of the upper portion of the platform, unless located in shallow water (Claisse et al. 2015; Meyer-Gutbrod et al. 2019). Overall, partial platform jackets are likely to remain highly productive compared to many other marine habitats (Love et al. 2012; Claisse et al. 2015).

Under Alternative 2, shell mounds would not be excavated. However, partial removal would take the greatest shell-producing section of the platform jacket, and fish abundance may decrease over time if there is a significant decline in organic matter subsidies from the platform jacket (Page et al. 2005; de Wit 2001 [cited in Love 2019]; Meyer-Gutbrod et al. 2019). Shell-producing invertebrates are found on platform jackets below 26 m (85 ft) so inputs may continue to a lesser extent even after partial jacket removal. Therefore, the shell mound habitat may persist depending on local currents and sedimentation rates, as well as the magnitude of the reduction in mussel production (Claisse et al. 2015; Meyer-Gutbrod et al. 2020). Studies indicate that even shell mounds at locations where platforms were completely removed at the seafloor 30 years prior continued to have shell mound fish communities (similar to natural rocky reef habitat) and also had greater diversity and abundance of fish and their invertebrate food sources compared to surrounding softbottom habitat (Page et al. 2005; Krause et al. 2012). The largest shell mounds, typically found in waters shallower than 106.7 m (350 ft), may persist longer than mounds in deeper waters which are smaller and more widely dispersed around the platform (Meyer-Gutbrod et al. 2019; Love 2019). If there is a decline in shell mound habitat quality over time, fish species requiring low-relief reef habitat will move to other areas and fish productivity at the platform site may decrease.

Overall, impacts on fish and EFH associated with severance activities are expected to be moderate and of lesser magnitude than for Alternative 1, because shell mounds and a portion of the platform would remain in place and continue to serve a habitat function.

For Alternative 2, disposal activities are expected to generate temporary vessel noise similar to but of lesser duration than Alternative 1, and are expected to have negligible effects on fish communities.

Sub-alternative 2a. Explosive severance for partial removal of platform jackets and severance of conductors under Sub-alternative 2a could kill, injure, or displace fish on the seafloor and in the water column in the vicinity of the explosion, an impact that would not occur under Alternative 2 using non-explosive severance. Such impacts would be reduced compared to Sub-alternative 1a, due to the reduced level of jacket severance that would be required under Sub-alternative 2a.

4.2.5.3 Alternative 3

For Alternative 3, impacts on fish communities and EFH from pre-severance and severance activities are anticipated to be similar as those identified for Alternative 2. Impacts on fish and EFH from disposal activities are anticipated to be similar to those identified for Alternative 2, except the severed portion of the platform jacket would be placed on the seafloor. The seafloor EFH beneath the jacket fall area would be disturbed within the footprint in which the jacket is placed.

Once in place, fish and epibenthic invertebrate communities would develop on and around the platform jacket. The composition of the climax community and its ecological value would vary significantly with location on the POCS and the structural configuration of the platform, but would likely be similar to natural hardbottom communities found at that depth. Given the unusually high fish productivity of the deeper platform zone habitat (Claisse et al. 2014), adding more platform structure to the seafloor will likely increase fish density and productivity at some locations (Meyer-Gutbrod et al. 2020). EFH managed species like rockfish may especially benefit from the addition of the platform jacket to the seafloor, although this would depend on how fishing is managed at the decommissioned platform site (Macreadie et al. 2011). Overall, the impact of disposal activities would be minor, and could potentially benefit fish populations.

Sub-alternative 3a. Explosive severance for partial removal or toppling of platform jackets and severance of conductors under Sub-alternative 3a could kill, injure, or displace fish on the seafloor and in the water column in the vicinity of the explosion, an impact that would not occur under Alternative 3 using non-explosive severance. Such impacts would be reduced compared to Sub-alternative 1a due to the reduced level of jacket severance under Sub-alternative 3a, and similar to those under Sub-alternative 2a.

4.2.5.4 Alternative 4

Under Alternative 4, there would be no acceptance or authorization of decommissioning applications. As no pre-severance, severance, or disposal activities would be undertaken, no decommissioning-related impacts on marine fish and EFH would be expected. Platforms would remain in place, but no O&G production activities would be occurring. The platforms would continue to serve their current function as artificial reef supporting fish populations. The associated shell mounds would continue and to receive shell and organic matter inputs from the platform jacket and provide habitat for juvenile fish and low relief reef species. Based on data from 24 platform locations, Meyer-Gutbrod et al. (2020), calculated that if all the platforms were left intact the platform would support 29,200 kg (64,375 lb.) of fish biomass and an annual somatic production of 4,780 kg/yr (10,538 lb./yr).

There is some concern that about long-term contamination from shell mounds surrounding the platform. However, existing studies have not found evidence of consistent and widespread contaminant seepage or toxicity to fish communities at platform mounds (Scarborough Bull and Love 2019).

4.2.5.5 Threatened and Endangered Fish Species

Green Sturgeon. The green sturgeon potentially inhabits nearshore marine and estuarine waters and spawn in freshwater habitat. The NMFS has designated no critical habitat south of Monterey Bay (NMFS 2009;; NMFS 2018). Green sturgeon are not structure-oriented species associated with platforms, and they are not likely to be affected by decommissioning activities. Therefore, the impacts of decommissioning are expected to be negligible for all the alternatives.

Steelhead. Adult steelhead migrate to freshwater areas to spawn, and the resulting young fish travel back downstream and eventually enter marine waters to mature. Critical habitat for the

Southern California steelhead includes multiple rivers in California. Steelhead are not associated with O&G platforms and are not likely to be affected by decommissioning activities. Therefore, the impacts of decommissioning are expected to be negligible for all the alternatives.

Scalloped Hammerhead Shark. The scalloped hammerhead is found in coastal waters off the southern California coast. Scalloped Hammerhead are not common in the POCS, and the NMFS has not designated critical habitat for the Eastern Pacific DPS within the United States (NMFS 2015). Scalloped hammerhead often hunt on the seafloor and could potentially be affected by bottom disturbing activities and explosive platform removal. However, it is unlikely these activities would kill or injure this species due to their general scarcity within the project area. Therefore, the impacts of decommissioning are expected to be negligible for all the alternatives.

Tidewater Goby. The tidewater goby is restricted primarily to brackish waters of coastal wetlands, brackish shallow lagoons, and lower stream reaches larger than 2.5 ac (1.0 ha) (Lafferty et al. 1999). Given their distribution this species would not be affected by decommissioning activities and impacts would be negligible for all alternatives.

4.2.5.6 Cumulative Impacts

Cumulative impacts on marine fish and EFH could result from the combination of decommissioning activities along with past, present, and reasonably foreseeable future activities that may negatively influence fish resources and EFH. Decommissioning activities will have varied effects on fish populations depending on their habitats and life histories. Many decommissioning impacts on fish communities would be temporary and minor, primarily associated with noise (vessel traffic and explosive platform removal) and turbidity and sedimentation (jetting, pipeline decommissioning, anchoring). Some fish will be killed in the process of platform removals, especially if explosives are used. The most significant impact would be the removal of platform habitat and the associated fish communities.

Non-decommissioning activities that adversely affect fish and EFH include O&G production (including accidental oil spills), commercial and recreational fishing (many EFH managed species are overfished), sediment dredging and disposal, noise and anchoring from offshore marine transportation, and pollutant inputs from point and non-point sources. In addition, the National Centers for Coastal Ocean Science has published an atlas for identifying Aquaculture Opportunity Areas (AOAs) that may be suitable for aquaculture operations (Morris et al. 2021). While the atlas does not establish an AOA, many of the potential locations identified exist within the in Southern California POCS Planning Area. . If aquaculture and/or mariculture facilities are established, there is the potential to negatively affect natural populations by degrading water quality and spreading disease, unless effective mitigation is implemented (Bouwmeester et al. 2021; Mordecai et al. 2021).

Climate change, sea level rise, and the attendant physical and chemical changes in the marine environment could also affect fish communities through direct physiological stress (Alfonso et al. 2021), habitat loss (Valiela et al. 2018), and by altering large-scale oceanographic and ecosystem processes affecting larval dispersal (Bashevkin et al. 2020). Higher water temperature could also promote the spread and virulence of new and existing pathogens (Burge et al. 2014), alter the migration patterns of fish and their food sources (Bashevkin et al. 2020), and promote the range expansion of non-native species (Schickele et al. 2021).

The incremental contribution of decommissioning activities to the combined cumulative impacts is generally minor in comparison with all other anthropogenic activities that have and continue to affect fish resources and EFH. Most platform decommissioning activities would generally be of a short-term and temporary nature with no more than minor effects on fish communities, although moderate impacts are possible due to the permanent loss of artificial reef habitat and loss of the associated fish communities and productivity. Overall, the cumulative effects of decommissioning activities on fish and EFH would be similar to the effects of existing activities, representing a small incremental addition to past and ongoing impacts on these resources.

4.2.6 Sea Turtles

The IPFs potentially affecting sea turtles during decommissioning activities are presented in Table 4.1-1, and include noise generated from severance methods and vessel and helicopter noise, potential vessel strikes, entanglement in anchor or mooring lines and in trawls used for site clearance, and water quality degradation from seafloor disturbance and turbidity and from discharges or accidental spills. Platform and vessel lighting would have a negligible impact on sea turtles, as lighting is mainly an issue for sea turtle nesting, which does not occur in the project area. Mitigation measures for relevant IPFs are presented in Table 4.1-3 and the definitions of impact levels are presented in Table 4.1-4.

4.2.6.1 Alternative 1

Under Alternative 1, vessel traffic and helicopter flights would continue to convey workers, inspectors, and others to and from the platform. However, both the number and frequency of supply vessel traffic and helicopter flights would be greatly reduced under any of the alternatives compared to the levels that occurred during production operations. Helicopter noise has the potential to propagate underwater at levels that could be detected by sea turtles, but only short-term temporary changes in behavior are expected (CSA Ocean Sciences Inc. 2021). Therefore, impacts from helicopter flights would be negligible.

Underwater noise generated by vessels, including those using dynamic positioning thrusters, 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 near 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 166 dB re 1µPa rms may experience behavioral disturbance/modification (e.g., movements away from the noise source) (McCauley et al. 2000). The low volume 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.

Abrasive cutting of conductors BML may generate continuous noise in water at a level of 147–189 dB re 1µPa @ 1 m (3 ft) in the 500–8000 Hz band, peaking at 1000 Hz. Noise levels are estimated to fall to 120 dB re 1µPa @ 1 m (3 ft), the estimated threshold of behavioral changes in marine mammals, within 328 ft (100 m). This distance is also thought to be protective of sea turtles. BSEE would require as mitigation measures the conduct of a visual clearance survey of a 300-m (984-ft) clearance zone before and after each conductor cutting to ensure that no Endangered Species Act (ESA) protected whales or turtles are present (BOEM 2021).

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, as it can 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). Mandatory speed restrictions may be necessary to reduce the risk of vessel strike to sea turtles (Hazel et al. 2007). The decommissioning vessels will generally transit to the work location and remain in the area until installation is complete, which would lower the potential for vessel strikes. Protected species observers (PSOs) will monitor for the presence of marine protected species in the vicinity of activities (including vessel transit), notify project personnel to the presence of species, and communicate what enforcing action(s) are necessary to ensure mitigation and monitoring requirements are implemented as appropriate (CSA Ocean Sciences, Inc. 2021). Considering that decommissioning will employ a relatively low number of slower-moving work vessels, and that vessel strike avoidance and other mitigation measures will be implemented (Table 4.1-3), the risk of a strike is expected to be minor.

Spillage of lubricating oils, hydraulic fluids, waste oils, or other contaminants from vessels or platforms could result in a minor impact on the marine environment due to the small volume of such spills, the onsite oil spill response capability, and other spill response resources in the immediate area. The work vessels and platforms maintain oil spill response plans and would have spill containment and cleanup equipment in the event of local spills. As sources for a large contaminant spill (e.g., oil) would not be present, and vessel or platform crews would have the capability to respond to a spill, negligible water quality degradation impacts on sea turtles are expected.

Impacting factors potentially affecting sea turtles during the severance phase include noise from vessels and helicopters, platform removal, and pipeline and cable removal; vessel strikes; turbidity, sedimentation, and seafloor disturbance from jacket footer removal; shell mound removal; site clearing (e.g., seafloor trawling); pipeline and cable removal; and lighting in the platform area.

The potential impacts on sea turtles from lighting, helicopter and vessel noise, and vessel strikes would be equivalent to those described above for the pre-severance phase. Vessel sound levels can be louder when using dynamic positioning, which requires the operation of thrusters to control a vessel's location. However, few sea turtles are expected to be within the immediate area while severance activities are being conducted. Therefore, impact levels would be the same: negligible for lighting and helicopter noise, localized minor for vessel noise, and minor for vessel strikes. A discharge of residual hydrocarbons and/or chemicals is possible; however, the pipelines will all be cleaned and flushed prior to cutting to achieve no more than 30 mg/L oil in water. Pipeline removal will require the pipelines to be pigged and flushed prior to removal, which would minimize any contaminants left in the pipeline prior to its removal. Overall, spillage of lubricating oils, hydraulic fluids, waste oils, or other contaminants would have a negligible impact on sea turtles if spill volumes were low and appropriate spill containment measures are employed in a timely manner.

Under Alternative 1, nonexplosive cutting tools would be used for jacket removal. Explosive severance is discussed below under Sub-alternative 1a. Nonexplosive cutting methods do not create the impulse and shockwave-induced effects which accompany explosive detonation and are therefore considered to be an ecological and environmentally sensitive severance method. The level of garnet or copper slag used in abrasive water jet cutting are not reported to have environmental issues. The noise level of the supersonic cutting jet is safe for divers and is not considered harmful to marine life (Kaiser et al. 2004). Potential disturbance to sea turtles from non-explosive severance could cause potential behavioral changes due to increase in background underwater noise levels.

Anthony et al. (2009) present a review of published underwater sound measurements for various types of diver-operated tools. Several of these are underwater cutting tools, including a high-pressure water jet lance, chainsaw, grinder, and oxy-arc cutter. Reported source sound pressure levels were 148 to 170.5 dB re 1µPa (it was not indicated whether these are rms or zero-peak). Cutting that takes place 4.6 m (15 ft) below the sediment line may generate an equivalent in-water source level of 147 to 189 dB re 1 µPa @ 1 m (3.3 ft) (BOEM 2021; Kent et al. 2016). Because the cutting would be conducted 15 ft (4.6 m) below the sediment line, the higher frequencies (5 to 20 kHz) would likely be quickly attenuated into the sediment, further reducing the amount of sound radiated into the water (BOEM 2021). As sea turtles exposed to underwater noise greater than 166 dB re 1µPa rms may experience behavioral disturbance/modification (e.g., movements away from the noise source) [McCauley et al. 2000]), sea turtles within the immediate area of severance activities could experience behavioral disturbance. However, it is expected that the presence of the diver or mechanical cutting device would have initiated sea turtle avoidance of the area before cutting occurs. The use of nonexplosive cutting will be of relatively short duration and occur at noise levels not considered to cause physical harm to sea turtles. Coupled with mitigation measures to reduce the likelihood of sea turtles being in the severance area, the significance of nonexplosive cutting impacts on sea turtles is considered negligible to minor.

Discharges will occur from the use of vessels and small releases of the pipeline contents during cutting of the pipelines. Environmental risk is considered low, and the potential impacts are considered negligible. Sea turtles are visual feeders and may be expected to avoid the resultant sediment plume during pipeline removal and sea floor clearing. Impacts such as disruption of feeding would be short term, localized, and likely to affect very few individuals. Overall, impacts would be negligible. Entanglement of sea turtles with anchor and mooring lines from work vessels is possible during all stages of decommissioning.

Impact-producing factors potentially affecting sea turtles during the disposal phase include vessel noise and vessel strikes, and entanglement if trawling occurs. The removal of the platforms and pipelines would potentially result in the loss of forage habitat. Following platform and pipeline removal, trawling without a turtle excluder device installed could be conducted in support of final site-clearance and verification activities. The clearance area must include 100% of a 402-m (1,320-ft) radius surrounding the center of the platform location. If trawling is used, there could be further impact on sea turtle foraging habitat and risk of entanglement and drowning. This would be a negligible concern compared to potential impacts that occur from trawling used by commercial fishing. The removal of the platforms and associated facilities would restore the natural habitat, reversing the artificial reef effect (Birchenough and Degraer 2020). Once disposal is complete, few if any vessel trips to the platform area are expected. If platform components are shipped to the GOM, the vessel(s) used would transit areas in the Pacific Ocean, Caribbean Sea (Atlantic Ocean), and GOM where sea turtles are more numerous. However, vessel noise and risk of potential ship collisions with sea turtles would be limited compared to noise and collision risks associated with existing ship traffic in these areas. Overall, all impacts on sea turtles from platform and pipeline disposal would be negligible, except for forage habitat loss, which would be a localized negligible-to-minor impact, and vessel impacts that are expected to be negligible to minor.

Sub-alternative 1a. Sea turtles associate with offshore platforms, and there is evidence of resident turtles at platforms. Therefore, explosive removal of offshore O&G structures can impact sea turtles (Gitschlag and Renaud 1989). As summarized by Viada et al. (2008), explosive removal impacts on sea turtles may range from non-injurious effects (e.g., acoustic annoyance; mild tactile detection or physical discomfort) to varying levels of injury (i.e., non-lethal and lethal injuries). These impacts would not occur under Alternative 1, which uses non-explosive severance. Noise exposure can result in a loss of hearing sensitivity, termed a threshold shift. If hearing returns to normal after some quiet time, the effect is a temporary threshold shift (TTS); otherwise, it is a permanent threshold shift (PTS). A TTS is considered auditory fatigue, whereas a PTS is considered injury (Erbe 2012). Noise exposure criteria for the protection of marine biota are based on TTS and PTS thresholds (NMFS 2018; Southall et al. 2019) and are presented in Appendix D. The TTS onset threshold for sea turtles exposed to impulsive noise is 226 dB re 1 µPa SPL peak, while the PTS onset threshold is 232 dB re 1 µPa SPL peak (U.S. Department of the Navy 2022).

Conducting a visual census to determine that sea turtles are >915-m (3000-ft) away has been effective in preventing most sea turtle deaths and serious injuries (CSA 2004). While mitigation measures appear to be effective in preventing death or injury of sea turtles, it is uncertain to what extent sublethal effects may be occurring (Viada et al. 2008). As the use of explosives will be of relatively short duration and mitigation measures will reduce the potential impact, the significance of the impact on sea turtles is considered minor. Mitigation measures are summarized in Table 4.1-3 and include the use of PSOs to monitor for the presence of sea turtles prior to detonation.

4.2.6.2 Alternative 2

The potential impacting factors and associated impacts for the pre-severance phase for sea turtles would be equivalent to Alternative 1 (Section 4.2.10.1). Impacts on sea turtles would be negligible except for vessel strikes that would be considered minor.

The potential impacting factors for the severance phase for sea turtles would be similar to Alternative 1 (Section 4.2.10.1). However, as only the topside superstructure and upper portion of the jacket to a depth of at least 26 m (85 ft) below the sea surface would be removed, the potential impacts related to vessel operations, platform severance, and lighting would be less than for Alternative 1. It is not expected that explosives would be used for removal of the upper portion of the jacket. Impacts from non-explosive severance of the upper portion of the jacket would be minor. Impacts associated with shell mound removal would not occur. The pipelines would be flushed of contaminants, sealed, and then left in place on the seafloor in federal waters, with negligible impacts on sea turtles. Therefore, impacts on sea turtles would be negligible to minor, as described for Alternative 1.

Impacting factors potentially affecting sea turtles during the disposal phase include vessel noise and vessel strikes related to the transport the topside superstructure and upper 26 m (85 ft) of the jacket for land disposal. The remaining portion of the jacket, shell mound, and pipeline would continue to provide potential forage habitat. If components are transported to GOM for disposal, impacts on sea turtles would be negligible, as described for Alternative 1.

There are no quantitative estimates of the extent to which platforms contribute to the total amount of "reef" habitat in the Pacific OCS region (Carr et al. 2003). Estimates based on the general amount of hard substrate in shallower regions of the Santa Barbara Channel, including the Santa Barbara Channel Islands, lead to the conclusion that this contribution may be very small (Holbrook et al. 2000; Helvey 2002). However, many years of observations imply that rocky outcrops offshore California are relatively scarce below about 45.7 m (150 ft) in the areas where platforms occur (Schroeder and Love 2004, Scarborough Bull et al. 2008). Thus, deeper-water platforms may provide considerable local hard structure. In addition, there are few natural reefs that rise as abruptly as platforms and no reefs in any region with the physical vertical relief comparable to these structures. As such, the offshore platforms as artificial habitats are unique (Carr et al. 2003) and could provide foraging habitat for loggerhead (*Caretta caretta*) and olive ridley sea turtles.

The long-term ecological implications from leaving a pipeline on the seabed are unknown, as the ecotoxicological effects on biological organisms are still largely unknown (MacIntosh et al. 2021). However, these volumes will be small and pipeline degradation occurs over a long period (between 100–500 years). Therefore, concentrations are not likely to rise significantly above background levels or result in long-term toxicity to marine organisms or populations. There is potential for negligible quantities of materials such as O&G to be discharged to sea where the pipeline is cut. These releases are not likely to result in any significant impacts on the marine environment (ConocoPhillips 2015).

Overall, most impacts on sea turtles from platform and pipeline disposal would be negligible, except for vessel strikes that could be minor. Forage habitat provided by all but removed portions of the jacket, would be mostly maintained. The forage habitat that is lost is considered a negligible impact.

Sub-alternative 2a. Use of explosive severance under Sub-alternative 2a would present the possibility of injury and death from explosive shock waves that would not occur under Alternative 2. Such risks would be reduced compared to Sub-alternative 1a, due to fewer underwater severances required for partial removal of platform jackets under Sub-alternative 2a.

4.2.6.3 Alternative 3

The potential impacting factors and associated impacts for the pre-severance phase for sea turtles would be equivalent to those under Alternative 2. Impacts on sea turtles would be negligible except for vessel strikes that would be considered minor.

The potential impacting factors for the severance phase for sea turtles would differ to some extent from Alternative 2, largely depending upon the choice of reefing method (tow-and-place, topple-in-place, or partial removal). The impacts from tow-and-place and topple-in-place would be somewhat similar to the non-explosive method described for Alternative 1, whereas impacts for partial removal would be somewhat similar to those for Alternative 2. Impacts on sea turtles would be negligible to minor, as described for Alternative 1.

Impacting factors potentially affecting sea turtles during the disposal phase include vessel noise and vessel strikes related to the transport of the topside superstructure land disposal and, to a lesser extent, if the jacket is reefed at a location other than at the platform site. The shell mound and pipeline could continue to provide potential forage habitat, particularly for some loggerhead and olive ridley (*Lepidochelys olivacea*) sea turtle species. No components will be transported to the GOM for disposal. Impacts from vessel noise would be negligible, while vessel strike impacts would be minor.

The potential impacting factors for the disposal phase for sea turtles would differ from those of Alternative 2 in that there would be no land disposal of the top 26 m (85 ft) of the jacket. Thus, vessel noise and, potentially, vessel strikes would be less than under Alternative 2, especially if the jacket top is toppled in place, as fewer vessel trips and/or shorter vessel trips would occur compared to land disposal. The shell mound and pipeline would continue to provide potential forage habitat. Similar habitat would develop for the reefed portion of the jacket regardless of which method of reefing is used.

Overall, most impacts on sea turtles would be negligible, except for vessel strikes that could be minor. The entire jacket, regardless of reefing method used, would provide potential foraging habitat for sea turtles. The forage habitat that is maintained or increased is considered a localized negligible to minor beneficial impact.

Sub-alternative 3a. Use of explosive severance under Sub-alternative 3a would present the possibility of injury and death from explosive shock waves that would not occur under Alternative 3. Such risks would be reduced compared to Sub-alternative 1a, due to fewer underwater severances required for partial removal or toppling of platform jackets under Sub-alternative 3a, and similar to those under Sub-alternative 2a.

4.2.6.4 Alternative 4

Under Alternative 4, there would be no acceptance or authorization of decommissioning applications. As no pre-severance, severance, or disposal activities would be undertaken, no decommissioning-related impacts are expected to sea turtles. Platforms would remain in place, but no O&G production activities would be occurring. Some sea turtles could continue to use the underwater portions of the platform and pipeline as foraging habitat (Schroeder and Love 2004). This could increase as workers would seldom occur on the platform. Vessel trips to the platform would be greatly reduced, so noise disturbance and the potential for vessel strikes would decrease. None of the potential decommissioning impacts identified for Alternatives 1, 2, or 3 would occur under Alternative 4. The overall impacts on sea turtles under Alternatives 4 would be negligible for all activities, with a possible exception of a vessel strike, which would be considered a minor impact.

4.2.6.5 Cumulative Impacts

Impacts on sea turtles from any of the decommissioning alternatives would be added to the cumulative impacts that are occurring within both the project area and at a more regional or global scale. Activities that could overlap with platform decommissioning include ongoing O&G production at other platforms, including the potential for accidental oil spills related to their continued operation, and other platform decommissioning projects.

Cumulative impacts on sea turtles include bycatch in commercial and recreational fishing gear, entanglement, and injury/death from fishing gear; dredging; marine debris; environmental contamination; disease; loss or degradation of nesting habitat; artificial lighting; non-native vegetation; illegal harvest of turtles and eggs; vessel strikes; increased exposure to biotoxins (e.g., brevetoxins and domoic acid); predators; *Karenia brevis* blooms (red tides); military readiness activities; storm events; and climate change (Byrnes and Dunn 2020, Griffin et al. 2007; Shigenaka et al. 2021; U.S. Department of the Navy 2022). In addition to vessel strikes, ship operations can contribute to chemical environmental impacts resulting from operational and accidental discharges of hydrocarbons (i.e., fuels and oils), antifouling applications, human waste (e.g., sewage effluent), and trace metals. Ships can also introduce invasive alien (non-native) species, and along with associated onshore infrastructure, contribute to light pollution (Byrnes and Dunn 2020). Shigenaka et al. (2021) and Stacy et al. (2019) provide detailed overviews of the adverse effects of oil on sea turtles.

Any of the cumulative impacts listed above can have a moderate to major impact on sea turtles. For example, reported strandings of sea turtles coincident with individual harmful algal blooms events have numbered in the tens to hundreds of animals (Shigenaka et al. 2021). Bycatch of sea turtles is perhaps the most pervasive and important threat to sea turtle populations globally (Shigenaka et al. 2021) and occurs in the California large-mesh drift gillnet fishery. Between 1990 and 2018, this totaled 7 olive ridley sea turtles, 160 leatherback sea turtles (*Dermochelys coriacea*), 7 green sea turtles, and over 120 loggerhead sea turtles (Carretta 2020). Sea turtle species have been reported to have been struck by vessels worldwide. Reported vessel strikes are a rare event (i.e., reported for a limited number of locations with fewer than three reports in total) for the olive ridley sea turtle; frequent locally (i.e., reported as a common cause of mortality within specific areas of overall distribution) for the leatherback sea turtle; and frequent scattered (i.e., reported throughout distribution range) for the loggerhead and green sea turtles (Schoeman et al. 2020).

Potential climate change effects on sea turtles include increasing feminization (which could lead to population-level effects), beach erosion or loss (e.g., due to sea-level rise), altering dispersal and food availability (e.g., oceanic current changes are likely to affect the abundance and distribution of prey species), and causing cold-stunning strandings (Blechschmidt et al. 2020; Fish et al. 2005; Fuentes et al. 2009; Griffin et al. 2019; Jensen et al. 2018; Mast et al. 2009; Shigenaka et al. 2021; Veelenturf et al. 2020).

As the localized impacts of the decommissioning alternatives on sea turtles are negligible to minor, the decommissioning of the oil platforms would have a negligible contribution to the adverse cumulative impacts on sea turtles on a regional to global scale.

4.2.7 Marine and Coastal Birds

The IPFs that could affect marine and coastal birds during decommissioning are presented in Table 4.1-1 and include noise from vessels and equipment used in severance and removal activities, platform and vessel lighting, loss of platform-based habitat, and vessel and platform spills and discharges. Mitigation measures for relevant IPFs are presented in Table 4.1-3 and the definitions of impact levels are presented in Table 4.1-4.

4.2.7.1 Alternative 1

IPFs potentially affecting marine and coastal birds during the pre-severance phase would be vessel and helicopter noise and presence, lighting in the platform area, and water quality degradation from discharges or accidental spills from vessels or platform removal preparation, including direct oiling and fouling of birds.

Reactions of marine birds to vessels and aircraft can depend on the species involved (Rojek et al. 2007), the increase in sound level above background (Brown 1990), and previous exposure levels (habituation), as well the location, altitude, frequency of flights, and type of aircraft (Hoang 2013). Both noise, and to a lesser extent, visual detection, can induce behavioral responses in birds (Brown 1990; Acosta et al. 2010). Disturbance effects on birds from aircraft or approaching vessels may range from scanning and/or alert behavior to more obvious escape reactions/flushing behaviors, the latter of which could have physiological and ecological effects (e.g., increase in energy expenditure, lower food intake) and result in temporary loss of usable habitat and/or altered flight/migration patterns (Brown 1990; Komenda-Zehnder et al. 2003; Wright et al. 2007). Increased frequency and duration of flushing responses of birds because of boating activities may lead to reduced breeding success and negative survival consequences (Byrnes and Dunn 2020); however, this is not anticipated to be an issue from pre-severance activities, as vessel traffic would be an inconsequential addition to the vessel traffic that occurs in the Santa Barbara Channel. In addition, vessel and aircraft traffic to and from a platform being decommissioned would generally not occur near major breeding locations for seabirds or migratory and wintering locations for shorebirds.

Because of the transitory nature of vessel and helicopter traffic, and the mobility of marine birds, it is unlikely that marine birds will be adversely affected by vessel and helicopter traffic. Although support vessel and helicopter traffic may elicit an avoidance response in birds present along the ship and helicopter routes, any such disturbance would be occasional and transient, and any resultant impacts would be negligible.

Nighttime lighting of offshore structures and vessels may cause disorientation, mortality from collisions with lighted structures, and interruption of natural behaviors (BOEM and BSEE 2017; BOEM 2020; Davis et al. 2017; Ronconi et al. 2015). Similarly, light entrapment may negatively affect breeding seabirds by increasing their time away from their nests, leaving the nests vulnerable to predation for longer periods of time, as well as causing parent-chick separation of at-sea birds. In addition, time and energy spent circling lights may impede a bird’s ability to successfully forage for enough food to feed their young (BOEM 2020). Attraction of night-flying birds to artificial lighting can result in possible injury or mortality through strikes, stranding, disorientation, increased energy expenditure, and predation (Russell 2005; Wiese et al. 2001). Conversely, peregrine falcons (*Falco peregrinus*) take advantage of the platform lighting to hunt at night (Johnson et al. 2011; Hamer et al. 2014).

Since the southern California coastline is part of the Pacific Flyway, the potential for bird collisions with platforms exists (Bernstein et al. 2010). However, there has been no indication that platform lighting has significantly affected any seabird species or other migrating birds at the POCS platforms (Johnson et al. 2011; BOEM 2020). Johnson et al. (2011) summarized the reasons why light entrapment at POCS platforms is relatively rare compared to those in the GOM and North Sea, which are the result of significantly different environmental conditions and location of the migratory flyways. The migratory flyways for most seabirds are primarily located farther offshore than the POCS platforms, while the passerines flyways are located inshore of the

POCS platforms. The geography of the Santa Barbara region differs from that of the GOM or North Sea; for the latter areas, migrating birds in the Santa Barbara area are not forced to fly over large bodies of water from land mass to land mass without topographic relief mid-journey, as occurs in the GOM and North Sea. Finally, the meteorological conditions necessary to support the attraction, disorientation, and entrapment of migrating birds as observed in the GOM and North Sea only rarely occur in the POCS during the fall and spring migration periods.

Hamer et al. (2014) conducted nocturnal bird surveys at the Hermosa and Grace platforms, primarily aimed at determining if platform lighting influenced ashy storm-petrels (*Hydrobates homochroa*) and Scripps's murrelets (*Synthliboramphus scrippsi*). Neither species were observed to fly into the platform lights nor were any grounded individuals found on either of the platforms. During the spring and fall nocturnal migration periods, there were nights with hundreds or thousands of migrating birds, including many migrating shorebirds and waterfowl, detected by radar flying toward and over the platforms but did not get entrapped by the platform lighting (Hamer et al. 2014). Visual observations did not record many birds being attracted to platform lights (other than western gulls [*Larus occidentalis*]). However, the total adjusted rate of 1.28 light-attracted and grounded birds detected per night during fall at Platform Hermosa indicates that light attraction of birds at oil platforms in the POCS may be a persistent problem (Hamer et al. 2014). While no birds were detected on Platform Grace (exhibiting attraction to the platform lights), passerines were heard calling while transiting above the platform on multiple occasions during the spring survey sessions. These observations, along with the small flock of kingbirds seen on the platform during the spring, suggest that both land- and waterbird migration takes place over the platforms in the Santa Barbara Channel, and that oil platforms may offer over-water rest stops for some of these species. The abundance of moths and their attraction to the platform lights may also offer a food source for some of the migrating birds (Hamer et al. 2014).

Potential lighting effects on marine and coastal birds, particularly during the pre-severance phase, would be similar to those that occur during platform operations. Based on the information described above, impacts of lighting on marine and coastal birds would be negligible to minor.

Spillage of lubricating oils, hydraulic fluids, waste oils or other contaminants on a vessel or platform could result in their release to the marine environment. The adverse effects of petroleum exposure to birds have been recently reviewed by King et al. (2021). The platform and work vessels maintain oil spill response plans and would have spill containment and cleanup equipment on board in the event of local deck spills. Incidental spillage of lubricating oil, hydraulic fluids, and waste oil is expected to result in a minor impact on the marine environment due to the small volume of such spills, the onsite oil spill response capability, and other spill response resources in the immediate area. Due to the short Project timeframe, lack of a source for a large oil spill, and capability of an oil spill removal organization (OSRO) response to a spill of any size, no impacts from oil spills are expected, and oil spills are not further analyzed regarding impacts on marine and coastal birds. Birds may be entangled with or ingest debris that may intentionally or accidentally fall off the platform or a vessel during platform preparation. Overall, the impacts on marine and coastal birds would be negligible.

Impacting factors potentially affecting marine and coastal birds during the severance phase include noise from vessels, platform removal, and pipeline and cable removal; and, to a lesser extent, lighting in the platform area. Vessel traffic and helicopter flights would continue to convey workers and inspectors during the severance phase. However, because both the number and frequency of supply vessel traffic and helicopter flights would be greatly reduced compared to the levels that occurred during production operations, impact on marine and coastal birds would be negligible. Also, the additional equipment (e.g., vessels and cranes) needed during severance could increase flight hazards and interfere with roosting and foraging at the platform. Discharges to sea would occur from the use of vessels and small releases of the pipeline contents to sea during cutting of the pipelines. Also, small unplanned releases of fuel, hydraulic oil, lubricants, or chemicals may occur during decommissioning activities.

Severance (especially the removal of the topside superstructure) will remove the use of the platform by marine and coastal birds. For example, bird surveys from six platforms (Edith, Gina, Gail, Habitat, Hermosa, and Irene) revealed that a variety of both land- and seabirds occur in proximity to and occasionally perching on POCS platforms. POCS platforms provide primarily a temporary and opportunistic refuge for birds (Johnson et al. 2011). A few seabird species, notably brown pelicans (*Pelecanus occidentalis*), double-crested cormorants (*Nannopterum auritum*), and western gulls, were observed habitually using the substructure of a platform for nighttime roosting. Occurrence of migratory land birds on or near the structures was less frequent and episodic. Mixed flocks of passerines were observed on a few occasions on Platforms Edith and Irene during daylight. The presence of passerines at the platforms appears to be random and not influenced by physical characteristics of the structure or its location (Johnson et al. 2011). Below the water surface, the gas and oil platforms provided structure and habitat for various invertebrate and fish communities. Consequently, areas beneath and around the platforms provide foraging habitat for gulls, brown pelicans, and cormorants (Orr et al. 2017).

The POCS platforms also provide roosting and hunting habitats for Peregrine Falcons (Johnson et al. 2011, Hamer et al. 2014). This has observed on many platforms in the GOM (Russell 2005). An examination of peregrine prey remains collected on Platform Gina revealed a highly varied diet consisting of both land- and seabirds. (Johnson et al. 2011). Peregrine falcons were observed hunting at night on Platform Gina. Nighttime hunting by peregrine falcons is an unusual adaptation that is rarely reported in the literature (DeCandido and Allen 2006). Hamer et al. (2014) has suggested that oil platforms within the POCS provide important stopover sites for burrowing owls (*Athene cunicularia*) dispersing from the mainland to the Channel Islands (Hamer et al. 2014).

Nonexplosive cutting methods do not create the impulse and shockwave-induced effects that accompany explosive detonation and are therefore considered to be an ecological and environmentally sensitive severance method. The noise level of the supersonic cutting jet is not considered harmful to marine life (Kaiser et al. 2004).

Overall impacts on marine and coastal birds from severance activities would be negligible, except for the removal of the topside superstructure. This would be a negligible to minor adverse impact for birds that use the superstructure for habitat. Conversely, topside superstructure severance would result in a negligible to minor beneficial impact by reducing collisions and, for species such as phalaropes and Scripps's Murrelets, by removing Peregrine Falcon hunting from platforms.

Impacting factors potentially affecting marine and coastal birds during the disposal phase include vessel and helicopter noise, and to a lesser extent, vessel lighting. These would have a negligible impact on marine and coastal birds. Shipping components to the GOM would have a negligible impact on marine and coastal birds.

Sub-alternative 1a. Impacts from the use of explosive severance for sectioning jackets and removing conductors are not anticipated to impact seabirds other than by possible harassment from explosive noise. To be killed or injured from explosives, a bird would have to be submerged when the explosion occurs. Decommissioning activities at the platform immediately preceding an explosive severance event would likely preclude the occurrence of marine birds in the water around the platform. Seabirds that may be impacted are grebes, loons, shearwaters, scoters, cormorants, and alcids; however, many of these species remain close to shore and would not be affected. Gulls may be attracted to fish killed by the explosions but would not be affected as they feed on the surface after any explosions have occurred. Shorebirds, marsh birds, and waterfowl would not be affected (AEG 2005). Harassment from continuous noise and activities would be reduced compared to Alternative 1 due to reduced work schedules using explosive severance.

4.2.7.2 Alternative 2

The potential impacting factors and associated impacts for the pre-severance phase under Alternative 2 would be equivalent to those under Alternative 1. Impacts would be negligible for the most part, while lighting effects would be negligible to minor.

The potential impacting factors for the severance phase for marine and coastal birds would be equivalent to Alternative 1. However, as only the topside structure and upper portion of the jacket to a depth of at least 26 m (85 ft) below the sea surface would be removed, the potential impacts related to vessel operations, platform removals, and lighting would be shorter in duration than for Alternative 1 because equipment will be on site for a shorter period.

The potential impacting factors for the severance phase for marine and coastal birds would be equivalent to those under Alternative 1. These would have a negligible impact on marine and coastal birds.

Sub-alternative 2a. Use of explosive severance under Sub-alternative 2a would result in impacts on diving seabirds that would not occur under Alternative 2 using non-explosive severance. However, harassment of marine and coastal birds from continuous noise and work activities under Sub-alternative 2a would be less than under Alternative 2 due to shortened work schedules using explosive severance.

4.2.7.3 Alternative 3

The potential impacting factors and associated impacts for marine and coastal birds would be equivalent to those under Alternative 2. Impacts would be negligible for the most part, while lighting effects would be negligible to minor.

Sub-alternative 3a. Use of explosive severance under Sub-alternative 3a could result in impacts on diving seabirds that would not occur under Alternative 3 using non-explosive severance. However, harassment of marine and coastal birds from continuous noise and work activities under Sub-alternative 3a would be less than under Alternative 3 due to shortened work schedules using explosive severance, while impacts would be similar to those under Sub-alternative 2a.

4.2.7.4 Alternative 4

Under Alternative 4, there would be no acceptance or authorization of decommissioning applications. As there would be no pre-severance, severance, or disposal activities, no decommissioning-related impacts are expected to marine and coastal birds. Platforms would remain in place, but no O&G production activities would be occurring. Marine and coastal birds could continue to use the topside superstructure as resting, foraging, and, to a lesser extent, nesting habitat, and this could increase as humans would seldom occur on the platform. Lighting would not be as intense as during platform operations, so the negative impacts associated with platform lighting would be much less. In contrast, Peregrine Falcon hunting at night, a benefit, may decrease. As the number of vessel trips to the platform would be greatly reduced, disturbance of birds using the platforms by vessel noise would also decrease. Because decommissioning would need to occur at some time, any impacts that would occur under any of the action alternatives would still occur, only at a later point in time. Thus, overall impacts on marine and coastal birds under Alternative 4 would be negligible to minor.

4.2.7.5 Cumulative Impacts

Under Alternative 1, impacts on marine and coastal birds would be added to the cumulative impacts that are occurring within both the project area and at a more regional or global scale. Activities that could overlap with platform decommissioning include ongoing O&G production at other platforms, including the potential for accidental oil spills related to their continued operation, and other platform decommissioning projects. Cumulative impacts on marine and coastal birds include bycatch in commercial and recreational fishing gear, entanglement, and injury/death from fishing gear; marine debris; environmental contamination; disease; loss or degradation of nesting habitat (e.g., from beach erosion); artificial lighting; non-native vegetation; increased exposure to biotoxins (e.g., brevetoxins and domoic acid); predators; red tides; ecotourism; disturbance by people and dogs; competition with or predation by gulls; aquaculture; military readiness activities; storm events; and climate change (BirdLife International 2018a–e, 2020a–d; Byrnes and Dunn 2020; Ellis et al. 2013; Lance 2014; Moriarty et al. 2021; Shuford and Gardali 2008; U.S. Department of the Navy 2022).

In addition to noise impacts for Alternative 1, project and non-project related vessel operations, including accidental events, can contribute to chemical environmental impacts resulting from operational and accidental discharges of hydrocarbons (i.e., fuels and oils), antifouling applications, human waste (e.g., sewage effluent), and trace metals. Vessel operations can also introduce alien (non-native) species. Vessels and associated onshore infrastructure also contribute to light pollution (Byrnes and Dunn 2020).

Any of the cumulative impacts listed above can have a moderate to major impact on marine and coastal birds. For example, bycatch of marine birds occurs in the California large-mesh drift gillnet fishery. This included over 200 northern fulmars (*Fulmarus glacialis*) between 1990 and 2018 (Carretta 2020). During the winter of 2014/2015, thousands of Cassin's auklets (*Ptychoramphus aleuticus*) were found dead on beaches from California to British Columbia, Canada, due to wide-scale starvation resulting from a change in food quality associated with warmer ocean temperatures (marine heatwave). More frequent and intense ocean warming events may have complex impacts on food webs, with population consequences for marine seabirds such as Cassin's auklets. Climate change has exacerbated the occurrence of marine heatwaves. As the world's oceans continue to warm due to climate change, it is likely that marine heatwaves will increase in frequency, magnitude, and duration, raising the likelihood of more frequent mass mortality events and correspondingly rapid changes to marine ecosystem structure and functionality (Jones et al. 2018).

As the localized impacts of decommissioning under Alternative 1 on marine and coastal birds are negligible to minor, this alternative would have a negligible contribution to the adverse cumulative impacts on marine and coastal birds on a regional to global scale.

4.2.8 Marine Mammals

The IPFs potentially affecting marine mammals during platform decommissioning are presented in Table 4.1-1 and include vessel strikes and vessel noise and may be incurred during all phases of decommissioning, turbidity from seafloor disturbance, loss of platform-based habitat, and impacts from vessel and platform discharges and spills. 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 when a vessel is large (i.e., 80 m [262.5 ft] 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 whale [*Physeter macrocephalus*], gray whale [*Eschrichtius robustus*]) 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 power 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 POCS platforms (AEG 2005). Mitigation measures for relevant IPFs are presented in Table 4.1-3 and the definitions of impact levels are presented in Table 4.1-4.

Impacts from noise pose a more serious threat to marine mammals. Non-impulsive noise, such as that generated by vessel traffic and mechanical severance methods, may result in a variety of behavioral responses. Impulsive noise from explosive severance may also induce behavioral responses but may also result in injury of death in marine mammals. The following provides an overview of noise impacts on marine mammals (see Section 4.2.2 for a more detailed discussion of likely sound levels that could be associated with platform decommissioning).

Noise exposure can result in a loss of hearing sensitivity, termed a threshold shift. If hearing returns to normal after some quiet time, the effect is a TTS; otherwise, it is a PTS. A TTS is considered auditory fatigue, whereas a PTS is considered injury (Erbe 2012). Noise exposure criteria for the protection of marine biota are based on TTS and PTS thresholds (NMFS 2018, Southall et al. 2019). Exceedances of these thresholds are thought to have very similar effects on marine mammals, including the auditory masking of prey and a subsequent reduction in foraging efficiency; masking of species-specific vocalizations, which affects reproductive behaviors and social cohesion; and the masking of predators (Weilgart 2007). Table 4.2.8-1 presents the TTS and PTS onset thresholds for marine mammals exposed to non-impulsive noise, as would be generated by vessel traffic and mechanical severance methods.

TABLE 4.2.8-1 TTS- and PTS-Onset Thresholds for Marine Mammals Exposed to Non-impulsive Noise[a]

Marine Mammal Hearing Group	TTS onset: SEL (weighted)[b]	PTS onset: SEL (weighted)[b]
Low-Frequency Cetacean Hearing Group (all mysticetes)	179	199
High-Frequency Cetacean Hearing Group (most delphinid species such as bottlenose dolphins [*Tursiops truncatus*], common dolphins [*Delphinus delphis*], and short-finned pilot whales [*Globicephala macrorhynchus*]; mesoplodont beaked whales [*Mesoplodon* spp.]; sperm whales [*Physeter macrocephalus*]; and killer whales [*Orcinus orca*])	178	198
Very High-Frequency Cetacean Hearing Group (the true porpoises and pygmy sperm whales [*Kogia breviceps*])	153	173
Phocid Carnivores in Water Hearing Group (all the true seals, including harbor seal [*Phoca vitulina richardii*] and Northern elephant seal [*Mirounga angustirostris*])	181	201
Other Marine Carnivores in Water Hearing Group (all non-phocid marine carnivores, including the California sea lion [*Zalophus californianus californianus*], Guadalupe fur seal [*Arctocephalus townsendi*], Northern fur seal [*Callorhinus ursinus*], Steller sea lion [*Eumetopias jubatus*], and Southern sea otter [*Enhydra lutris nereis*])	199	219
Phocid Carnivores in Air Hearing Group (all the true seals, including harbor seal and Northern elephant seal)	134	154
Other Marine Carnivores in Air Hearing Group (all non-phocid marine carnivores, including the California sea lion, Guadalupe fur seal, Northern fur seal, Steller sea lion, and Southern sea otter)	157	177

[a] Source: Southall et al. 2019.

[b] Sound exposure level (SEL) thresholds in dB re 1 $\mu Pa^2 s$ underwater and dB re $(20\ \mu Pa)^2 s$ in air.

Behavioral changes (e.g., avoidance, changes in swimming speeds and direction, changes in foraging) in marine mammals can also occur at non-impulsive noise levels below those that cause TTS (Erbe et al. 2019; Kassamali-Fox et al. 2020; Silber et al. 2021; Weilgart 2007). 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 (Erbe et al. 2019; Joy et al. 2019; Silber et al. 2021; Blair et al. 2016; Kassamali-Fox et al. 2020).

Mechanical cutting noise generally falls within the 500 Hz to 8 kHz frequency bands, with most of the energy at 1 kHz (BOEM 2020). These noise levels are within the hearing range of all marine mammals (Ghoul and Reichmuth 2014; NMFS 2018; Southall et al. 2019; USFWS 2021a). However, underwater sound measured radiating from a diamond wire cutting operation was found to not be easily discernible above background noise (Pangerc et al. 2016), and broadband source levels have been reported to be unlikely to cause physiological impacts on marine mammals (McCauley et al. 2000).

Impacts from impulsive noise, such as what would be generated using explosives, can range from disturbance (e.g., behavioral changes) to auditory effects (i.e., TTS or PTS) to injury or death to marine mammals depending on the species exposed and its distance from a blast (Brand 2021). Marine mammals are at greatest risk of injury the closer they are to the source, and when they are at the same depth as, or slightly above, the explosion (Chapman 1985; Keevin and Hempen 1997). At the same exposure level, smaller marine mammals tend to be more susceptible to blast injury than are larger animals (Baker 2008). Table 4.2.8-2 presents the TTS and PTS onset thresholds for marine mammals exposed to impulsive noise, such as those that may be generated during use of explosive severance methods.

TABLE 4.2.8-2 TTS- and PTS-Onset Thresholds for Marine Mammals Exposed to Impulsive Noise[a]

Marine Mammal Hearing Group	TTS Onset: SEL (weighted)[b]	TTS Onset: Peak SPL (unweighted)[b]	PTS Onset: SEL (weighted)[b]	PTS Onset: Peak SPL (unweighted)[b]
Low-Frequency Cetacean Hearing Group (all mysticetes)	168	213	183	219
High-Frequency Cetacean Hearing Group (most delphinid species such as bottlenose dolphins [*Tursiops truncatus*], common dolphins [*Delphinus delphis*], and short-finned pilot whales [*Globicephala macrorhynchus*]; mesoplodont beaked whales [*Mesoplodon* spp.]; sperm whales [*Physeter macrocephalus*]; and killer whales [*Orcinus orca*])	170	224	185	230
Very High-Frequency Cetacean Hearing Group (the true porpoises and pygmy sperm whales [*Kogia breviceps*])	140	196	155	202
Phocid Carnivores in Water Hearing Group (all the true seals, including harbor seal [*Phoca vitulina richardii*] and Northern elephant seal [*Mirounga angustirostris*])	170	212	185	218

TABLE 4.2.8-2 (Cont.)

Marine Mammal Hearing Group	TTS Onset: SEL (weighted)[b]	TTS Onset: Peak SPL (unweighted)[b]	PTS Onset: SEL (weighted)[b]	PTS Onset: Peak SPL (unweighted)[b]
Other Marine Carnivores in Water Hearing Group (all non-phocid marine carnivores, including the California sea lion [*Zalophus californianus californianus*], Guadalupe fur seal [*Arctocephalus townsendi*], Northern fur seal [*Callorhinus ursinus*], Steller sea lion [*Eumetopias jubatus*], and Southern sea otter [*Enhydra lutris nereis*])	188	226	203	232
Phocid Carnivores in Air Hearing Group (all the true seals, including harbor seal and Northern elephant seal)	123	155	138	161
Other Marine Carnivores in Air Hearing Group (all non-phocid marine carnivores, including the California sea lion, Guadalupe fur seal, Northern fur seal, Steller sea lion, and Southern sea otter)	146	170	161	176

[a] Source: Southall et al. (2019).

[b] Sound exposure level (SEL) thresholds in dB re 1 μPa^{2}s underwater and dB re (20 μPa)^{2}s in air; and peak sound pressure level (SPL) thresholds in dB re 1 μPa underwater and dB re 20 μPa in air.

4.2.8.1 Alternative 1

During pre-severance activities, marine mammals may be affected by vessel strikes and conductor removal and vessel noise. In addition, haul-out use of the platform by pinnipeds (Orr et al. 2017), particularly the California sea lion (*Zalophus californianus*) and Steller sea lion (*Eumetopias jubatus*), would probably be minimized or cease during pre-severance activities conducted to get the topside superstructure ready for severance. This is considered a negligible impact.

The low volume of pre-severance-related vessel traffic relative to existing commercial and recreational 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 and transient minor impact. As decommissioning will employ a relatively low number of slower-moving work vessels and barges traveling along a limited number of routes between ports and the platforms, the risk of a strike is also expected to be minor. Several mitigation measures are available to minimize the potential for vessel strikes (CSA Ocean Sciences Inc. 2021), including vessel speed restrictions, establishment of separation distances, and the use of on-board PSOs to monitor for the presence of marine mammals.

Abrasive cutting of conductors BML may generate continuous noise in water at a level of 147–189 dB re 1μPa @ 1 m (3.3 ft) in the 500–8000 Hz band, peaking at 1000 Hz. Noise levels are estimated to fall to 120 dB re 1μPa @ 1 m (3.3 ft), the estimated threshold of behavioral changes in marine mammals, within 100 m (328 ft). BSEE would require as mitigation measures the conduct of a visual clearance survey of a 300-m (984-ft) clearance zone before and after each conductor cutting to ensure that no ESA protected whales or turtles are present (BOEM 2021).

During the severance phase, marine mammals may be affected by noise associated with vessel traffic, platform removal, and pipeline and cable removal; by vessel strikes; and by increases in turbidity during seafloor disturbance. The potential impacts from vessel noise and strikes would be equivalent to those discussed for the pre-severance phase and are expected to be minor.

The main impact on marine mammals from severance activities is noise associated with jacket removal employing mechanical cutting, and especially by impulsive noise that would be associated with explosive cutting methods. The use of explosives could add the most significant amount of noise to the surrounding environment, although this would be a short-term event (Bernstein et al. 2010). Section 4.2.2 discusses potential noise levels that could be generated with explosive severance methods at the POCS platforms. Impacts of explosive severance are discussed below under Sub-alternative 1a.

Nonexplosive cutting methods do not create the impulse and shockwave-induced effects which accompany explosive detonation and are therefore considered to be an ecologically and environmentally sensitive severance method. In contrast to explosive severance methods, mechanical severance methods greatly reduce the potential for severe noise harm to marine mammals (Scarborough Bull and Love 2019). Cutting that takes place 4.6 m (15 ft) below the sediment line, may generate an equivalent in-water source level of 147 to 189 dB re 1 µPa @ 1 m (3.3 ft) (BOEM 2021; Kent et al. 2016). The continuous mechanical noise that the abrasive cutting tool generates is at an equivalent in-water source level of 147 dB re 1 µPa @1 m (3.3 ft). This sound level would be below the TTS threshold for all marine mammals except for true seals (Table 4.2.8-1). However, it is not expected that marine mammals would be in the immediate area due to the physical presence of equipment and workers.

When marine mammals are exposed to continuous noise, the sound threshold at which they are thought to exhibit behavioral changes is 120 dB re 1µPa @ 1 m (NMFS 2005). Because the cutting would be conducted 4.6 m (15 ft) below the sediment line, the higher frequencies would likely be quickly attenuated into the sediment, further reducing the amount of sound radiated into the water (BOEM 2020; BOEM 2021). It is expected that exceedance of this behavioral threshold by non-explosive cutting will be limited to < 100 m (330 ft) above the ocean's floor (BOEM 2020).

The topside superstructure provides haul-out habitat for pinnipeds such as the California sea lion and the Steller sea lion (Orr et al. 2017). The Pacific harbor seals (*Phoca vitulina*) have been on occasion seen in waters adjacent to some of the POCS platforms, but none were seen hauled out on the platforms (Orr et al. 2017). Marine mammals target both platforms and pipelines for foraging (Arnould et al. 2015; Todd et al. 2009, 2016; Russell et al. 2014; Orr et al. 2017; Clausen et al. 2021; Love et al. 2006; Delefosse et al. 2018). Loss of platform-based habitat (permanent removal of haul-out habitats) and potential foraging habitat provided by the jacket, shell mounds, and pipeline would be a negligible to minor impact.

IPFs potentially affecting marine mammals during the disposal phase include vessel noise and vessel strikes which could result in short-term adverse impacts. Once disposal is complete, few if any vessel trips to the platform area are expected. If platform components are shipped to the GOM, the vessel(s) utilized would transit areas in the Pacific Ocean, Caribbean Sea (Atlantic Ocean), and GOM where marine mammals also occur. However, vessel noise to and potential ship collision with marine mammals would be extremely remote in comparison to existing ship traffic in these areas. Overall, all impacts on marine mammals from platform and pipeline disposal would be negligible.

Sub-alternative 1a. If employed, the use of explosives for jacket severance could result in auditory injury to marine mammals or even death to individuals, even with the implementation of mitigation measures, but would not be expected to result in population-level effects. Mitigation measures may include visual monitoring by marine mammal observers, passive acoustic monitoring, pre-detonation search for marine mammals, and suspending operations when marine mammals are in the vicinity (Bernstein et al. 2010, JNCC 2010). If feasible, a mitigation measure that may also be considered is restricting the use of explosives to times of the year least likely to interfere with migrating whales. Also, if more than one explosive event would be used, consideration should be given to collecting and removing fish kills between blasts to avoid subsequent blast exposure to scavenging marine mammals.

Appendix D presents impact radius and take estimates for non-auditory injury (including mortality), auditory injury (PTS), and behavior injury (TTS) for marine mammals for explosive severance on the OCS using various quantities of explosives. Considering the seasonal presence of marine mammal species, for all baleen and endangered species, the estimated takes are 0.002 or less, while for almost all other species the estimated takes are 0.08 or less per explosive use for an explosive weight of 200 lbs in shallow water (50 m [164 ft]). Take estimates are reduced for explosive use in deeper waters. Take estimates are higher for common dolphin species and can be as high as 0.82 in some months, due to their high densities. Auditory take estimates for all baleen and endangered species are 0.02 or less, while for almost all other species the estimated takes are 0.03 or less. Again, the exceptions to this are the common dolphin species, with take estimates as high as 0.83 in some months, and the Dall and harbor porpoises, with take estimates of about 1.5 and 0.5, respectively. For the dolphins, this is due to their high densities, while for the porpoises it is due to the large radii for their thresholds. Lastly, estimated radii for behavior take are roughly double or triple of those for auditory injury, corresponding to a roughly four-to-nine-fold increase in the number of behavioral takes compared to equivalent auditory injury takes for the same species.

Mitigation measures for explosive severance are summarized in Table 4.1-3 and include the use of PSOs to monitor for the presence of marine mammals prior to detonation. Experience in the GOM, where roughly one hundred explosive severances have been conducted annually for decades (MMS 2005) has found that mitigation measures developed in consultation with NMFS have been effective in limiting impacts on marine protected species. Thus, impacts of use of explosive severance on the POCS are expected to be limited to a level of minor to moderate. A moderate level impact is indicated when some impacts may be irreversible, but the affected resource would recover completely if proper mitigation were applied once the impact producing factor ceases (Table 4.1-4).

4.2.8.2 Alternative 2

The potential impacting factors and associated impacts for the pre-severance phase for marine mammals would be equivalent those identified for Alternative 1. Impacts on marine mammals would be negligible except for vessel strikes that would be considered minor.

The potential impacting factors for the severance phase for marine mammals would be similar to those of Alternative 1. However, as only the topside structure and upper portion of the jacket would be removed, the potential impacts of structure removal would be of lesser magnitude and duration than under Alternative 1. Explosive severance methods would not be used for jacket severance. Impacts on marine mammals would be negligible except for vessel strikes that would be considered minor.

While haul-out habitat for some pinnipeds would be lost, the remaining portions of the jackets, shell mounds, and pipelines would continue to provide potential foraging habitat for some marine mammals.

In soft sediment areas, the pipeline would continue to serve as artificial habitats for fish (Lacey and Hayes 2020) and may indirectly support forage for marine mammals (Love and York 2005). For example, Arnould et al. (2015) investigated the influence of anthropogenic sea floor structures, including pipelines, on the foraging locations of Australian fur seals (*Arctocephalus pusillus doriferus*), and reported pipeline routes were the most visited and most influential structures associated with fur seal foraging locations despite such features having limited vertical scope and habitat.

The long-term ecological implications from leaving a pipeline on the seabed are unknown, as the ecotoxicological effects (e.g., from naturally occurring radioactive material [NORM] and other metal contaminants) on biological organisms are still largely unknown (MacIntosh et al. 2021). However, these volumes will be small and pipeline degradation occurs over a long period (between 100–500 years). Therefore, concentrations are not likely to rise significantly above background levels or result in long-term toxicity to marine organisms or populations. There is potential where the pipeline is cut for a negligible quantity of material be discharged to sea. These are not likely to result in any significant impacts on the marine environment (ConocoPhillips 2015).

Overall, most impacts on marine mammals from platform severance under Alternative 2 would be negligible, except for vessel strikes that could be minor and for the loss of haul-out habitat that would be negligible to minor. Forage habitat provided by all, but the top 26 m (85 ft) of the jacket, would be mostly maintained. The forage habitat that is lost is considered a negligible impact.

Impacting factors potentially affecting marine mammals during the disposal phase include vessel noise and, potential, vessel strikes related to the transport the platform topside and upper 26 m (85 ft) of the jacket for land disposal. Potential impacts during disposal under Alternative 2 would be similar those identified for Alternative 1, but of lesser magnitude and duration. Overall, impacts on marine mammals would be negligible except for vessel strikes that would be considered minor. If components are transported to GOM for disposal, impacts on marine mammals would be negligible, as described for Alternative 1.

Sub-alternative 2a. Use of explosive severance under Sub-alternative 2a would present the possibility of injury and death from explosive shock waves as described for Sub-alternative 1a that would not occur under Alternative 2 using non-explosive severance. Such risks would be reduced under Sub-alternative 2a compared to Sub-alternative 1a, due to far fewer underwater severances required for partial removal of platform jackets and conductors.

4.2.8.3 Alternative 3

The potential impacting factors and associated impacts for the pre-severance phase for marine mammals would be the same as identified for Alternative 2. Impacts on marine mammals would be negligible except for vessel strikes that would be considered minor.

The potential impacting factors for the severance phase for marine mammals would be the same as those identified for Alternative 2. All impacts on marine mammals would be negligible except for vessel strikes that would be considered minor.

Impacting factors potentially affecting marine mammals during disposal include vessel noise and vessel strikes related to the transport of the topside superstructure for land disposal and, to a lesser extent, to jacket transport to a rigs-to-reefs (RTR) site. Potential foraging habitat for some species may develop at the RTR sites regardless of which RTR method is used, thus resulting in a very localized positive benefit. No components would be possibly transported to the GOM for disposal. Overall, most impacts on marine mammals would be negligible, except for vessel strikes that could be minor.

Sub-alternative 3a. Use of explosive severance under Sub-alternative 3a would result in impacts on marine mammals that would not occur under Alternative 3 using non-explosive severance. Impacts would be similar to those under Sub-alternative 2a, since a similar number of jacket and conductor severances would be required under both sub-alternatives.

4.2.8.4 Alternative 4

Under Alternative 4, there would be no acceptance or authorization of decommissioning applications. As there would be no pre-severance, severance, or disposal activities undertaken, and no decommissioning-related impacts are expected to marine mammals. Platforms would remain in place, but no O&G production activities would be occurring. Some marine mammals would continue use the platform jackets, the shell mounds, and pipeline areas as foraging habitat, and pinnipeds would continue to use the topside superstructure as haul-out habitat, which increase as human activity would seldom occur on the platform. Vessel trips to the platform would be greatly reduced, so noise and potential vessel strikes would decrease. Vessel and helicopter traffic supporting platform safety inspections would continue at a much lower level than during O&G production operations; and would have little to no effect on marine mammals, except for a greatly reduced potential for a vessel strike. Thus, overall impacts on marine mammals under Alternatives 4 would be negligible from all activities, with a possible exception of minor impacts from platform inspection-related vessel strikes. However, decommissioning would need to occur at some time, so impacts that would occur from any of the action alternatives would still occur, only at a later point in time.

4.2.8.5 Cumulative Impacts

Impacts on marine mammals from decommissioning of a platform under Alternatives 1–3 would add incrementally to the cumulative impacts incurred by marine mammals within both the project area and at a more regional or global scale. Activities that could overlap with decommissioning include ongoing O&G production at other platforms, including the potential for accidental oil spills related to their continued operation, and other platform decommissioning projects.

Cumulative impacts on marine mammals include bycatch in commercial and recreational fishing gear, entanglement, and injury/death from fishing gear; marine debris; fishery activities (e.g., causing a reduction in available prey); habitat loss or degradation through coastal and offshore development; environmental contamination; disease; vessel strikes; increased exposure to biotoxins; harmful algal blooms; authorized removals of pinnipeds under MMPA Section 120; military activities; shootings and illegal hunts; natural sounds in the marine environment (e.g., wind, waves, ice cracking, earthquakes, and marine biota); military readiness activities; storm events; entrainment in power plant water intakes; whaling (outside the United States); and climate change (Albouy et al. 2020; Avila et al. 2018; Byrnes and Dunn 2020; Carretta et al. 2021; Cholewiak et al. 2018; Culik 2010; Hildebrand 2004; McCue et al. 2021; Moriarty et al. 2021; Orr et al. 2017; U.S. Department of the Navy 2022; USFWS 2021b; Warren et al. 2021; Watters et al. 2010; Wright et al. 2007). In addition, vessel operations can contribute to chemical environmental impacts resulting from operational and accidental discharges of hydrocarbons (i.e., fuels and oils), antifouling applications, human waste (e.g., sewage effluent), and trace metals. Ships can also introduce alien (non-native) species (Byrnes and Dunn 2020).

Some of the cumulative impacts listed above can have a moderate to major impact on marine mammals. For example, bycatch of marine mammals occurs in the California large-mesh drift gillnet fishery (Carretta 2020). Off the coast of California, Oregon, and Washington, there were 429 confirmed whale entanglements reported between 1982 and 2017, with gray whales and humpback whales (*Megaptera novaeangliae*) the most frequently reported species. Most of the confirmed whale entanglements were from California (85%), with 7% from Washington, and 6% from Oregon, and 1% from Mexico and Canada (Saez et al. 2021). Whale entanglement from 2018 through 2021 reported from the Channel Barbara Channel area include 11 humpback whales, four gray whales, one fin whale (*Balaenoptera physalus physalus*), one sperm whale, and one unidentified whale (NMFS 2019, 2021, 2022).

The presence of shipping along whale migration routes increases the chances of ship strikes on marine mammals. All species of marine mammals are susceptible to vessel strikes, but the true scale of such strikes is not known (Silber et al. 2021). Marine mammals in the POCS are exposed to heavy vessel traffic in the form of commercial ships, military vessels, service vessels, fishing vessels, whale-watching boats, pleasure craft, and other vessels. Much of the risk to marine mammals is more nearshore waters where both vessel volume and whale abundance are high. High-volume container-ship traffic contributes considerable risk along the west coast of North America, particularly at major port entrances. For example, the ports of Los Angeles and Long Beach are the highest-volume container ship ports in the Western Hemisphere (Rockwood et al. 2021; Silber et al. 2021). In 2019, there were 2,104 ship arrivals and 2,095 departures at Long Beach; while in 2020 there were 1,533 arrivals and 1,501 departures at Los Angeles (Starcrest Consulting Group 2020, 2021). Thus, the Los Angeles and Long Beach port entrances are among the areas with the highest risk of vessel strike for blue whales (*Balaenoptera musculus musculus*), fin whales, and humpback whales (Rockwood et al. 2017).

Areas of high ship-strike risk also coincide with areas where marine mammals are most exposed to elevated underwater noise from vessels (Silber et al. 2021). Ship strike is an important seasonal cause of blue whale mortality along the California coast, particularly when krill occur in the shipping lanes (Berman-Kowalewski et al. 2010). The shipping lanes in the Santa Barbara Channel, California, and nearby waters have some of the highest predicted whale mortality from vessel strikes in U.S. waters of the eastern Pacific. For 2012–2018, on average during summer/fall (June–November) 8.9 blue, 4.6 humpback, and 9.7 fin whales were killed from ship strikes each year; winter/spring (January–April) humpback mortality estimates of 5.7 deaths on average per year (Rockwood et al. 2021). The number of gray whales killed by ship strikes throughout their range each year may number in the tens to the low hundreds (Silber et al. 2021).

The overall effects of climate change on marine mammals globally have been geographical range shifts and loss of habitat through ice cover loss, changes to the food web, increased exposure to algal toxins, and susceptibility to disease (Evans and Waggitt 2020). One consequence of increasing anthropogenic climate warming is an increasing frequency, duration, and spatial extent of marine heatwaves. The 2014–2016 marine heatwave in the North Pacific coincided with rise off California in whale entanglements (mainly humpback whales) with crab fishing gear (Santora et al. 2020). A marine heatwave in Australia resulted in a long-term decline in survival and reproduction on a resident population of the Indo-Pacific bottlenose dolphin (*Tursiops aduncus*) (Wild et al. 2019). While the full nature and scope of climate-driven impacts on marine mammals are unclear, changes in population ranges and regional abundance are expected (Silber et al. 2017).

As the localized impacts of the removal of the superstructure, jacket, pipelines, and/or power cables (alternative dependent) on marine mammals are negligible to minor, as well as localized in extent, decommissioning activities would have a negligible contribution to the adverse cumulative impacts on marine mammals on a regional to global scale.

4.2.9 Commercial and Recreational Fisheries

Recreational and Commercial Fisheries in the Pacific Region that could potentially be affected by decommissioning of OCS O&G platforms are described in Section 3.6. Recreational and commercial fisheries could be affected by activities or structures that affect the abundance or distribution of target species or that interfere with or preclude recreational and commercial fishing from specific areas. Activities with a potential to affect recreational and commercial fisheries under the proposed action include removal of existing platforms, pipelines, and powerlines.

The IPFs that could potentially affect commercial and recreational fisheries during decommissioning include noise, turbidity and sedimentation, seafloor disturbance, space-use conflicts, and wastewater and trash from vessels and platforms. Table 4.1-2 presents the various decommissioning activities that produce these IPFs and the following sections describe and evaluate their potential consequences on commercial and recreational fisheries. These evaluations consider the magnitude, extent, duration, and frequency of the IPFs during various stages of the decommissioning process. Mitigation measures for relevant IPFs are presented in Table 4.1-3 and the definitions of impact levels are presented in Tables 4.1-4 and 4.1-5.

4.2.9.1 Alternative 1

Commercial Fisheries. The potential impacts on commercial fisheries during the pre-severance phase of decommissioning would be associated with traffic from vessels to support above-water deconstruction and material removal that could result in space-use conflicts and hindrances to navigation and fishing activities for fishing vessels. Because commercial fishing activities are already largely precluded from waters directly adjacent to O&G platforms due to safety concerns and due to the presence of obstructions that could snag fishing gear such as trawls and seines, it is anticipated that there would be negligible impacts from work vessels anchoring or positioning near specific platforms during the pre-severance period. The increase in vessel traffic associated with pre-severance activities would be small relative to existing traffic from commercial and recreational vessels and traffic from service vessels traveling to and from platforms (Section 4.2.15.1). Overall, impacts on commercial fisheries from pre-severance activities are expected to be negligible.

The severance phase of decommissioning under Alternative 1 would include platform removal, cleaning and removal of pipelines, removal of power cables, and clearing the seafloor of O&G–related obstructions (including shell mounds). Although some invertebrates and fish in the vicinity of platforms would be displaced or killed during removal (especially if explosives are used), no population-level effects to commercial fisheries resources in the study area are anticipated (Sections 4.2.4.1 and 4.2.5.1). Because commercial fishing activities are already precluded from waters immediately adjacent to O&G platforms, there would be negligible impacts associated with space-use conflicts during the severance of platforms. There could be some space use conflicts with fishing vessels during the severance phase while pipelines and cables are being cleaned and removed and there is a potential for vessels conducting severance and clearing activities to run over set gear buoys and damage commercial fishing gear such as floats, traps, and pots. Eighteen of the commercial fishing blocks within the project area have O&G–related pipelines and cables that pass through them and a total of 3,914 ha (9,672 ac) of surface area fall within 45.7 m (150 ft) of pipelines or cables. However, removal activities would be limited to only a very small proportion of the project area at any given time and removal activities within specific commercial fishing areas would likely be completed within relatively short periods of time (days to weeks). Potential conflicts could be mitigated by utilizing established vessel traffic corridors, coordinating with commercial fishing organizations through the Joint Oil/Fisheries Office regarding planned timing and location of decommissioning activities, and by conducting removal activities during seasons with lower levels of commercial fishing activity.

Complete removal of the platform and pipelines could result in a loss of existing fish habitat and structure-oriented fish communities associated with the removed structures (Section 4.2.5.1). The area of the platform would revert to open-water habitat with fish species typical of the water column and areas with exposed pipelines would revert to soft bottom seafloor habitat. Fish surviving platform removal would likely disperse to natural reef habitat in surrounding areas, although they may experience greater fishing pressure at natural reefs compared to the platform. Areas associated with platforms, where commercial fishing activities are currently precluded, would become available to commercial fishing activities, especially after obstructions associated with shell mounds and other O&G–related debris have been cleared. It is estimated that 408 ac of surface area is located within 152.4 m (500 ft) of O&G platforms on the OCS within the project area. This would represent a small increase relative to the existing commercial fishing grounds encompassed by the project area. Clearing of shell mounds and removal of pipelines and cables associated with O&G activities would reduce existing impediments to commercial fishery activities by reducing the potential for gear losses from snagging.

Under the Alternative 1, the removed O&G infrastructure would be shipped on vessels to onshore locations for processing, recycling, and/or land disposal. These activities are expected to generate temporary and negligible conflicts with commercial fishing activities due to the additional transport vessel traffic within the POCS and could be mitigated by utilizing established vessel traffic corridors, coordinating with commercial fishing organizations through the Joint Oil/Fisheries Office regarding planned timing and location of decommissioning activities, and by conducting transport activities during seasons with lower levels of commercial fishing activity.

Overall, adverse impacts on commercial fisheries resulting from decommissioning under Alternative 1 would be negligible. There would be a small benefit to commercial fisheries, because removal of platforms, pipelines, and cables and clearing of seafloor obstructions such as shell mounds or other debris would reduce space use conflicts and the potential for snagging losses of commercial fishing gear.

Recreational Fisheries. Under Alternative 1, impacts on recreational fisheries during the pre-severance phase of decommissioning would primarily be associated with traffic from vessels supporting above-water deconstruction and material removal that could result in space-use conflicts and hindrances to navigation and fishing activities for privately-owned and for-hire recreational fishing vessels. Recreational fishing currently occurs near fishing platforms although vessels greater than 30.5 m (100 ft) in length are required to remain outside established safety zones that can extend as far as 500 m (1,600 ft) around platform locations (Ocean Science Trust 2017). However, safety concerns would preclude most fishing activities from waters directly adjacent to O&G platforms while pre-severance activities are underway. Although impacts on recreational fisheries from pre-severance activities alone are expected to be small because they would be spatially limited and temporary, the ultimate removal of O&G platforms under this alternative would alter recreational fishing opportunities at these locations by converting structured habitat containing popular groundfish (e.g., rockfish) to open-water habitat as described below.

The severance phase would include platform removal, pipeline cleaning and removal of power cables, and removal of other O&G–related obstructions. Although some invertebrates and fish in the vicinity of platforms would be displaced or killed during removal (especially if explosives are used), no population-level effects to fisheries resources in the southern California fishing area are anticipated (Sections 4.2.4.1 and 4.2.5.1).

Recreational fishing activities are currently popular adjacent to oil platforms but would be precluded during severance activities. There may be some space use conflicts with recreational fishing vessels during the severance phase while pipelines and cables are being cleaned and removed, but removal activities would be limited to only a very small proportion of the project area at any given time and would likely be completed within relatively short periods of time (days to weeks). Potential conflicts could be mitigated by informing recreational fishing organizations and for-hire recreational fishing providers about the planned timing and location of activities and by conducting removal activities during seasons with lower levels of recreational fishing activity (e.g., November through May; see Section 3.6).

Complete removal of the platform and pipelines would result in a loss of existing fish habitat and structure-oriented fish communities associated with the removed structures (Section 4.2.5.1). The area of the platform would revert to open-water habitat with fish species typical of the water column and bottom-dwelling fish species (e.g., rockfish) associated with any remaining shell-mound habitat. Areas with exposed pipelines would revert to soft bottom seafloor habitat. Structure-oriented fish surviving platform removal would likely disperse to natural reef habitat in surrounding areas. Consequently, recreational fishing opportunities in the vicinity of existing platforms would be less attractive after platform removal and existing recreational fishing activities would probably shift, at least partially, to remaining natural habitats such as offshore reefs. The proportion of recreational fishing activity that takes place near offshore oil platforms in southern California is largely unknown, although a limited survey conducted of crewmembers for a single sportfishing vessel operating in the Santa Barbara area reported that approximately 18% of the vessel’s fishing time was spent near oil platforms, 21% was spent over natural reef areas, and 61% was spent in other areas (Love and Westphal 1990).

Under the Alternative 1, the removed O&G infrastructure would be shipped on vessels to onshore locations for processing, recycling, and/or land disposal. These activities are expected to generate temporary and negligible conflicts with recreational fishing activities within the south POCS.

Although areas where platforms are currently located may become less desirable for recreational fishing after platform removal due to the reduced habitat structure, recreational fishing access would not be restricted within those areas. It is likely that this would result in a partial shift of recreational fishing efforts to other areas, such as nearby natural reef habitats. Although the change in fishing conditions at platform locations would be essentially permanent, the affected area represents a very small proportion of nearby natural reef and rocky outcrop habitat available for recreational fishing. Because of the small spatial extent of the areas where recreational fishing activities may become less desirable and the availability of alternative recreational fishing areas, adverse impacts on recreational fisheries resulting from decommissioning under Alternative 1 would be negligible to minor.

Sub-alternative 1a. Impacts on commercial and recreational fisheries from noise, turbidity and sedimentation, seafloor disturbance, space-use conflicts, and wastewater and trash from vessels and platforms would be reduced compared to Alternative 1 if explosive severance is used to sever and section platform jackets. These reduced impacts would be due to reduced work schedules required and thus shorter disturbance times, potentially less anchoring, reduced abrasive cutting discharges, reduced vessel discharges, and reduced periods of space-use conflicts for vessels.

4.2.9.2 Alternative 2

Commercial Fisheries. Impacts on commercial fisheries from pre-severance activities are anticipated to be the same under Alternative 2 as those identified for Alternative 1 although they may be of shorter duration because only the upper sections of platforms would be removed. Even though the platform jacket would be removed to at least 26 m (85 ft) below the waterline under Alternative 2, areas near platforms would remain unsuitable for most commercial fishing methods (e.g., trawls) due to snagging hazards presented by the remaining structure. The potential for commercial fishery gear losses from snagging on non-platform O&G infrastructure would be greater than under Alternative 1, but less than existing conditions, because pipelines would be abandoned in place and cables would be buried or removed.

Impacts on commercial fisheries from disposal phase activities under Alternative 2 are expected to be similar to those described for Alternative 1, resulting in temporary and negligible conflicts with commercial fishing activities within the south POCS.

Overall, impacts on commercial fisheries under Alternative 2 are expected to be slightly beneficial compared to existing conditions, and less beneficial than Alternative 1, because platform areas would remain unsuitable for most commercial fishing methods while snagging hazards for commercial fishing in areas with pipelines would be slightly greater than under Alternative 1.

Recreational Fisheries. Impacts on recreational fisheries from pre-severance activities are anticipated to be the same under Alternative 2 as those identified for Alternative 1 although they may be of shorter duration because only the upper sections of platforms would be removed.

During the severance phase, the platform jacket would be removed to at least 26 m (85 ft) below the waterline. However, the magnitude and duration of impacts would be less than for Alternative 1 because only the upper portion of the jacket would be removed in most cases. As described in Section 4.2.5.1, partial jacket removal would preserve some existing hardscape fish habitat and fish communities associated with platforms (depending on the platform depth) and the remaining platform structure would continue to support some fish productivity and nursery functions.

After severance, areas associated with platforms where recreational fishing activities are currently popular would continue to be available. Thus, recreational fishing opportunities in the vicinity of platforms would remain similar to the existing conditions and would be greater than under Alternative 1 under Alternative 2.

Impacts from disposal phase activities under Alternative 2 are expected to be similar to those described for Alternative 1, resulting in temporary and negligible conflicts with recreational fishing activities within the south POCS.

Overall, impacts on commercial and recreational fisheries under Alternative 2 are expected to be slightly beneficial compared to existing conditions and to Alternative 1, because a portion of the platform would remain in place to serve a habitat function and would provide improved recreational fishing opportunities for structure-oriented fish species, even though snagging hazards for commercial fishing would be slightly greater than under Alternative 1.

Sub-alternative 2a. Impacts on commercial and recreational fisheries from the use of explosive severance of platform jackets would be similar in nature but of reduced duration than under Alternative 2 due to reduced work schedules and associated impacts from vessel noise, discharges, bottom disturbance, and space-use conflicts.

4.2.9.3 Alternative 3

Commercial Fisheries. Alternative 3 is similar to Alternative 2, except that the removed portions of platform jackets will be transported to other locations along southern California for an RTR conversion. Impacts on commercial fisheries from pre-severance and severance activities under Alternative 3 are anticipated to be similar to those identified for Alternative 2.

During the disposal phase, transport of removed portions of platform jackets to reefing locations could result in conflicts with commercial fisheries navigation and space-use conflicts that would be similar in magnitude and duration to levels that would occur under Alternative 2. Depending on the locations and depths selected for reefing locations, there is a potential for an increase in snagging hazards for some commercial fishing methods (e.g., seines) compared to Alternative 2 and it is likely that commercial fishing activity would be excluded from the newly established reef locations.

Overall, impacts on commercial fisheries under Alternative 3 are expected to be greater than under Alternatives 1 and 2 because reefing of the removed portions of platform jackets could introduce snagging hazards to new areas and to the development of (potentially) additional exclusion areas for commercial fishing. If areas selected for the RTR conversions do not increase areas unsuitable for commercial fishing due to snagging, the impacts on commercial fishing from Alternatives 2 and 3 would be similar. As noted in Section 4.2.4.3, invertebrates and other fauna present in the selected RTR areas could be initially harmed by placement of the reefed platform components.

Recreational Fisheries. Impacts on recreational fisheries from pre-severance and severance activities under Alternative 3 are anticipated to be similar to those identified for Alternative 2.

During the disposal phase, transport of removed portions of platform jackets to reefing locations could result in conflicts with fisheries navigation that would be similar in magnitude and duration to levels that would occur under Alternative 2. The reefs established using the upper portions of platform jackets would create additional structured habitat that, over time, could result in increases to fish production for some recreationally important target species compared to Alternative 2 and recreational fishing opportunities would likely increase compared to Alternative 2. However, as noted in Section 4.2.4.3, invertebrates and other fauna present in the selected RTR areas could initially be harmed by placement of the reefed platform components. If the selected RTR areas are in existing hard-bottom habitat, there is a potential to temporarily reduce the quality of recreational fishing opportunities at those locations.

Overall, impacts on recreational fisheries under Alternative 3 are expected to be slightly beneficial compared to existing conditions and to Alternatives 1 and 2, because the removed portions of platform jackets would be used to provide additional habitat function and fish concentration areas. Therefore, this alternative would provide improved recreational fishing opportunities for structure-oriented fish species.

Sub-alternative 3a. Impacts on commercial and recreational fisheries from the use of explosive severance of platform jackets would be less than those under Alternative 3 due to less vessel traffic for jacket disposal, especially if jackets are toppled in place, but would be similar to those under Sub-alternative 2a.

4.2.9.4 Alternative 4

Commercial Fisheries. Under Alternative 4, there would be no acceptance or authorization of decommissioning applications. As no pre-severance, severance, or disposal activities would be undertaken, no decommissioning-related impacts are expected to commercial fisheries. Platforms would remain in place, but no O&G production activities would be occurring. Commercial fishing activities would continue to be precluded in the immediate vicinity of platforms, but vessel traffic for periodic safety inspections would likely be negligibly less than current traffic needed to support O&G operations. Overall, space use conflicts would remain similar to current conditions. Existing impacts on commercial fishing would continue and would be greater than impacts associated with Alternative 1 or Alternative 2. Impacts of Alternative 3 could be greater than under Alternative 4 if development of reef conversion areas results in additional areas where commercial fishing is precluded.

Recreational Fisheries. Under Alternative 4, there would be no decommissioning-related related impacts on recreational fishing compared to existing conditions, although vessel traffic for periodic safety inspections would be considerably less than current traffic to support O&G operations. Existing fish and invertebrate habitat functions provided by the platforms would continue and the recreational fishing opportunities provided by platform areas would continue. Overall, impacts on recreational fisheries would be negligible.

4.2.9.5 Cumulative Impacts

There would be negligible impacts (primarily negligible beneficial impacts) to commercial and recreational fisheries under Alternatives 1–3, the action alternatives. Cumulative impacts on commercial and recreational fisheries could result from the combination of decommissioning activities along with past, present, and reasonably foreseeable future activities that may negatively influence fisheries.

A major driver for fisheries impacts is related to the availability of the populations of target species. As identified in Section 4.2.5, decommissioning activities can have varied effects on fish populations depending on habitat and life history needs. However, it is anticipated that many decommissioning impacts on fish communities would be temporary and minor. Some fish will be killed in the process of platform removals, especially if explosives are used. The most significant impact on fish populations would be associated with the removal of platform habitat and the displacement of the associated fish communities (Section 4.2.5.1). Non-decommissioning activities that can adversely affect fishery resources include O&G production (including accidental oil spills), the levels of commercial and recreational fishing activities (many managed species are overfished), sediment dredging and disposal, noise and anchoring from offshore marine transportation, and pollutant inputs from point and non-point sources.

The incremental contribution of the proposed decommissioning activities under Alternatives 1–3 to the overall cumulative impacts on commercial and recreational fisheries is generally negligible and potentially beneficial in comparison with other anthropogenic activities that affect fish populations and fishery operations. Platform decommissioning activities under Alternative 1 would generally be short-term and localized in nature with no more than minor impacts, including potentially beneficial effects, on fish resources and fishery activities. Overall, the effects of decommissioning activities under Alternatives 1–3 on commercial and recreational fisheries would be similar to or beneficial compared to existing conditions and would represent a negligible change to past and ongoing cumulative impacts.

4.2.10 Areas of Special Concern

IPFs potentially affecting areas of concern (AOCs) are presented in Table 4.1-2 and include air emissions and noise from vessels and equipment, and seafloor disturbance and resultant turbidity and sedimentation. Mitigation measures for these impacts are presented in Table 4.1-3 and the definition of impact levels is presented in Table 4.1-4.

Several AOCs occur along the southern Pacific coast in the vicinity of the POCS platforms, including national marine sanctuaries (NMSs), national parks (NPs), national wildlife refuges (NWRs), national estuarine research reserves (NERRs), National Estuary Program (NEP) estuaries, and California State marine protected areas (MPAs) (see Section 3.7). The nearest

POCS platforms to any of these areas are Platform Gail, which is about 1.1 km (0.6 mi) from the northeastern boundary of the Channel Islands NMS, and Platform Gina, about 2.3 km (1.2 mi) from the boundary of this NMS. This NMS surrounds Channel Islands NP, extending generally 11 km (6 mi) from the nearest shoreline of this NP (see Section 3.7.2). In addition, Platform Irene is located about 5.8 km (3.1 mi) from the western boundary of Vandenberg State Marine Reserve; all other platforms are located further from any areas of special concern.

4.2.10.1 Alternative 1 — Proposed Action

During all three phases of decommissioning, air emissions and noise will be generated by vessel traffic traveling to and from decommissioning sites and ports (see Sections 4.2.1 and 4.2.2). Because of the distances of the AOCs from the POCS platforms, pipelines, and power cables that would be removed and from the shipping lanes that would be used during decommissioning under Alternative 1 (see Section 4.2.15), coastal biota at some of the AOCs are not expected to be affected by such air emissions or noise generated during any of the phases of decommissioning.

During pre-severance, activities would include the mobilization of lift and support vessels, specialized lifting equipment, and load barges. Activities would also include those needed to prepare the target platform for severance, such as structure surveys; topside salvageable equipment shutdown, cleaning, and removal; and topside and jacket bracing.

During the severance phase, there would be extensive seafloor disturbance resulting from complete jacket removal and during pipeline and power cable removal. Additional seafloor disturbance would also occur with final site clearing that employs trawling. Seafloor habitat would be disturbed during these activities (see Sections 4.2.4.1 and 4.2.4.2), which would also result in temporary increases in turbidity as well as sedimentation of the disturbed seafloor sediments (see Section 4.2.3).

Turbidity and sedimentation resulting from seafloor disturbance during jacket, pipeline, and power cable removal are not expected to extend beyond 1 km (0.5 mi) from the areas of disturbance. In addition, because the predominant currents run roughly parallel to the coastline (see Section 3.4.2), any turbidity and sedimentation plumes generated during seafloor-disturbing activities would not be directed toward nearby NMSs or state MPAs. Consequently, no effects are expected to seafloor and water column habitats and biota at the AOCs from decommissioning-produced turbidity and sedimentation.

None of the military AOCs, such as the Point Mugu Sea Range (see Section 3.7.6), would be affected under Alternative 1. While there are four POCS platforms (Harvest, Hermosa, Hidalgo, and Irene) located in Military Warning Area W-532 (see Figure 3.7-2), the decommissioning of these platforms under Alternative 1 would not affect military training activities in this area. During O&G production, lessees and platform operators were required to coordinate their activities with appropriate military operations to prevent potential conflicts with military training and use activities. Similar coordination will be required during platform decommissioning. Thus, Alternative 1 is not expected to adversely affect military activities in in any of the military AOCs of the POCS.

Overall, decommissioning activities under Alternative 1 are expected to have negligible impacts on areas of special concern and the biota and habitats they support. Potential impacts on visual resources associated with, and recreational use of, the AOCs are discussed separately in Sections 4.2.8 and 4.2.9, respectively.

Sub-alternative 1a. Since impacts of the IPFs air emissions, noise, and seafloor disturbance would be negligible under Alternative 1, shortened work schedules afforded by explosive severance would similarly have no effect on AOCs.

4.2.10.2 Alternative 2

Compared to Alternative 1, under Alternative 2 there would be less decommissioning vessel traffic, only partial removal of platform jackets, and only in-place abandonment of pipelines. Consequently, there will be fewer air emissions and less noise and only limited seafloor disturbance (as with Alternative 1, none of which would occur within any AOCs) under Alternative 2. Thus, overall impacts on AOCs under Alternative 2 would be negligible.

Sub-alternative 2a. Since impacts of the IPFs on air emissions, noise, and seafloor disturbance would be negligible under Alternative 2, shortened work schedules afforded by explosive severance would similarly have no effect on AOCs.

4.2.10.3 Alternative 3

As with Alternative 2, under Alternative 3 there would be no impacts on AOCs during the pre-severance and severance phases of decommissioning. However, disposal under Alternative 3 will include an additional amount of vessel traffic (primarily tugboats and barges) for transporting platform jackets to locations for RTR conversion. Air emissions and noise from this vessel traffic are not expected to affect any of the AOCs.

While it is not presently possible to identify RTR locations, RTR jacket disposal at a state MPA such as a marine conservation area would result in a positive impact through the creation of new reef habitat and the follow-on establishment of marine invertebrate and fish communities. The benefits of an RTR conversion at a state MPA for recreation and tourism are discussed separately in Sections 4.2.9 (Commercial and Recreational Fishing) and 4.2.13 (Recreation and Tourism). Thus, overall adverse impacts on AOCs under Alternative 3 would be negligible, while a localized moderate to major positive impact could be realized at an RTR conversion.

Sub-alternative 3a. Since impacts of the IPFs on air emissions, noise, and seafloor disturbance would be negligible under Alternative 3, shortened work schedules afforded by explosive severance would similarly have no effect on Areas of Concern.

4.2.10.4 Alternative 4

Under Alternative 4, there would be no acceptance or authorization of decommissioning applications. As no pre-severance, severance, or disposal activities would occur under this alternative, no decommissioning-related impacts on any of the AOCs would be expected. Platforms would remain in place, but no O&G production activities would be occurring. The only platform-related activities under this alternative would be periodic safety inspections of the platforms, and the continued platform lighting for aircraft and navigation safety. Under this alternative, there would be no impacts on any of the AOCs.

4.2.10.5 Cumulative Impacts

Only negligible impacts on AOCs are anticipated due to platform decommissioning conducted under Alternative 1. Thus, Alternative 1 would not result in any cumulative impacts on the AOCs on the Southern California POCS.

4.2.11 Archeological and Cultural Resources

IPFs potentially affecting archaeological and cultural resources are presented in Table 4.1-2 and are related to seafloor disturbance from anchoring and trawling, and potentially from excavation of jacket pilings, pipelines, shell mounds, or other obstructions. Mitigation measures for these impacts are presented in Table 4.1-3 and the definition of impact levels is presented in Table 4.1-4.

As discussed in Chapter 3, cultural resources on the POCS include submerged precontact archaeological sites; submerged historic archaeological sites, particularly shipwrecks; traditional cultural properties (TCPs) that are partially or wholly maritime in nature; and built architectural resources, such as platforms and manmade islands. Cultural resources on shore that could be indirectly impacted by activities on the POCS include precontact and historic archaeological sites, built architectural resources, and TCPs.

4.2.11.1 Alternative 1

Under Alternative 1, submerged archaeological resources could be impacted by the ground disturbance associated with jacket, pipeline, and power cable removal; clearance of the seafloor of any obstructions related to O&G production, particularly trawling; and anchoring activities from vessels and barges used for platform removal and site clearance. Land-based archaeological resources would not be impacted, as all land-based disposal would occur at existing, permitted disposal sites. Since pre-disturbance geophysical surveys would be conducted to identify submerged archaeological resources in areas of planned ground disturbance, project coordinators would be able to plan for avoidance, minimization, or mitigation of potential effects to submerged archaeological resources. Impacts on submerged archaeological resources would therefore mostly be minor. However, unavoidable impacts would be major and long-term.

Maritime TCPs, built architectural resources, land-based TCPs, and terrestrial archaeological sites are likely to be beneficially impacted by platform removal via restoration of the integrity of setting, feeling, and association of any given resource within view of a platform or platforms. However, if the period of significance of a historic property overlaps with the initial presence of platforms off southern California (early 1960s), it is possible that the property's integrity of setting, feeling, and association could be negatively affected by platform removal. That is, if a historic property's significance dates to a period when a platform or platforms existed offshore and was or were visible from the property, the removal of said platform(s) could adversely affect the historic property's integrity, particularly if said historic property is related to offshore O&G development. Impacts on maritime TCPs, built architectural resources, land-based TCPs, and terrestrial archaeological sites would be moderate and long-term, but largely beneficial.

Removal of a platform could also cause an adverse effect if the platform itself is eligible for listing in the National Register of Historic Places (NRHP) (i.e., a historic property). For example, Platform Hogan is the oldest extant drilling platform in federal waters off southern California and, as such, may be a historic property. Platform A may also be a historic property because of its association with the January 1969 oil spill, caused by the blowout of the platform, that made a significant contribution to the broad history of the U.S. environmental movement. Under Alternative 1, complete removal of a platform that is a historic property would be an adverse effect and would require completion of a Memorandum of Agreement (MOA), as per Section 106 of the National Historic Preservation Act, to formalize agreed-upon mitigation of the adverse effect. Impacts on eligible platforms would be major and long-term.

Mitigation of adverse effects to historic properties, such as removal of an eligible platform, can take many forms and is developed during consultation amongst BOEM/BSEE, other relevant federal agencies, the Advisory Council on Historic Preservation (ACHP), the State Historic Preservation Office (SHPO), tribal nations, and other consulting parties. Other consulting parties can include local and regional historical societies and museums as well as national historical societies and interest groups, such as the Santa Barbara Maritime Museum, American Oil & Gas Historical Society, American Society for Environmental History, Sierra Club, Nature Conservancy, Natural Resources Defense Council, Environmental Defense Fund, Friends of the Earth, and others.

For example, mitigation for the removal of an eligible platform could include conventional methods like Historic American Engineering Record (HAER) documentation or more innovative methods, such as digital recordation and modeling, using 3D photogrammetry and laser scanning, and public outreach via museum exhibits, historical trails, and lesson plans. Museum exhibits could be developed about the history of offshore O&G development and the environmental movement for area museums like the Santa Barbara Maritime Museum, California Science Center, Channel Islands Maritime Museum, Natural History Museum of Los Angeles County, California Oil Museum, Santa Barbara Museum of Natural History, Olinda Oil Museum and Trail, Aquarium of the Pacific, Southern California Marine Institute, Santa Monica History Museum, Los Angeles Maritime Museum, Museum of Ventura County, and Santa Barbara Historical Museum. Interactive Science, Technology, Engineering, and Math (STEM) exhibits could be developed for area children's museums like MOXI, the Wolf Museum of Exploration and Innovation; Discovery Cube Los Angeles; Cayton Children's Museum; Discovery Cube Orange County; Kidspace Children's Museum; and Pretend City Children's Museum. Traveling exhibits to reach a broader audience could be developed for display at natural history, science, and history museums around the country as well as subject-specific museums, like the Oil & Gas Museum in West Virginia and the Ocean Star Offshore Drilling Rig Museum in Texas. Any of the exhibits could utilize digital documentation and models of platforms and related infrastructure for interactive activities and displays.

Historical trails could be developed along the southern California coast and could include physical signage and/or digital tour stops with information about topic-specific historical events, landscape changes, and area points of interest. The Olinda Oil Museum's two-mile trail, which offers panoramic views of coastal Orange and Los Angeles counties, is a good example of a small, local trail that could be augmented or expanded as part of mitigation efforts. Lesson plans exploring the history of O&G extraction in California, emphasizing the environmental movement's connection to the 1969 oil spill, and incorporating STEM principles, could be developed for area K–12 schools. Lesson plans could also use digital documentation and models of the platforms. In short, if an MOA or MOAs are necessary due to adverse effects, a broad range of opportunities for meaningful mitigation exists.

Sub-alternative 1a. Since the seafloor disturbance footprint would be the same whether explosive and non-explosive severance is used for jacket sectioning, impacts on archaeological and cultural resources under Sub-alternative 1a would be the same as under Alternative 1.

4.2.11.2 Alternative 2

Under Alternative 2, effects to potential submerged archaeological resources could be reduced, since pipelines would be abandoned in place. Some effects could still occur since ground disturbance would still be caused by clearance of the seafloor of any O&G–related obstructions and anchoring activities from vessels and barges used for platform removal and site clearance, but pre-disturbance geophysical surveys would be expected as under Alternative 1. Impacts on submerged archaeological resources would therefore mostly be minor, but any unavoidable impacts would be major and long-term. Impacts on terrestrial archaeological sites, maritime TCPs, built architectural resources, land-based TCPs, and eligible platforms would be the same as under Alternative 1.

Sub-alternative 2a. Since the seafloor disturbance footprint would be the same whether explosive and non-explosive severance is used for partial jacket removal, impacts on archaeological and cultural resources under Sub-alternative 1a would be the same as under Alternative 2.

4.2.11.3 Alternative 3

Under Alternative 3, effects to potential submerged archaeological resources, although reduced compared to Alternative 1, could increase compared to Alternative 2, since disposal of the platform jacket in an artificial reef could impact submerged archaeological resources in the locations chosen for reefing disposal. Impacts on submerged archaeological resources would mostly be minor, but any unavoidable impacts would be major and long-term. Impacts on terrestrial archaeological sites, maritime TCPs, built architectural resources, land-based TCPs, and eligible platforms would be the same as under Alternative 1.

Sub-alternative 3a. Since the seafloor disturbance footprint would be the same whether explosive and non-explosive severance is used for partial jacket removal or toppling, impacts on archaeological and cultural resources under Sub-alternative 1a would be the same as under Alternative 3.

4.2.11.4 Alternative 4

Under Alternative 4, there would be no acceptance or authorization of decommissioning applications. As there would be no pre-severance, severance, or disposal activities under this alternative, no decommissioning-related impacts are anticipated to submerged and terrestrial archaeological resources. However, beneficial impacts of platform removal to maritime TCPs, built architectural resources, land-based TCPs, and terrestrial archaeological sites would not occur. The integrity of setting, feeling, and association of historic properties within view of a platform or platforms would continue to be compromised by the presence of said platform(s). Impacts on maritime TCPs, built architectural resources, land-based TCPs, and terrestrial archaeological sites, caused by construction and ongoing use of the platforms, would continue to be moderate and long-term.

4.2.11.5 Cumulative Impacts

Under the three action alternatives, cumulative impacts on submerged and terrestrial archaeological and cultural resources would range from minor to moderate and would be long-term, but generally beneficial. The eventual removal of all platforms and their associated infrastructure, with an accompanying lack of future offshore O&G development, would result in reduced impacts on submerged archaeological resources and improved integrity of setting, feeling, and association for most, if not all, historic properties within view of existing platforms, including built resources, maritime and terrestrial TCPs, and terrestrial archaeological sites. Following removal of all platforms, the seascape would return to a state closer to its pre-offshore platform character.

4.2.12 Visual Resources

IPFs potentially affected visual resources are presented in Table 4.1-2 and include lighting of platforms and work vessels and visual clutter from vessels during removals. Long term impacts would occur from the removal of platforms from the visual landscape. Mitigation measures for these impacts are presented in Table 4.1-3. Impact levels are defined below.

4.2.12.1 Approach to Visual Effects Analysis

This section discusses potential temporary and permanent impacts that could result from implementing the proposed alternatives. Potential effects to visual resources were assessed by determining the overall change in landscape character. Overall change in landscape character was based on an assessment of visual contrast, scale dominance and experience, as perceived from various Key observation points (KOPs) within Ocean, Seascape and Landscape Character Areas (OCA, SCA, LCA, respectively). LCAs are discussed in detail in Section 3.9.

Indicators of change include the expected level of change to the existing landscape aesthetic, such as lighting, movement, activity (measured in terms of change in visual condition), and developed or naturalness character. Indicators used to measure potential impacts on visual resources that could result from the project included the magnitude/intensity of effects to visual resources, which was measured by the level of visual contrast created by the proposed project. The duration of impacts was measured by the anticipated temporal extent of effects (i.e., temporary, long-term, permanent). The indicators of change include:

- The context of the effect, which was measured by the perceived sensitivity of viewers and the potential for impacts to alter the human experience of the landscape;
- Impacts on visual resources, which was measured by the size and scale of visual change and level of visual contrast created by the project;
- Changes in scenic quality, visual sensitivity, and distance zones from sensitive viewpoints;
- All the potential construction-related impacts on visual resources are considered short-term (5 years); and
- Change visual quality based on the combined contrast of all project components and activities within both day and nighttime settings.

4.2.12.2 Methods

The evaluation procedures were implemented at selected KOPs within a specific character area to determine the level of visual contrast and impact expected to result from the proposed project alternatives. Based on the results of the site analysis, a determination was made regarding the levels of change to the geographic extent, ranging from negligible to strong contrast for each major project component. The magnitude of change in landscape character at each KOP was determined by evaluating the relationship between viewer characteristics (viewer duration and viewer exposure), and the visual contrast of the project feature in view.

Zone of Theoretical Visibility (Viewshed Analysis). A viewshed analysis was completed to identify the Zone of Theoretical Visibility (ZTV). Seen and unseen areas within the analysis area were determined by implementing a viewshed analysis using GIS (see Section 3.9,

Figure 3.9-1). This analysis determines project visibility based on the relationship between topography, height of the oil platforms, and average eye height of the viewer. The resulting "seen area," or viewshed, represents the area where one or more oil platforms could theoretically be seen. The viewshed analysis was used to assess potential visibility of the project, and to better understand viewer experience within the ocean, seascape, and landscape. For the purposes of this analysis, input parameters were defined as follows: eye level of 1.7 m (5.5 ft), maximum platform height measuring 75 m (250 ft).

Selection of Key Observation Points (KOPs). The effects analysis was conducted from 14 sample KOPs representing common and/or sensitive views between Ventura California, Santa Cruz Island, and Gaviota State Park. The KOPs represent viewer positions within OCA, SCAs, and LCAs. These KOPs included beaches, from the water by boat, inland vista points, and trails. All KOPs are managed by federal, state, county or city agencies, and are publicly accessible. Although public engagement was not part of this study, the intact scenic attributes and the highly aesthetic visual qualities found within the viewshed assumes a high level of visual sensitivity. Table 4.2.12-1 describes the visual character physical factors and activities of different viewer groups at each KOP.

Visual Contrast Rating. A Contrast Rating procedure was used to determine visual contrast that may result from the construction and operation of the project, based on descriptions of the four alternatives and examples of existing conditions from KOPs depicting existing project features. This method assumes that the extent to which the project results in improved visual quality or adverse effects to visual resources is a function of the visual contrast between the project and the existing settings within of the OCAs, SCAs, and LCAs.

At each KOP, existing landforms, vegetation, and structures were described using the basic components of form, line, color, and texture. Project features were then evaluated using simulations, and described using the same basic elements of form, line, color, and texture. The degree of perceived contrast between the proposed project and the setting was evaluated using the following contrast rating level descriptions:

- Negligible (N): The element contrast is not visible or perceived.

- Weak (W): The element contrast can be seen but does not attract attention.

- Moderate (M): The element contrast begins to attract attention and begins to dominate the characteristic landscape.

- Strong (S): The element contrast demands attention, would not be overlooked, and is dominant in the landscape.

Visual Effects Analysis. The level of contrast was assessed for all project components and activities proposed for each of the alternatives. The level of visual contrast expected to result from construction or decommissioning related activities was estimated based on knowledge of anticipated deconstruction, operation, maintenance, decommissioning, and equipment that will be present. No photo simulations of the proposed alternatives have been developed for this study, as the result of the project will be full removal of all visible elements.

TABLE 4.2.12-1 Descriptions of Key Observation Points

Key Observation Point	Description
Gaviota Beach State Park, California State Parks and Recreation	The coastal bluffs at Gaviota State Park rise to 152.4 m (500 ft) above sea level. There are extensive offshore and inland petroleum oil reservoirs within this rock sequence within the area. The state park offers overnight camping and day use parking and picnic tables and restroom facilities. It is also a popular spot to launch small private boats used to access a surf wave west of the beach that is not accessible off public roads.
Arroyo Hondo Vista Point, California State Department of Transportation Highway 101 Rest Area	Arroyo Hondo Vista is a rest area located between the Pacific Ocean and Highway 101. The rest area is management by California Department of Transportation. There are trails from the rest area accessing a beach below the steep coastal cliff and the old highway bridge that spans over Arroyo Hondo Creek gully. This site is a very remote and quiet place to enjoy unencumbered views of the Santa Barbara County coastline and provides interpretive panels educating visitors to natural, pre-settlement, and settlement history of the area.
El Capitan State Beach, California State Parks and Recreation	El Capitan is a popular California State Beach offering day use amenities and overnight camping facilities. The curvilinear beach is both rocky and with patches of sand. Trails guide visitors through the stands of sycamore, oak, and eucalyptus trees to broad picturesque vistas of the Pacific Ocean and the mountains of the Channel Islands. Picnic areas containing wooden tables and barbeque amenities are scattered throughout the park and along the paths above the beach. Recreational activities include camping, fishing, surfing, and birdwatching.
Painted Caves Sunset Terrace View, California State Parks and Recreation	Painted Caves Sunset terrace is located along the entry road to the Painted Caves State Park. The winding road traverses the steep slopes of the foothills of the Santa Ynez mountains, providing a comprehensive view overlooking the landscape and ocean below. Locals and tourists flock to this site to take advantage of the picturesque sunset over the undeveloped landscape of Gaviota Channel Islands, and the Pacific Ocean
Hendry’s Beach, Arroyo Burro Beach County Park	Hendry’s Beach is a very popular, centrally located destination for locals and tourists. Access is located between pristine, steep cliffside terrain separating extensive curvilinear beaches along Shoreline Park to the west and Mesa Lane Beach to the east. Geologic formations can be seen within the walls of the cliffs along the beach. Amenities include parking, a beach front restaurant, viewing stations, and public restrooms.
Elling’s Park, an independent non-profit park managed by the Elling’s Park Association	Elling’s Park is the largest community-supported non-profit park in America. The park was partially developed on a landfill site. Reclamation included covering and capping the landfill, revegetating and restoring the ecology of the site, and developing recreation fields, dog parks, trails, and paths, including the installation of art and sculpture within the park. A short walk up the single-track trails lead up to a vast mesa with panoramic views of the Channel Islands and the Pacific Ocean. There is vast parking and immediate access from neighboring residential communities that make this park a popular destination for the local community.

TABLE 4.2.12-1 (Cont.)

Key Observation Point	Description
Shoreline Park, City of Santa Barbara Community Park	Shoreline Park offers intimate views of the Channel Islands and the Strait of Santa Barbara. Wooden stairs lead visitors down to the beach. The park offers developed recreation amenities such as picnic tables, restrooms, play areas, and walking paths. Marine mammals such as gray whales and dolphins can be spotted from the park overlook. It is a popular surfing spot for the local community.
East Beach, City of Santa Barbara Community Park	East beach is a very popular tourist destination due to its proximity to downtown shopping and hotels. East and West Beach are separated by Steam’s Wharf. East Beach is well known for its dramatic views and world-famous beach volleyball courts and tournaments.
West Beach, City of Santa Barbara Community Park	West Beach runs between Steam’s Wharf in downtown Santa Barbara and the Bellosguardo Foundation property on the boarder of Montecito. A pedestrian bike path segments the beach from a major roadway leading to commercial shopping, restaurants, and hotels, making it a popular location for tourists and local visitors.
Toro Canyon Park, Santa Barbara County Parks and Recreation	Toro Canyon Park is located off the beaten path in the mountains above the City of Carpinteria. The park offers developed trails and park amenities that can be reserved for private events. This relatively hidden location makes it optimal as a destination for local residents. Short hikes lead to expansive panoramic views of the Pacific Ocean and Channel Islands. Expansive views of the ‘backcountry,’ including citrus and avocado plantations, are nestled into the residential neighborhoods within the Santa Ynez mountains.
Loon Point Beach, Santa Barbara County Parks and Recreation	Loon Point is located at the eastern edge of Summerland along Pedro Lane near the community of Carpinteria. The beach is known as one of the only beaches in Santa Barbara County to allow horseback riding. It is also a popular location for surfing, beach walking, and inspecting the tide pools below Loon Point.
Prisoner’s Harbor, Santa Cruz Island, NPS	Prisoner’s Harbor is located on the middle of Santa Cruz Island offering access to both NPS and TNC lands. The NPS provides limited seasonal access to the island, offering guided hiking and interpretive talks and basic backcountry amenities. Designated trails provide access to camp sites on NPS lands. The island is famous for birdwatching, (specifically for the Coastal Scrub Jay). 4,733 acres, or 24%, of Santa Cruz Island, is managed by the NPS.
Trail Pelican Cove, Santa Cruz Island, TNC	TNC owns 76% of Santa Cruz Island and manages more than 1,000 species of plants and animals. TNC lands make up the island’s high peaks, deep canyons, pastoral valleys, and 124 km (77 mi) of dramatic coastline. Public access is limited to Pelican Bay Trail from Prisoner’s Cove or through prearranged tours.
Channel Island Ferry	Island Packers Cruises provides transportation from Ventura to Scorpions and Prisoner’s harbors. Transportation across the Santa Barbara Channel provides a recreational, tourist, and interpretive experience. Dolphins and whales are seen while crossing. Oil platforms are also seen at approximately a 2.4-km (1.5-mi) distance and visible in detail.

4.2.12.3 Alternative 1

As decommissioning of a platform proceeds through each of the three phases, there would be a continuous incremental reduction to visual contrast that would eventually result in reestablishing pre-platform visual conditions. Viewers situated adjacent to the platforms during decommissioning might see localized impacts; however, impacts would be short-term and include an incremental reduction in visual contrast from project actions.

Due to the addition of support vessels and equipment such as large barges and cranes needed to support platform severance, minor transient visual impacts would occur during daytime hours. The support vessels would introduce bold horizontal and vertical lines to the ocean and seascape setting. Structure would appear smooth and flat. Colors might vary from white, light gray, and dark gray, depending on sun angle and the reflection of light off the ocean surface. This systematic repetition of equipment and vessels needed for platform severance would contrast with the form, lines, colors, and textures of the OCAs, SCAs, and LCAs to varying degrees, depending on observer's position (offshore looking toward shore or onshore looking seaward), the angle of observation, spacing and distribution, and activity (movement) occurring within the view.

The addition of the decommissioning vessels and equipment would also increase visual clutter and add additional contrasting geometric forms the visual environment. Visual impacts would be short-term and occur within the deconstruction period. Decommissioning activities would also introduce motion to an otherwise still environment. The movement of decommissioning vessels within the project area might cause visual contrast along with increased reflectivity from surfaces under certain light, seasonal, and atmospheric conditions.

Artificial lighting at night to illuminate the work areas on the existing oil platforms and the decommissioning equipment would increase the contrast against an otherwise naturally dark environment and visibility of decommissioning activities during the nighttime hours. Glare and light trespass could occur if sources of artificial light were not properly shielded, adding to the nighttime levels of visual contrast. The range of potential color of lighting would also create strong contrast against the darkness of existing night skies. The resulting visual effect is expected to be minor to moderate and be visually evident from KOPs from foreground to middle ground distance zones during decommissioning.

Permanent removal of the platforms would restore the natural scenic quality of affected OCA settings. At present, BOEM does not foresee future planned activities within the proposed action's viewshed. The area would be fully restored to its natural condition after decommissioning is finished.

Short-term visual effects are considered to be 5 years or less, long-term is 5–30 years, and permanent is more than 30 years. Table 4.2.12-2 presents the short-term visual effects that could occur during decommissioning under Alternative 1 in day and night conditions.

TABLE 4.2.12-2 Temporary Visual Effects from Key Observation Points during Deconstruction in Night and Day Conditions

				Magnitude						
				Visual Contrast[b]		Dominance[c]				
Key Observation Points[a]	Viewer Groups	Character Area	Platforms in View	Day	Night	Day	Night	Viewer Duration	Viewer Geometry	Viewer Distanced (mi)
Gaviota Beach State Park	Surfers, Campers, Fisherman locals, tourists	Open Ocean, Beach, Coastal Bluffs	Heritage, Harmon, and Hondo	N-W	M-S	NVE	VS	Intermittent	Grade	Harmony (7.3)
Arroyo Hondo Vista Point	Drivers, Truckers, Locals, Tourists	Open Ocean, Beach, Coastal Bluffs, Highway	Heritage, Harmon, and Hondo	N-W	W-M	VS	VS	Prolonged	Superior	Hondo (5.8)
El Capitan State Beach	Surfers, Campers, Fisherman Locals, Tourists	Open Ocean, Beach, Coastal Scrub, Hardwood Forest	Harmon, Hondo, and Holly (State)	W-M	M-S	VS	VE	Intermittent	Grade	Hondo (7.2)
Painted Caves Sunset Terrace View	Locals, Tourists, Recreation	Grassland, Hardwood Forest, Rock Outcrops, Highway	Harmon, Hondo, Holly (State), Henry, and Hillhouse	W-M	M-S	NVE	VS	Intermittent	Elevated Superior	C (14.3)
Hendry's Beach	Locals, Tourists, Recreation	Ocean, Beach, Coastal Bluffs,	Hondo, Holly (State), Henry, and Hillhouse	W-M	M-S	VS	VE	Prolonged	Grade	– C (8.1)
Elling's Park	Locals, Tourists, Recreation, Commercial, Residential	Ocean, Beach, Coastal Bluffs, Coastal Scrub	Harmon, Hondo, Holly (State), Henry, Hillhouse, Hogan, and Houchin	W-M	M-S	VS	VE	Intermittent	Superior	– C (7.9)
Shoreline Park	Locals, Tourists, Recreation, Commercial, Residential	Ocean, Beach, Coastal Bluffs, Coastal Scrub, Developed Park	Henry, Hillhouse, Hogan, and Houchin	M	S	VE	D	Prolonged	Grade – Slightly Superior	C (6.3)

TABLE 4.2.12-2 (Cont.)

Key Observation Points[a]	Viewer Groups	Character Area	Platforms in View	Magnitude: Visual Contrast[b] Day	Visual Contrast[b] Night	Dominance[c] Day	Dominance[c] Night	Viewer Duration	Viewer Geometry	Viewer Distanced (mi)
East Beach	Locals, Tourists, Recreation, Commercial, Residential	Ocean, Beach, Coastal Bluffs, Coastal Scrub, Developed Park	Henry, Hillhouse, Hogan, and Houchin	M	S	VE	D	Prolonged	Grade	C (6.3)
West Beach	Locals, Tourists, Recreation, Commercial, Residential	Ocean, Beach, Coastal Bluffs, Coastal Scrub, Developed Park	Henry, Hillhouse, Hogan, and Houchin	M	S	VE	D	Prolonged	Grade	Hogan (6.0)
Toro Canyon Park	Residential, Locals	Grassland, Hardwood Forest, Rock outcrops, Orchards, Residential Estates, Commercial Open Ocean	Harmon, Hondo, Holly (State), Henry, Hillhouse, Hogan, Houchin, Grace, Gilda, and Gail	M	S	VE	D	Prolonged	Elevated Superior	Hogan (6.3)
Loon Point Beach	Residential, Locals, Tourists, Horseback riding	Ocean, Beach, Coastal Bluffs, Coastal Scrub, Residential	Henry, Hillhouse, Hogan, and Houchin	W-M	M-S	VS	VE	Intermittent	Grade	Henry (5.8)
Prisoner’s Harbor	Locals, Tourists, Recreation	Ocean, Beach, Coastal Bluffs, Coastal Scrub,	Grace, Gilda, and Gail	N-W	W	NVE	VS	Intermittent	Grade	Grace (16.6)
Trail Pelican Cove	Locals, Tourists, Recreation	Ocean, Beach, Coastal Bluffs, Coastal Scrub	Grace, Gilda, and Gail	N-W	W	NVE	VS	Intermittent	Elevated Superior	Grace (16.7)
Channel Island Ferry	Locals, Tourists, Recreation	Open Ocean	Grace, Gilda, and Gail	S	S	VE -D	D	Prolonged	Grade – Moving	Grace (3.1)

[a] See Table 4.2.12-1 for descriptions of the Key Observation Points.

[b] Negligible (N); Weak (W); Moderate (M); Strong (S).

[c] NVE=“not visually evident”, VS = “visually subordinate”, VE = “visually evident”, and D = “dominant”.

[d] Viewer Distance: Foreground (0-3 miles);Middle ground (3-5 miles); Background (5-15 Miles); Seldom Seen (>15 miles).

Sub-alternative 1a. The use of explosive severance for sectioning platform jackets would result in shortened work schedules for removals. Impacts from vessel lighting and visual clutter would be reduced compared to those expected for Alternative 1.

Mitigation Measures. Obstruction lighting may result in strong contrast against the night sky. Any artificial lighting plans should be submitted by the decommissioning contractor for BOEM review and approval. At a minimum, the lighting plan should include directional hoods and demonstrate where and how the light will be directed to avoid impacts from glare and light trespass, and provide the decommissioning work crews a safe nighttime work environment. These measures will help avoid light trespass and glow and may offset temporary impacts on night skies.

4.2.12.4 Alternative 2

Under Alternative 2, decommissioning activities would be the same as those under Alternative 1, but would be completed sooner. Only a portion of the subsurface jacket would be removed, and pipelines would be abandoned in place. Thus, visual impacts under Alternative 2 would be identical to those expected under Alternative 1, but of reduced duration.

Sub-alternative 2a. The use of explosive severance for partial removal of platform jackets and serving conductors would result in shortened work schedules for removals. Impacts from vessel lighting and visual clutter would be reduced in duration compared to those expected under Alternative 2.

4.2.12.5 Alternative 3

Visual impacts under Alternative 3 would be identical to those identified for Alternative 2.

Sub-alternative 3a. The use of explosive severance for partial removal or toppling platform jackets and severing conductors would result in shortened work schedules for removals. Impacts from vessel lighting and visual clutter would be of reduced duration compared to those expected under Alternative 3.

4.2.12.6 Alternative 4

Under Alternative 4, there would be no acceptance or authorization of decommissioning applications. As no pre-severance, severance, or disposal activities (including vessel traffic) would occur, no decommissioning-related visual impacts would be expected to occur under this alternative. Platforms would remain in place, but no O&G production activities would be occurring.

4.2.12.7 Cumulative Impacts

The temporary nature of the incremental contribution of potential visual impacts from decommissioning activities (i.e., visual clutter, night lighting) would not result in any significant cumulative visual impacts.

4.2.13 Environmental Justice

IPFs related to potential adverse impacts on minority and low-income populations would include noise, traffic, and emissions from vessels and trucks used for transportation to port and the subsequent processing of platform materials, pipelines, and power cables at scrap facilities (Table 4.1-2), which have the potential to affect air quality, noise, property values, and road congestion in the vicinity of the California ports and processing facilities. In addition, barge transportation to and from the platforms and ports has the potential to affect subsistence fishing along the barge routes.

4.2.13.1 Alternative 1

Under Alternative 1, decommissioning activities have the potential to affect local air quality, noise levels, and subsistence fishing along barge transportation routes, as well as local air quality, noise levels, and property values in the vicinity of the port and scrap processing facilities. In accordance with 40 CFR 1508.7 and 1508.8, BOEM has considered potential cumulative, direct, and indirect impacts on minority and low-income populations in the analysis area (BOEM 2017). As measured on a county-wide basis, there are minority populations, but no low-income populations (as defined using standard criteria described in Section 3.14 and 2020 Census data) in each of the counties in the four-county region of influence. At a local level, similarly, minority populations, but no low-income populations were identified within a 3.2-km (2-mi) region of influence (ROI) area surrounding port facilities at Los Angeles/Long Beach and Port Hueneme (Section 3.14). These ports are likely to be used to receive at least a portion of scrap materials produced from platform and pipeline decommissioning, although major portions of materials may be shipped to ports in the GOM or overseas.

Previous NEPA reviews for conductor removals of Point Arguello and Santa Clara Unit platforms, provided as Appendices A and B (BOEM 2020, 2021), similarly identified low-income and/or minority populations near these ports or along the 20-km (12.5-mi) truck route between Port Hueneme and Standard Industries, a potential scrap yard. They concluded that, due to the limited scope and project duration, significant impacts on low-income or minority populations near staging areas or along the truck route would not occur.

If under Alternative 1, port facilities at Los Angeles/Long Beach and Port Hueneme were similarly used for disposition of all platform materials, the total material volume of about 431,000 tons from the 23 platforms would represent about 20 times the volume of the conductors removed from the five platforms included in the two EAs.

The total duration and average level of activity required to process all platform materials, can be projected from that required for the largest platforms, such as Harmony. Such platforms are estimated take up to 1,191 days, or roughly 3 years, to disassemble, cut up, and transfer to trucks at the ports for shipment to scarp yards, according to assumptions BOEM's DEEP model for air emissions (BOEM 2019). Transport of the 72,549 tons of Harmony material would require 3,600 truckloads using 20-ton trucks, or roughly six round trips per day over the estimated 591 days required to remove the platform (Section 4.2.2.1), or roughly three round trips per day over the estimated 1,191 days to dismantle and cut up the largest platforms at ports (BOEM 2019). Because Harmony contains about 17% of all materials in the 23 platforms, transporting all materials would require 21,600 truck trips and the period of truck traffic at six round trips per day would grow to 3,545 days, or roughly 10 years, and at three round trips per day to 7,090 days, or roughly 19 years.

The effects from noise from an additional three to six round trips per day of estimated truck traffic would not likely be discernible above existing traffic noise in the communities along truck routes, while noise from heavy equipment used at transfer yards would fall to background levels before reaching residential areas (Section 4.2.2.1). Assessing the cumulative effects of potential vehicle and equipment emissions on communities near ports and along truck routes over a one- to two-decade period requires analysis of site-specific plans.

Impacts on low-income or minority communities will be assessed when individual decommissioning applications are received, and site-specific information is available to conduct a meaningful analysis. Specific local populations and potential effects of decommissioning on air quality, noise levels, property values, road congestion, and subsistence fishing for those communities will be identified and evaluated when decommissioning applications are received to allow for site-specific review.

Sub-alternative 1a. There are no relevant IPFs and thus there would be no direct, indirect, or cumulative impacts on onshore low-income or minority communities from explosive removal of platform jackets.

4.2.13.2 Alternative 2

Under this alternative, there would be less platform infrastructure and no pipeline and power cable removed for processing and land disposal than under Alternative 1. Decommissioning activities under this alternative would have a similar, but reduced, potential to affect air quality, noise levels, subsistence fishing, property values, and road congestion in the ROI area around the ports and processing facilities. As for Alternative 1, impacts on low-income or minority populations will be assessed when individual decommissioning applications are received, and site-specific information is available to conduct a meaningful analysis.

Sub-alternative 2a. There would be no direct, indirect, or cumulative impacts on onshore low-income or minority communities from using explosive severance for partial removal of platform jackets.

4.2.13.3 Alternative 3

Decommissioning under Alternative 3 has the same potential to affect air quality, noise levels, property values, road congestion, and subsistence fishing as under Alternative 2. The RTR disposal of the platform jackets may increase recreational traffic between shore facilities and the RTR sites, potentially adding to traffic congestion, air emissions, and noise levels in coastal communities, which may in turn affect subsistence fishing activities. Impact on low-income or minority populations will be assessed when individual decommissioning applications are received, and site-specific information is available to conduct a meaningful analysis.

Sub-alternative 3a. There would be no direct, indirect, or cumulative impacts on onshore low-income or minority communities from using explosive severance for partial removal or toppling of platform jackets.

4.2.13.4 Alternative 4

Under Alternative 4, there would be no acceptance or authorization of decommissioning applications, and no pre-severance, severance, or disposal activities would occur. Platforms would remain in place, but no O&G production activities would be occurring. As a result, under this alternative there would be negligible impacts on the environment in the vicinity of ports or coastal communities, and thus, no environmental justice impacts.

4.2.13.5 Cumulative Impacts

Reasonably foreseeable future activities and actions could contribute to cumulative impacts on minority and low-income populations in the potentially affected portions of the southern California POCS. These activities include offshore wind energy development in the Morro Bay Wind Energy Area, increased military training in designated military use areas, and increases in commercial shipping and recreational boating. Wind energy development and platform decommissioning would likely only produce negligible increases in barge and boat traffic, and while increases in truck traffic to deliver equipment necessary for offshore wind development and platform decommissioning could produce air and noise impacts and road congestion leading to decreases in property values in the vicinity of the POLA, POLB, and Port Hueneme, compared to existing conditions, these impacts are expected to be negligible. Boat traffic to support increased military training in designated military use areas and increases in commercial shipping and recreational boating in traffic lanes in the vicinity of port facilities have the potential to affect subsistence fishing, although any increases in traffic are expected to be negligible compared to existing levels, meaning subsistence impacts are expected to be negligible.

Each of the alternatives is expected to have negligible impacts on potentially affected resources, and any impacts that might result under each alternative are expected to be temporary. Impacts from the implementation of any of the alternatives is not expected to result in any measurable cumulative effects on environmental justice in the project area.

4.2.14 Socioeconomics

IPFs affecting socioeconomics include economic activity resulting from the removals; numbers and types of jobs created; income; taxes; and impacts; if any, on local housing; schools; medical; and other local services created by an influx of workers.

Included in the assessment of the socioeconomic impacts of platform decommissioning are the impacts on recreation and tourism in the vicinity of platforms, and in the ports that would be used to provide decommissioning transportation services. The impacts of decommissioning expenditures on employment, income, and tax revenues, and of any population in-migration on housing and community and social services, are also assessed, for a four-county region of influence.

There are various recreation and tourism activities occurring in shoreline parks, reserves, sanctuaries, marine protected areas, beaches, and public-access sites in the coastal zone, including beach recreation, surfing, sightseeing, diving, and recreational fishing, that could potentially be affected by platform decommissioning. In addition, fishing and scuba diving around shut-in and decommissioned platform structures have also become popular recreational activities. The impacts of decommissioning on these activities, and on commercial fishing in the vicinity of platforms and along barge transportation routes, and on the revenues, employment, income, and tax revenues generated by firms providing tourism and recreation services, and on commercial fishing firms, are assessed qualitatively.

To assess the impacts of platform decommissioning on employment, income and tax revenues, cost estimates were obtained for the various decommissioning activities at each platform, including topside superstructure, full or partial jacket, pipeline and power cable removal, seafloor clearance, and the transportation of decommissioned platform, pipeline, and power cable materials to scrap processing facilities located at or near ports (InterAct PMTI 2020). These estimates were then used to establish a high-impact scenario based on the platform with the highest decommissioning costs, and a low-impact scenario based on the platform with the lowest decommissioning costs. All decommissioning activities were assumed to be accomplished in a single year.

The analysis estimated the employment, personal income, and state and local tax impacts of decommissioning activities in the region of influence These impacts include direct effects, which are the employment, personal income, and tax revenues that would be created by companies and contractors involved in decommissioning activities; and indirect effects, which are the employment, personal income, and tax impacts that would be created in the remainder of the economy of the four-county region as a result of spending occurring at the platforms during decommissioning. Many of many of the direct jobs created are expected to be higher-paid, some of which would be filled from outside the four-county region, while many of the indirect jobs would be lower-paid, filled by individuals already living in the four-county region. Indirect impacts are estimated using IMPLAN data (IMPLAN 2020).

4.2.14.1 Alternative 1

Under Alternative 1, preparation for decommissioning (the pre-severance phase), and the subsequent the removal of platform structures and associated infrastructure (the severance phase), would have negligible impacts on recreational fishing and boating, and on coastal and waterborne tourism and recreation. There would also be negligible adverse effects on scuba diving and on employment, income, and tax revenues generated by companies providing scuba diving services. During the disposal phase, the transportation of platform infrastructure (e.g., topside infrastructure, jacket segments, pipelines) would be expected to involve only a small number of barge trips per platform. Thus, the impact of barge traffic on recreational boating and fishing is expected to be negligible. Truck traffic into Los Angeles/Long Beach or Port Hueneme to deliver equipment necessary for decommissioning platforms is not expected to be significant or produce visual or noise impacts in areas used by recreationists and tourists. Overall, the impacts of Alternative 1 on recreation and tourism are expected to be negligible.

The removal of platform structures, power cables and pipelines would have minor impacts on employment, income, and state and local tax revenues in the four-county region of influence. Based on platform-specific BSEE cost data, total employment created under Alternative 1 within this region of influence would range from 174 to 1,712 jobs, the associated increase in total personal income would range between $20.7 million and $203.2 million, and the additional state and local tax revenues would range from $4.0 million to $39.2 million (Table 4.2.14-1). As the number of jobs created from decommissioning activities would be less than 0.1% of total employment in the four-county region, with existing unemployment in the occupational groups likely to be affected, there would only be negligible in-migration of population from outside the region, and consequently negligible impacts on housing and on community and social services. The impacts on tourism and recreation services, and on commercial fishing activity, are also expected to be negligible.

TABLE 4.2.14-1 Potential Increases in Total Jobs Created, Total Personal Income, and Additional Tax Revenues for the Four Decommissioning Alternatives

	Alternative 1		Alternative 2		Alternative 3		Alternative 4
Category	Low Impact Scenario	High Impact Scenario	Low Impact Scenario	High Impact Scenario	Low Impact Scenario	High Impact Scenario	Per Platform
Total Number of Jobs Created	174	1,712	124	1,056	110	686	14
Total Personal Income ($millions)	20.7	203.2	14.4	122.1	12.7	79.3	1.6
Total Local and State Tax Revenue ($millions)	4.0	39.2	2,7	23.1	2.4	15.0	0.3

Sub-alternative 1a. The use of explosive severance for sectioning jackets and severing conductors would shorten removal timeframes and lower the cost of decommissioning. Thus, this sub-alternative would produce fewer jobs and reduce income and taxes paid compared to

Alternative 1, which assumes non-explosive severance. Impacts on recreation and tourism would also be reduced by shortened schedules.

4.2.14.2 Alternative 2

Impacts from decommissioning on tourism and recreation under Alternative 2 would be the same as those identified for Alternative 1, but of lesser magnitude and duration due to the smaller amount of platform infrastructure that would be removed and transported to port for disposal. Thus, overall impacts of Alternative 2 on tourism and recreation would be negligible.

Under Alternative 2, with the partial removal of platform structures, there would be minor impacts on employment, personal income, and state and local tax revenues in the four-county region of influence. Within the four counties, under this alternative, total employment created would range from 124 to 1,056 jobs, total personal income would increase between $14.4 million and $122.1 million, and increases in state and local tax revenues would range from $2.7 million to $23.1 million (Table 4.2.14-1). As with Alternative 1, the number of jobs created from decommissioning activities would be less than 0.1% of total employment in the four-county region. As there would be negligible in-migration from outside the region, impacts on population, housing, or community and social services would be negligible. The impacts on tourism and recreation services, and on commercial fishing activity, are expected to be negligible.

Sub-alternative 2a. Use of explosive severance for partial removal of jackets and for severing conductors would reduce work schedules under Sub-alternative 2a compared to Alternative 2. Jobs, income, taxes, and other socioeconomic impacts would be somewhat less than Alternative 2.

4.2.14.3 Alternative 3

Impacts under Alternative 3 would be the largely the same as those identified for Alternative 2, namely negligible. As portions of platform jackets will be used to produce artificial reefs at RTR sites, there will be economic benefits at those locations. This new marine habitat will have a minor positive impact on recreational fishing, boating, and scuba diving in the longer term, once reefs are established, and on employment, income, and tax revenues generated by scuba diving services. While there would be less barge traffic transporting platform materials to port for disposal, but additional traffic associated with the transport of the jacket structures to RTR sites, the overall amount of barge traffic would be low and have negligible impacts on recreation and tourism.

Similar to Alternative 2, impacts on employment, income, and state and local tax revenues in the four-county region of influence would also be minor. Total employment created would range from 110 to 686 jobs, less than 0.1% of total employment in the four-county region; the associated increase in total personal income ranges between $12.7 million and $79.3 million; and increases in state and local tax revenues would range from $2.4 million to $15.0 million

(Table 4.2.14-1). There would be negligible impacts on population, housing, or community and social services. The impacts on tourism and recreation services, and on commercial fishing activity, are also expected to be negligible.

Sub-alternative 3a. Use of explosive severance for partial removal or toppling of jackets and severing conductors would reduce work schedules somewhat under Sub-alternative 3a compared to Alternative 3. Jobs, income, taxes, and other socioeconomic impacts would be less than Alternative 3.

4.2.14.4 Alternative 4

Under Alternative 4, there would be no acceptance or authorization of decommissioning applications. Platforms would remain in place, but no O&G production activities would be occurring. Thus, Alternative 4 is expected to have negligible impacts on recreational fishing, scuba diving, or recreational boating. With the structures still in place, there would continue to be impacts on visual resources, but this would not affect recreational activities and tourism in the area. Thus, the overall impacts of Alternative 4 on recreation and tourism and recreation would be negligible.

Under Alternative 4, it was assumed that a small, part-time workforce would be required to monitor conditions on a shut-in platform, regardless of the platform, producing negligible socioeconomic impacts in the four-county region of influence. A total of 14 jobs would be created for each platform, producing $1.6 million in personal income, and $0.3 million in state and local tax revenues (Table 4.2.14-1). There would be no impact on population growth, housing, or community and social services. The impacts on tourism and recreation services, and on commercial fishing activity, are expected to be negligible.

4.2.14.5 Cumulative Impacts

Past, present, and reasonably foreseeable future activities and actions could contribute to cumulative impacts on recreation and tourism and socioeconomic conditions in the potentially affected portions of the southern California POCS.

Reasonably foreseeable future activities and actions could contribute to cumulative impacts on recreation and tourism in the potentially affected portions of the southern California POCS. These activities include offshore wind energy development in the Morro Bay Wind Energy Area, increased military training in designated military use areas, and increases in commercial shipping and recreational boating. As wind energy development would only occur in the northernmost portion of the area in which platforms are located, and would likely only produce negligible increases in barge and boat traffic during turbine construction; which, together with negligible increases in barge traffic during platform decommissioning, would mean that the overall impact of barge traffic on recreational boating and fishing would be negligible. Although increases in military activity are unlikely in the areas used for wind power developments or O&G platforms, activity could occur outside these areas, meaning increases in military traffic in coastal ports leading to negligible impacts on tourism and recreation in the area around coastal ports. It is assumed that shipping accompanying these activities would use smaller ports, which are less likely to be congested with international container traffic and coastal cargo shipping.

Increases in commercial shipping and recreational boating could occur during wind development and platform decommissioning, but given the negligible increase in barge and boat traffic during these activities, the overall impact of each of these activities on tourism and recreation in the area would be negligible. Truck traffic into the POLA and the POLB or Port Hueneme to deliver the equipment necessary for wind development and platform decommissioning is expected to be negligible, and would produce negligible visual, air quality, or noise impacts compared to existing conditions in areas used by recreational visitors and tourists.

Past, present, and reasonably foreseeable future activities and actions could contribute to cumulative impacts on socioeconomic conditions in the potentially affected portions of the southern California POCS. Reasonably foreseeable future activities that could contribute to cumulative impacts on socioeconomics include offshore wind energy development in the Morro Bay Wind Energy Area, increased military training in designated military use areas, and increases in commercial shipping and recreational boating. Wind energy development would only occur in the northernmost portion of the area in which platforms are located, and would likely only produce negligible barge and boat traffic during the construction of turbines. Based on data presented in National Renewable Energy Laboratory (NREL) (2022), the impact of expansion in the supply-chain to support wind development in Morro Bay on employment, income, and tax revenues in the four-county region of influence is expected to be negligible.

Although increases in commercial shipping and recreational boating could occur during wind development and decommissioning, there were about 3,870 container ship arrivals into the POLA and the POLB in 2019 (see Section 3.13), meaning that impact of each of these activities on employment, income, and tax revenues in the region of influence would be negligible. Increases in military activity are unlikely in area used for wind power developments or O&G platforms, yet activity could occur outside these areas, resulting in military traffic in coastal ports leading to negligible impacts on employment, income, and tax revenues in the region of influence.

Each of the decommissioning alternatives is expected to have negligible impacts on potentially affected resources, and any impacts that might result under each alternative are expected to be temporary. Impacts from the implementation of any of the alternatives is not expected to result in any measurable cumulative effects on socioeconomic conditions in the project area.

4.2.15 Commercial Navigation and Shipping

IPFs affecting commercial navigation and shipping involve mainly space-use conflicts between work vessels and commercial shipping during all stages of decommissioning

(Table 4.1-2), but most likely during disposal. Mitigation measures for these impacts are presented in Table 4.1-3 and the definition of impact levels is presented in Table 4.1-4.

4.2.15.1 Alternative 1

Under Alternative 1, there would be a small increase in surface vessel traffic in the immediate vicinity of the platform undergoing decommissioning. These vessels might include lift crane vessels, supply and utility boats, tugboats, offshore support vessels (OSVs), and barges. The supply and utility vessels would be intermittently moving between the platform undergoing decommissioning and one or more port locations from which decommissioning-related equipment, supplies, and personnel would be transported to the platform or returned to port. The tugboat and barge traffic would occur primarily between the platform and the port locations where topside and jacket structures would be offloaded for transport to a processing facility.

During the pre-severance phase, decommissioning vessel traffic would be associated with the mobilization of cranes, barges, and crews to the platform site. The number of vessels that would be needed at a platform would depend on platform-specific characteristics such as its location and associated water depth, which would dictate the required number of barges as well as the number of support vessels and their frequency of travel between a port and the platform.

During the severance phase, some of the decommissioning vessels (e.g., lift cranes, barges) would be largely stationary at the platform location, and vessel traffic would primarily consist of supply and utility boats traveling between ports and platforms. The number and frequency of supply and utility vessel traffic would also be a function of platform location and size. Additional vessels might be required for pipeline and power cable removal, and these would travel along the paths of the pipelines and power cables. As none of the pipelines occur in or cross designated shipping safety fairways or traffic lanes, pipeline removal is not expected to affect commercial navigation or shipping.

Vessel traffic during disposal would be primarily tugboats and barges transporting platform infrastructure to shore. As with the earlier decommissioning phases, the number of barges and tugboats would be a function of the platform location and water depth. More barges, and thus, tugboat-assisted trips would be needed for platforms in deeper waters (due to larger platform jackets), and travel times would be longer for platforms farther away from the receiving ports.

All decommissioning-related vessel traffic, regardless of decommissioning phase, will be required to follow established shipping safety fairways,[2] traffic lanes,[3] and traffic separation

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[2] *Shipping safety fairway or fairway* means a lane or corridor in which no artificial island or fixed structure, whether temporary or permanent, will be permitted.

[3] A *traffic lane* means an area within defined limits, in which one-way traffic is established (33 CFR 167.5 (c)).

schemes[4] (see Section 3.13) to the extent feasible when traveling between ports and platforms. Because no POCS platforms are located within designated vessel traffic lanes, it is assumed that decommissioning vessels would follow the most direct route feasible between platforms and designated vessel traffic lanes. All decommissioning-related vessel traffic would be expected to fully comply with the traffic requirements when within the designated Precautionary Areas[5] at the POLA and POLB.

Compared to the existing volume of vessel traffic in the area (e.g., the POLA and POLB combined receive about 4,000 commercial and cruise vessel arrivals annually, many of which come through the Santa Barbara Channel), under Alternative 1 there would be a largely negligible addition of vessel traffic to the area. Alternative 1 would have negligible effects on congestion of traffic lanes in the Santa Barbara Channel or on those leading to the POLA and POLB. None of the POCS platforms are in any traffic lanes or Precautionary Areas, and thus, activities such as topside and jacket removal would not be expected to interfere with commercial vessel transit.

The removal of the POCS platforms, and especially those that are near traffic lanes or Precautionary Areas (e.g., Platform Edith is near the Precautionary Area and the northbound traffic lane into the POLA and POLB, and Platform Gail adjacent to the northwest traffic lane in the Santa Barba Channel) could result in positive impacts associated with the elimination of potential platform-vessel allisions following completion of decommissioning.

The principal concerns to commercial fishing vessel traffic that could arise during decommissioning are a potential for space-use conflicts and hindrances to navigation due to the anchoring, positioning, and transit of decommissioning support vessels. Because commercial fishing vessels generally avoid waters directly adjacent to the platforms due to concerns related to snagging of fishing gear, such space-use conflicts are not anticipated under the Alternative 1, and those associated with the platforms would no longer exist following platform removal. While commercial fishing vessels currently do not typically transit between closely located platforms (e.g., Platforms A, B, C, and Hillhouse; Platforms Henry, Houchin, and Hogan), these areas would be available for vessel transit following removal of the platforms. While there is a potential for space-use conflicts during pipeline and power cable removal, any such conflicts would be restricted to the transient presence of the support vessels along the pipelines and cables. Thus, space-use conflicts would be very temporary, very localized, and result in negligible impact on commercial fishing vessel traffic.

While some POCS maritime traffic likely uses existing POCS platforms as unofficial navigation aids or “landmarks” in some areas, only temporary minor effects related to course disorientation could result with platform removal. As some of the features associated with the platforms (e.g., mooring and marker buoys) currently hold Private Aid to Navigation (PATON) permits with the U.S. Coast Guard, BOEM would ensure that a platform operator submits the

[4] A *traffic separation scheme* (TSS) is a designated routing measure aimed at the separation of opposing streams of traffic by appropriate means and by the establishment of traffic lanes (33 CFR 167.5(b)).

[5] A *precautionary area* is a routing measure comprising an area within defined limits where ships must navigate with particular caution, and within which the direction of traffic flow may be recommended (33 CFR 67.5(e)).

appropriate removal applications to the USCG District issuing the PATON. Once the USCG District confirms the removal, the USCG coordinates with NOAA for the removal of the PATON from applicable nautical maps and lists.

Adverse impacts on commercial navigation and shipping resulting from decommissioning under Alternative 1 would be negligible. There would be positive impacts from platform removals with the elimination of the potential for platform-vessels allisions, removal of navigation hinderances, and elimination of space-use conflicts for commercial fishing vessels.

Mitigation measures to reduce potential impacts may include:

- *Mandatory Vessel Traffic and Coastwise Shipping Lanes*. Where feasible, decommissioning vessels will operate within the established vessel traffic lanes.

- *Voluntary Traffic Lanes To/From the Project Platforms*. Where feasible, decommissioning vessel traffic will follow currently used direct voluntary traffic lanes[6] from the POLA/POLB to the Platforms.

- *Navigational Safety*. At all times, decommissioning-related vessels will operate using the highest level of navigational safety and in accordance with international and USCG regulations and guidelines.

- *USCG-Approved Day Shapes*. In accordance with USCG requirements and to alert nearby vessels, the work vessels at a platform will "fly" the appropriate "day shapes" that specify that the vessel is engaged in project activities and that it has limited maneuverability.

- *Posting of Notices*. A document that shows and describes the proposed decommissioning activities will be posted at the Harbor Master's office at the POLA and the POLB, the Port of Hueneme, the Long Beach Marina, Anaheim Bay/Huntington Harbor, Newport Bay, and other marinas. That document will provide information on the proposed decommissioning activities, contact information for all decommissioning-related vessels and their responsible personnel, and will have a map depicting the ocean area affected.

- *Notice to Mariners*. At least 15 days prior to in-water activities, a local Notice to Mariners (NTM) will be submitted to the 11th District, U.S. Coast Guard and, as

6 To address the safety concerns created by increased traffic south of the Channel Islands, on October 6, 2009, the Los Angeles/Long Beach Harbor Safety Committee (LA/LB HSC) endorsed voluntary traffic lanes in the area south of the Channel Islands (referenced herein as "voluntary western traffic lanes"). The LA/LB HSC developed these lanes as a voluntary measure to promote vessel safety.

required, to the Captain of the Port.[7] This notification will specify vessel and personnel contact information, the scope of the proposed decommissioning actions, location, and the anticipated duration of the decommissioning activities.

Sub-alternative 1a. Use of explosive severance for sectioning platform jackets and severing conductors would reduce overall work schedules, and thus, reduce the duration of potential space-use conflicts as compared to Alternative 1.

4.2.15.2 Alternative 2

Compared to Alternative 1, Alternative 2 would require fewer decommissioning vessels using established vessel traffic lanes in the Santa Barbara Channel and leading to the POLA and the POLB. Because only a portion of the platform jacket would be removed and transported to port for disposal, fewer supply/utility vessels and barges would be required, and their activities would occur over a shorter time. Due to pipelines being abandoned in place, there would be minimal decommissioning-related vessel traffic along the pipeline routes, with traffic limited to the vessels associated with pipeline plugging and burial of the plugged pipeline ends.

Due to fewer decommissioning-related surface vessels for a shorter period, there would be fewer potential impacts on shipping and navigation than identified for Alternative 1. Thus, impacts on navigation and shipping would be negligible. As under Alternative 1, the removal of the platforms under Alternative 2 would result in a positive impact due to the elimination of the potential for platform-vessel allisions and the removal of navigation hindrances for commercial navigation and shipping, and there would be a reduction in space-use conflicts with commercial fishing vessels.

Sub-alternative 2a. Use of explosive severance for partial removal of jackets and for severing conductors would reduce work schedules, and thus, the duration of space-use conflicts compared to Alternative 2.

4.2.15.3 Alternative 3

Under Alternative 3, impacts on navigation and shipping would be similar to those identified for Alternative 2, except for a small amount of additional vessel traffic (primarily tugboats and barges) associated with the transport of platform jackets to other location along southern California for an RTR conversion. It is anticipated that the transport of the severed jacket structure to an artificial reef location would occur along designated shipping safety fairways and traffic lanes to the extent feasible, following USCG shipping regulations and safety requirements. No platform jackets would be placed in areas where they would interfere with or

[7] The term Captain of the Port means the officer of the Coast Guard, under the command of a District Commander, so designated by the Commandant for the purpose of giving immediate direction to Coast Guard law enforcement activities within the general proximity of the port in which he is situated (33 CFR Part 125).

pose a threat to navigation and shipping. Impacts under Alternative 3 to navigation and shipping would be negligible.

Sub-alternative 3a. Use of explosive severance for partial removal or toppling of jackets and for severing conductors would reduce work schedules, and thus, the duration of space-use conflicts compared to Alternative 3.

4.2.15.4 Alternative 4

Under Alternative 4, there would be no acceptance or authorization of decommissioning applications. As no pre-severance, severance, or disposal activities (including vessel traffic) would occur, no decommissioning-related impacts would be expected to commercial shipping and navigation. Platforms would remain in place, but no O&G production activities would be occurring. The platforms would continue to undergo periodic safety inspections, and aircraft and navigation safety lighting would continue. Under this alternative, the very small potential for platform-vessel allisions would remain. In addition, impacts associated with space-use conflicts and navigation hinderance between the platforms and commercial fishing vessels would continue at current levels.

4.2.15.5 Cumulative Impacts

Negligible impacts on navigation and shipping might occur under Alternative 1. The use of designated shipping traffic lanes by decommissioning vessels would result in only a very small incremental increase in overall shipping traffic on the POCS and using ports such as the POLA and the POLB. These ports are the highest-volume container ship ports in the Western Hemisphere (Rockwood et al. 2017; Silber et al. 2021). In 2019, there were 2,104 ship arrivals and 2,095 departures at the POLB; while in 2020, there were 1,533 arrivals and 1,501 departures at the POLA (Starcrest Consulting Group 2020, 2021). Any increased vessel traffic associated with platform decommissioning would cease with completion of the disposal phase of decommissioning. The incremental increases in vessel traffic would be temporary and neither add to nor interfere with long-term commercial shipping and navigation on the POCS.

Future activities that may increase or otherwise affect vessel traffic on the POCS include the development of offshore wind energy (e.g., in the Morro Bay and Humboldt Wind Energy Areas, offshore areas west of Gaviota). Large vessel traffic supporting offshore wind energy developments may be expected to increase vessel traffic at these areas of development and at ports supporting the developments. The small and temporary incremental increase in vessel traffic that would occur under Alternative 1 would not be expected to interfere with commercial navigation and shipping that might be expected with future wind energy development on the POCS.

The incremental contribution of increased vessel traffic associated with decommissioning activities (i.e., temporary support vessel traffic, transport barges) under Alternative 1 would not result in any significant cumulative impacts on navigation and shipping on the Southern California POCS.

4.3 SUMMARY OF ENVIRONMENTAL EFFECTS

The potential effects of the Proposed Action and alternatives on potentially affected environmental and cultural resources and social and economic systems or conditions are summarized and compared in Table 4.3-1.

TABLE 4.3-1 Summary Comparison of Potential Effects among Alternatives

Resource	Alternative 1 Proposed Action	Alternative 2	Alternative 3	Alternative 4 No Action
Resource	**Alternative 1 Proposed Action:** Proposed Action: Review and Approve or Deny Decommissioning Applications for Complete Removal of Platforms Employing Non-explosive Severance; Removal of Associated Pipelines and other Facilities and Obstructions; Onshore Disposal. Sub-Alternative 1a. Same as Alternative 1, but with Explosive Severance of Platform Jackets.	**Alternative 2:** Review and Approve or Deny Decommissioning Applications for Partial Platform Removal Employing Non-explosive Severance; Removal of Accessible Facilities and Obstructions; Onshore Disposal; Abandonment-in-Place of Associated Pipelines. Sub-Alternative 2a. Same as Alternative 2, but with Explosive Severance of Platform Jackets.	**Alternative 3:** Review and Approve or Deny Decommissioning Applications for Partial Platform Removal Employing Non-explosive Severance with Upper Jackets Placed in an Artificial Reef; Removal of Accessible Facilities and Obstructions with Onshore Disposal; and Abandonment-in-Place of Associated Pipelines. Sub-Alternative 3a. Same as Alternative 3, but with Explosive Severance of Platform Jackets.	**Alternative 4 No Action:** No Review of, or Decision on, Decommissioning Applications.
Air Quality	Under Alternative 1, temporary and minor impacts on regional air quality from emissions of criteria pollutants from diesel engines on heavy equipment, barges, tugboats, and crew and supply vessels used in pre-severance, severance, and disposal phases of decommissioning. GHG emissions from vessels and equipment. Under Sub-alternative 1a, air emissions compared to Alternative 1 would be reduced, mainly through decreased barge time and no requirement for support equipment for cutting during jacket removal.	Similar to but less than Alternative 1 due to reduced emissions during severance and disposal phases resulting from only the partial removal of platform jackets. During pre-severance, emissions would be similar to those under Alternative 1. Under Sub-alternative 2a, air emissions would be reduced compared to Alternative 2 and Sub-alternative 1a, mainly through decreased barge time and no requirement for support equipment for cutting during jacket removal.	Similar to but less than Alternative 1 due to reduced emissions during severance and disposal phase resulting from jacket removal by reefing, and similar to Alternative 2. Emissions under Sub-alternative 3a would be less than under Alternative 3, and similar to levels under Sub-alternative 2a, as both have about the same number of explosive severances required.	Negligible impacts from vessels and helicopters used during periodic platform and pipeline inspection or maintenance.
Acoustic Environment (Noise)	Under Alternative 1, temporary and localized minor impacts from continuous or impulsive underwater or airborne noise on ecological receptors or coastal communities from noise sources on vessels and equipment used in pre-severance, severance, and disposal phases of decommissioning of platforms, pipelines, and power cables. Under Sub-alternative 1a, in the absence of mechanical jacket cutting there would be some reduction in continuous underwater noise, but replaced by impulsive underwater noise due to the use of explosives for jacket severance.	Under Alternative 2, similar to but less than Alternative 1 due to reduced duration for jacket removal and elimination of pipeline removal. Under Sub-alternative 2a, underwater noise would be similar to that under Sub-alternative 1a, but reduced due to no subseafloor jacket removal.	Under Alternative 3, similar to Alternative 2, with minor additional noise generation during rigs-to-reef jacket disposal. Explosive severance could be used for some reefing options. Under Sub-alternative 3a, underwater noise would be similar to that under Sub-alternative 2a.	Negligible impacts from vessels and helicopters used during periodic platform and pipeline inspection or maintenance.

TABLE 4.3-1 (Cont.)

Water quality	Under Alternative 1,negligible to temporary and localized minor impacts during pre-severance; during severance, temporary and minor impacts from vessel discharges, wastes from mechanical severance activities, and potential leaks from pipelines, equipment, or topside structures; and temporary and localized moderate impacts from bottom disturbance related to jacket severance, shell mound removal, pipeline and other facility removal, and seafloor clearance. Under Sub-alternative 1a, impacts on water quality would be similar to those under Alternative 1 except that impacts on water quality from vessel anchoring and discharges would be reduced due to reduced work schedules afforded by explosive severance.	Less than Alternative 1 due to smaller impacts from vessel discharges and elimination of nearly all water quality impacts associated with bottom disturbance that would occur under Alternative 1 with complete platform and pipeline removal; minor seafloor disturbance and associated turbidity from capping and burying pipeline ends. Under Sub-alternative 2a, impacts on water quality would be similar to those under Alternative 2, except that impacts on water quality from vessel anchoring and discharges would be reduced due to reduced work schedules afforded by explosive severance.	Under Alternative 3, impacts would be similar to those under Alternative 2, except some small impacts from vessel discharges during jacket transport for rigs-to-reef disposal. Under Sub-alternative 3a, impacts to water quality would be similar to those under Alternative 3, except that impacts on water quality from vessel anchoring and discharges would be reduced due to reduced work schedules afforded by explosive severance.	Negligible impacts from platform inspections, maintenance; pollution control measures would prevent impacts on water quality from platforms.
Marine Invertebrates and Benthic Habitat	Under Alternative 1, negligible to minor impacts during pre-severance, dependent on extent of vessel anchoring. During severance, localized temporary moderate impacts from noise, turbidity, and sedimentation. Permanent loss of jacket- and pipeline-related habitat (including shell mounds) would result in localized moderate impacts. Potential reduction in geographic spread of invasive species that may be colonizing platforms. Negligible impacts from disposal. Negligible impacts on threatened and endangered species. While potentially significant locally, the loss of platform- and pipeline-related hard bottom habitat is unlikely to result in significant, long-term changes in marine invertebrate communities of the POCS. Under Sub-alternative 1a, impacts would be similar to those under Alternative 1, except that explosive removal of the jacket would result in impulsive noise impacts that could kill, stun, or displace marine invertebrates in the immediate vicinity. Impacts from continuous noise from work vessels and from vessel anchoring and discharges would be reduced compared to Alternative 1 due to reduced work schedules afforded by explosive severance.	Impacts under Alternative 2 would be similar to those of Alternative 1 (overall moderate) but of lesser magnitude. Loss of hardbottom habitat would be limited largely to the upper portions of the platform jackets, and there would be greatly reduced disturbance of the seafloor and shell mounds. Remaining jacket infrastructure could continue to facilitate spread of some invasive species. There would be much less disturbance of seafloor habitat as pipelines would be abandoned in-place. Under Sub-alternative 2a impacts would be similar to those under Alternative 2, except that explosive severance could kill or stun benthic and pelagic invertebrates within, or displace them from, the area of the explosion, an impact that would not occur under Alternative 2. Such impacts would be reduced compared to Sub-alternative 1a due to the reduced level of jacket severance under Sub-alternative 2a.	Under Alternative 3, the impacts would be similar to those under Alternative 2 (overall moderate). However, with rigs-to-reef jacket disposal, localized positive impacts may be realized from the creation of new hardbottom habitat. Under Sub-alternative 3a, impacts would be similar to those under Sub-alternative 2a, and localized positive impacts may be realized from the creation of new hardbottom habitat through rigs-to-reef jacket disposal.	Negligible impacts. Platforms would continue serving as habitat supporting benthic communities.

TABLE 4.3-1 (Cont.)

Marine Fish and EFH	Under Alternative 1, overall, no more than moderate impacts. Negligible to minor impacts during pre-severance, dependent on extent of anchoring. During severance, localized temporary moderate impacts from noise and moderate impacts from sediment resuspension. Permanent loss of jacket- and pipeline-related hardbottom habitat (including shell mounds) would result in long-term but localized moderate impacts, which could be locally significant for some species. Negligible impacts from disposal. Negligible impacts on threatened and endangered species. While potentially significant locally, the loss of platform- and pipeline related hard bottom habitat is unlikely to result in significant, long-term changes in marine fish communities and productivity on the POCS. Negligible impacts on EFH and threatened and endangered species. Under Sub-alternative 1a, explosive severance of platform jackets would result in localized and temporary moderate impacts due to shock waves from impulsive noise that could kill, injure, or displace fish on the seafloor and in the water column in the vicinity of the explosion that would not occur under Alternative 1. However, the effects would be spatially limited, with the greatest effects within the vicinity of the platforms. Any fish mortality from explosive removal is not expected to result in population level impacts to fish communities in the POCS.	Similar to Alternative 1 (overall moderate), except impacts of lesser magnitude due to less habitat loss, less seafloor disturbance, and less associated decreases in fish productivity. Under Sub-alternative 2a, impacts would be similar to those under Alternative 2, except that the use of explosive severance methods could kill, injure, or displace fish on the seafloor and in the water column in the vicinity of the explosion, an impact that would not occur under Alternative 2. Such impacts would be reduced compared to Sub-alternative 1a due to reduced level of jacket severance that would be required under Sub-alternative 2a.	Similar to Alternative 2 (overall moderate), except localized positive impacts associated with increases in fish density and productivity could be realized in some areas from the creation of new hardbottom habitat from rigs-to-reef jacket disposal. Under Sub-alternative 3a, impacts would be similar to those under Sub-alternative 2a, except that localized positive impacts associated with new foraging habitat in some areas from the creation of new hardbottom habitat with rigs-to-reef jacket disposal.	Negligible impacts. Platforms would continue serving as artificial reefs supporting fish populations and communities.
Sea Turtles	Under Alternative 1, overall negligible to localized minor impacts. Negligible impacts during pre-severance, with potential minor impacts from vessel strikes. During severance, potential localized, temporary minor impacts noise, seafloor disturbance. The permanent loss of jacket- and pipeline-related foraging habitat (including shell mounds) would result in localized minor impacts. Negligible impacts from disposal. Under Sub-alternative 1a, impacts on sea turtles from explosive severance could range from non-injurious effects (e.g., acoustic annoyance; mild tactile detection or physical discomfort) to varying levels of injury (i.e., non-lethal and lethal injuries). Short-duration use of explosives and mitigation measures would limit the level of impact on sea turtles to minor.	Impacts under Alternative 2 would be similar to those under Alternative 1. Overall, most impacts would be negligible, except for vessel strikes that could be minor. Impacts associated with the loss of jacket-related foraging habitat would be of lesser magnitude than under Alternative 1. Under Sub-alternative 2a, impacts would be similar to those under Alternative 2, except that the use of explosive severance could result in injury and death from explosive shock waves, which would not occur under Alternative 2. Such risks would be reduced compared to Sub-alternative 1a due to fewer underwater severances required for partial removal of platform jackets.	Impacts would be similar to those under Alternative 2 (overall negligible to minor) except localized positive impacts associated with new foraging habitat in some areas from the creation of new hardbottom habitat. Impacts under Sub-alternative 3a would be similar to those under Sub-alternative 2a, except that localized positive impacts associated with new foraging habitat in some areas from the creation of new hardbottom habitat with rigs-to-reef jacket disposal.	Negligible impacts. Platforms and pipelines would continue serving as hardbottom foraging habitat.

TABLE 4.3-1 (Cont.)

Marine and Coastal Birds	Under Alternative 1, overall negligible to localized minor impacts. During severance, minor impacts from the loss of topside perching structures and jacket-related foraging habitat for diving seabirds, and harassment from continuous noise and decommissioning activities. Negligible impacts from disposal. Positive impacts would occur from elimination of lighting-related platform collisions by birds, especially during migration. Under Sub-alternative 1a, impacts from explosive severance are not anticipated to impact seabirds other than by possible harassment from explosive noise. Harassment from continuous noise and activities would be reduced compared to Alternative 1 due to reduced work schedules using explosive severance and reduction in non-explosive severance noise.	Under Alternative 2, impacts would be similar to those under Alternative 1, being overall negligible to localized minor. Under Sub-alternative 2a, the use of explosive severance could result in impacts to diving seabirds that would not occur under Alternative 2. However, harassment of marine and coastal birds from continuous noise and work activities under Sub-alternative 2a would be less than under Alternative 2 or Sub-alternative 1a due to shortened work schedules using explosive severance and reduction in non-explosive severance noise.	Impacts would be similar to those under Alternative 1. Positive impacts could be realized as a result of new foraging habitat being created in some areas following rigs-to-reef jacket disposal. Under Sub-alternative 3a, impacts would be similar to those under Sub-alternative 2a. Positive impacts could be realized as a result of new foraging habitat being created in some areas following rigs-to-reef jacket disposal.	Negligible impacts. Platform topsides would continue to provide perching and resting habitat, and diving seabirds would continue foraging around the jacket structures. Decreased potential for lighting-related bird-platforms collisions due to reduced platform lighting.
Marine Mammals	Under Alternative 1, temporary and localized minor impacts associated with potential for vessel strikes, noise disturbance, and loss of topside-associated pinniped haul-out habitat. Impacts from other activities would be negligible. Under Sub-alternative 1a, the use of explosives for jacket severance could result in disturbance, auditory injury, or non-auditory injury to marine mammals, including death to individuals, even with the implementation of mitigation measures, but would not be expected to result in population level effects. Thus, impacts could be up to moderate. Harassment from continuous noise would be reduced due to reduced work schedules using explosive severance and reduction in non-explosive severance noise.	Impacts would be similar to those under Alternative 1, but with reduced potential for vessel strikes due to smaller amount of support vessel traffic, and a reduced duration of noise impacts from mechanical cutting. Under Sub-alternative 2a, impacts would be similar to those under Sub-alternative 1a. Impacts under Sub-alternative 2a, however, would be less than under Alternative 2 or Sub-alternative 1a due to shortened work schedules using explosive severance.	Under Alternative 3, impacts would be similar to those under Alternative 2. Positive impacts could be realized as a result of new hardbottom habitat being created in some areas following rigs-to-reef jacket disposal.	No decommissioning-related impacts. A minor impact from vessel strikes would occur, but the potential for such strikes would be greatly reduced as vessel traffic to the platforms would be greatly reduced from current conditions.

TABLE 4.3-1 (Cont.)

Commercial and Recreational Fisheries	Decommissioning under Alternative 1 is anticipated to result in overall negligible impacts on commercial fishing from noise, turbidity and sedimentation, seafloor disturbance, space-use conflicts, and wastewater and trash from vessels and platforms. A possible minor benefit, as platform and pipeline removal would eliminate space-use conflicts and reduce potential for snagging loss of fishing gear. Negligible to minor impacts on recreational fishing due to reduction in fishing opportunities near existing platforms. Under Sub-alternative 1a, impacts on commercial and recreational fisheries would be reduced compared to Alternative 1, due to reduced work schedules, and thus, shorter disturbance times, potentially less anchoring, reduced abrasive cutting discharges, reduced vessel discharges, and reduced periods of space-use conflicts for vessels.	Impacts under Alternative 2 would be similar to those under Alternative 1, except that the remaining infrastructure (e.g., jackets and unburied pipelines) would continue to pose some potential for snagging loss. Recreational fishing opportunities would occur at the platform locations due to the remaining jacket structures and associated habitats and elimination of access restrictions that may have been previously present at the platforms. Under Sub-alternative 2a, impacts would be similar in nature but of reduced duration than under Sub-alternative 1a due to reduced work schedules and associated impacts from vessel noise, discharges, bottom disturbance, and space-use conflicts.	Impacts would be similar to those under Alternative 2 except for an additional benefit from increased recreational fishing opportunities at the rigs-to-reef jacket disposal site. Under Sub-alternative 3a, impacts to commercial and recreational fisheries would be similar to those under Sub-alternative 2a. Positive impacts to recreational fishing could be realized as a result of new hardbottom habitat being created in some areas following rigs-to-reef jacket disposal.	No decommissioning-related impacts. Potential for space-use conflicts and snagging loss of fishing gear would continue at current levels.
Areas of Special Concern	Negligible impacts under both Alternative 1 and Sub-alternative 1a.	Same as Alternative 1 and Sub-alternative 1a.	Same as Alternative 1 and Sub-alternative 1a.	Negligible impacts.
Archeological and Cultural Resources	Under Alternative 1, potential impacts to both submerged and land-based archaeological resources, including submerged precontact or historic archaeological sites, particularly shipwrecks, or built architectural resources would be minor; impacts to any platforms eligible as historic properties would be major and long-term. Since the seafloor disturbance footprint would be the same whether explosive or non-explosive severance is used for jacket removal, impacts on archaeological and cultural resources under Sub-alternative 1a would be the same as under Alternative 1.	Under Alternative 2, impacts would be similar to but less than Alternative 1, due to reduced seafloor disturbance from leaving lower jacket portions, as well as pipelines in place. Impacts under Sub-alternative 2a would be the same as Alternative 2.	Under Alternative 3, impacts would be similar to but less than Alternative 1 and similar to Alternative 2, with the slight possibility of additional disturbance of archaeological resources at the rigs-to-reef jacket disposal site. Impacts under Sub-alternative 3a would be the same as Alternative 3.	Negligible adverse impacts from maintenance activities, but continued impacts to the integrity of the cultural setting and integrity from the presence of the platforms and loss of positive impacts from platform removal to maritime and land-based traditional cultural properties.
Visual Resources	Impacts under both Alternative 1 and Sub-alternative 1a would be minor and short-term, associated with visual clutter by decommissioning vessels and work lighting at the platforms. The permanent removal of the platforms would restore the natural scenic quality of platform locations.	Similar impacts to those under Alternative 1 and Sub-alternative 1a. Impacts from vessel lighting and visual clutter would be reduced in duration under Sub-alternative 2a compared to Alternative 2.	Similar impacts to those under Alternative 2 and Sub-alternative 2a.	Negligible impacts.

TABLE 4.3-1 (Cont.)

Recreation and Tourism	Overall impacts under Alternative 1 and Sub-alternative 1a would be negligible during any of the three phases of decommissioning.	Similar impacts to those under Alternative 1 and Sub-alternative 1a.	Similar impacts to those under Alternative 2 and Sub-alternative 2a, except potential positive impacts associated with increased opportunities for diving and recreational fishing at the rigs-to-reef jacket disposal sites.	Negligible impacts.
Environmental Justice	Impacts on low income or minority populations under either Alternative 1 or Sub-alternative 1a will be assessed when individual decommissioning applications are received, and site-specific information is available to conduct a meaningful analysis.	Impacts under Alternative 2 and Sub-alternative 2a will be assessed when individual decommissioning applications are received, and site-specific information is available to conduct a meaningful analysis.	Impacts under Alternative 3 and Sub-alternative 3a will be assessed when individual decommissioning applications are received, and site-specific information is available to conduct a meaningful analysis.	Negligible impacts.
Socioeconomics	Under Alternative 1, there would be minor impacts associated with decommissioning-related employment, personal income, and local and state tax revenues. Negligible impacts to housing and to community and social services. Under Sub-alternative 1a, the use of explosive severance would shorten removal timeframes and lower the cost of decommissioning, producing fewer jobs and reducing income and tax revenues compared to Alternative 1.	Similar to Alternative 1, but of lower magnitude due to the smaller amount of platform infrastructure that would be removed and transported to port for disposal. Impacts under Sub-alternative 2a, would be similar to those under Sub-alternative 1a, resulting in decreases in decommissioning-related employment, personal income, and tax revenues.	Impacts associated with decommissioning-related employment, personal income, and tax revenues under Alternative 3 would be similar to those under Alternative 2. Impacts under Sub-alternative aa, would be similar to those under Sub-alternative 1a, with decreases in decommissioning-related employment, personal income, and local and tax revenues.	Negligible impacts.
Navigation and Shipping	There would be negligible adverse impacts to navigation and shipping under either Alternative 1 or Sub-alternative 1a. Positive impact from elimination of platform-vessel allision potential.	Impacts the same as under Alternative 1 and Sub-alternative 1a.	Impacts the same as under Alternative 1 and Sub-alternative 1a.	Under this alternative, the potential for platform-vessel allisions would remain.

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5 OTHER NEPA CONSIDERATIONS

5.1 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

5.1.1 Impacts on Physical Resources

Some unavoidable adverse effects on water and sediment quality would be expected to occur under each of the action alternatives, and would be greatest under Alternative 1, the Proposed Action. Seafloor disturbances during decommissioning activities (e.g., removal of conductors, jacket footers and pilings, subsea infrastructure, and pipelines) and during final site clearance and obstruction removal activities will result in unavoidable sediment mobilization into the water column. This would cause increased turbidity of the water column and would degrade water and sediment quality in the vicinity of a platform, pipeline, and associated facility. Similarly, seafloor disturbances resulting from anchoring of support vessels and barges would affect local water and sediment quality. In all instances, any such impacts, while unavoidable, would be temporary and localized in nature.

Temporary, unavoidable emissions of air pollutants would be expected to occur during all platform decommissioning activities, including during transport of platform structures to ports for processing and land disposal. Emissions of criteria air pollutants, along with reactive organic gases, could temporarily increase ozone and other pollutant concentrations near platforms and pipelines undergoing decommissioning, along the shipping routes used by support vessels and barges, and in areas downwind of these facilities and activities. Diesel particulate matter (DPM) will be released into the atmosphere from engines used for vessel propulsion, auxiliary equipment, emergency power, trucks, and trains. Odorous emissions may impact neighborhoods located along truck routes, adjacent to piers and quays, and in the vicinity of disposal facilities.

5.1.2 Impacts on Ecological Resources

Under the three action alternatives, marine mammals, sea turtles, and fish would be adversely affected by noise and other disturbances associated with underwater decommissioning activities, and especially if explosive severance methods are used for jacket removal. Although individual marine mammals, sea turtles, or fish could be injured, killed, or otherwise affected during decommissioning, population-level effects are unlikely.

Noise impacts, while unavoidable, would be mitigated to the extent practicable. Impacts from continuous decommissioning-related noise sources, such as vessel engines, would be short-term behavioral responses such as startlement, diving, and evasive swimming. Impacts of greatest concern would be from explosive severance, which may result in the injury or death of individual marine animals in the immediate vicinity of the platform, although overall populations would not be affected. Mitigation measures, including monitoring the presence of marine protected species prior to detonation, would be employed to minimize such impacts.

If an accidental spill were to contact marine biota, some individuals might not recover from the exposure, although populations of marine mammals, sea turtles, fish, and other marine biota would not be threatened.

Marine and coastal birds would be adversely affected by noise and disturbances associated with topside removal. Several marine and other birds, including the Peregrine Falcon, have used platform structures for roosting and nesting. Such platform-associated habitat represents only a very small portion of available roosting and nesting habitat for these species. The loss of platform-related habitat is not expected to affect the use of natural nesting and roosting sites on the Channel Islands or along the Southern California coast.

Unavoidable adverse effects on seafloor habitats, including essential fish habitat (EFH), and associated organisms could result from support vessel anchoring, jacket footer jetting, disturbance of shell mounds, and pipeline and power cable removal. Marine habitat and productivity that developed on the submerged jacket structures would be unavoidably lost.

5.1.3 Impacts on Social, Cultural, and Economic Resources

Commercial fisheries and, to a lesser extent, recreational fisheries will be adversely affected by the temporary loss of access to areas that would be occupied by decommissioning vessels and barges during topside and jacket removal. Commercial and recreational fishing access would also be temporarily restricted in areas undergoing pipeline removal or abandonment. Commercial trawling grounds may be lost under Alternatives 2 and 3 that leave some seafloor obstructions in place.

The decommissioning of the platforms and associated facilities would result in minor beneficial impacts on employment, income, and state and local tax revenues in the four-county region of influence.

Unavoidable adverse effects to unknown seafloor archaeological resources could occur under each of the action alternatives, and especially under Alternative 1, the Proposed Action. The complete removal of platforms and pipelines could displace, damage, or destroy seafloor archaeological resources. In addition, the removal of any platforms that may be designated as eligible for listing in the National Register of Historic Places (NRHP) as a historic property would be an unavoidable loss of a potential cultural resource.

Table 5-1 details potential unavoidable adverse impacts of the action alternatives by resource.

TABLE 5-1 Potential Unavoidable Adverse Impacts of the Action Alternatives (Unless Otherwise Noted), by Resource

Resource	Potential Unavoidable Impacts
Air Quality	Temporary impacts of air emissions from internal combustion engines associated with vessel traffic and decommissioning equipment.
Water Quality	Localized and temporary increases in turbidity and sediment resuspension during conductor removal. Localized and temporary increases in turbidity and sediment resuspension during removal (and to a lesser extent during abandonment-in-place) of pipelines, jackets, other seafloor-bounded facilities, and obstructions. Releases of abrasive cutting fluids during conductor and jacket severance, and inadvertent minor releases of fuels, residual petroleum in tanks and pipelines, and other liquids used during decommissioning under all action alternatives.
Marine Invertebrates and Fish, Benthic Habitats, and EFH	Disturbance, injury, and mortality of invertebrate and fish in the vicinity of the platform if explosive severance methods are used. Localized and temporary exposure of biota to sediment-associated contaminants released during seafloor disturbance. Localized and temporary impacts to habitat quality from increases in suspended sediments during seafloor disturbance. Loss of jacket-related habitat and conversion of platform-based habitat to open water pelagic habitat. Loss of shell mound habitat under Alternative 1 and potential reduction of shell inputs under Alternatives 2 and 3. Habitat impacts as a result of seafloor disturbance from anchoring (if used), shell mound excavation (Alternative 1), and removal of jacket, pipelines, other seafloor-bounded facilities, and obstructions. Displacement or loss of sea floor and water column biota due to habitat loss, equipment noise, vessel traffic, and increased turbidity and sediment deposition. Conversion of hard-bottom habitat to soft-bottom habitat in some areas due to removal of pipelines or pipeline-related infrastructure located on the seafloor surface.
Sea Turtles	Temporary and localized disturbance and displacement of individuals due to decommissioning noise, vessel traffic, increased turbidity, and sediment deposition. Disturbance, injury, and mortality of individuals in the vicinity of the platform if explosive severance methods are used. Loss of jacket-related foraging habitat. Injury or mortality from vessel strikes.
Marine and Coastal Birds	Removal of platform topsides would result in loss of platform-associated roosting, foraging, and nesting habitat for some species.

TABLE 5-1 (Cont.)

Resource	Potential Unavoidable Impacts
Marine Mammals	Localized and temporary disturbance and displacement of individuals due to decommissioning noise, vessel traffic, increased turbidity, and sediment deposition. Disturbance, injury, and mortality of individuals in the vicinity of the platform if explosive severance methods are used. Loss of jacket-related foraging habitat. Vessel strikes.
Commercial and Recreational Fisheries	Space-use conflicts between commercial and for-hire recreational vessels and decommissioning vessels and barges, with access temporarily restricted in the immediate vicinity of the platform as well as in areas undergoing pipeline removal or abandonment.
Areas of Special Concern	There would be no impacts to any of the areas of special concern (AOCs).
Archaeological and Cultural Resources	Removal or disturbance of known and previously unidentified resources beneath or in close proximity to platforms, pipelines, and associated facilities. The removal of any platforms eligible for listing in the NRHP.
Visual Resources	Lighting impacts to night sky. Daytime visual clutter and motion from vessel traffic.
Environmental Justice	Potential environmental justice impacts resulting from decommissioning activities are expected to be negligible.
Socioeconomics	There would be no unavoidable impacts to area demographics, employment, and economics.
Recreation and Tourism	Loss of boating and scuba diving opportunities at some platform locations. Rigs-to-Reefs (RTR) conversion will increase some recreational opportunities at the RTR locations.
Navigation and Shipping	Potential localized and temporary space-use conflicts between decommissioning vessels and commercial shipping traffic.

5.2 RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

The short-term uses of the human environment would be similar among the three action alternatives and would be associated with the offshore and onshore activities needed to support platform, pipeline, and other facility removal and disposal. The Bureaus make every attempt to identify and minimize the environmental effects from decommissioning by adopting mitigating measures to minimize long-term impacts and maintain or enhance long-term productivity.

Under each of the action alternatives, short-term use of the environment in the vicinity of platforms will be greatest during the severance phase (i.e., during platform topside, jacket, and pipeline removal). The effects of this short-term use may be reduced by mitigation measures required by the Bureaus. Upon completion of the Proposed Action, productivity associated with the marine habitats that developed on the submerged jacket structures would be permanently lost. However, productivity of the seafloor habitat (i.e., non-jacket-related habitat) is generally expected, the seafloor conditions would recover to levels that could support the types of soft sediment communities that exist in nearby areas and that were present prior to platform construction. With the partial removal of the platforms, pipelines, and associated facilities under Alternatives 2 and 3, the remaining infrastructure will continue to provide habitat for marine biota, and for commercial and recreational fishing opportunities long after decommissioning has been completed, but may continue to limit commercial trawling where obstructions remain. Under Alternative 3, the Rigs-to-Reef (RTR) conversion of the platform jackets would result in the creation of hardbottom habitat, which would maintain or enhance productivity at the RTR location.

Under the action alternatives, most socioeconomic impacts are anticipated to be short-term (i.e., over the course of completing the three phases of decommissioning), associated with employment, income, and tax revenues generated by equipment and vessel rental, fuel and equipment purchases, onshore processing to support platform severance and disposal activities, and the recovery value of any reused equipment or scrap metals. There may also be negligible short-term environmental justice impacts on minority communities in the vicinity of scrap processing facilities and ports with increases in road traffic, noise, and deterioration in air quality. Negligible or minor long-term impacts may apply to recreation and tourism in the vicinity of platforms with loss of boating and scuba diving opportunities. Long-term positive impacts may occur at the locations where new reefs are created under Alternative 3. There may be short-term impacts on commercial fishing from access restrictions in the vicinity of platforms and pipelines undergoing decommissioning.

Archaeological and historic finds discovered during decommissioning would enhance long-term knowledge and may help to locate other sites, but destruction of artifacts would represent long term losses.

The platforms have been a part of the visual landscape of the Southern California POCS since the first platforms were installed in the late 1960s. Removal of the platforms would alter the visual landscape once again, returning the ocean view to the more natural, pre-platform conditions, and result in a long-term viewshed improvement.

5.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

An irreversible or irretrievable commitment of resources refers to impacts on or losses of resources that cannot be recovered or reversed, such as a permanent conversion of a wetland or loss of cultural resources, or biota. The term irreversible describes the loss of future options or use for a resource and applies primarily to the impacts of use of nonrenewable resources such as fossil fuels or cultural resources, or to factors such as benthic productivity that are renewable but only over long periods of time. The term irretrievable applies to the temporary loss of use of a resources. For example, if the seafloor is used to host a platform and pipelines for O&G production, the use of that seafloor for other purposes (e.g., benthic habitat, commercial fishing) is lost irretrievably while the seafloor is temporarily used to support O&G production. However, while the loss of use of the seafloor for other purposes is irretrievable, this loss of use is not irreversible.

Table 5-2 details irreversible and irretrievable commitments of resources, by resource area.

TABLE 5-2 Irreversible and Irretrievable Commitments of Resources, by Resource Area

Resource Area	Irreversible Commitment	Irretrievable Commitment	Explanation
Air Quality	No	No	Under Alternatives 1, 2, and 3, all air emissions would be temporary and expected to comply with all required permits. Air quality would return to ambient conditions. Under Alternative 4, there would air emissions associated with maintenance and inspection vessel traffic, but these would not be irreversible or irretrievable.
Water Quality	No	No	Under Alternatives 1, 2, and 3, turbidity and other water quality impacts (e.g., accidental spills) would be localized and temporary, and water quality is anticipated to return to ambient conditions. Under Alternative 4, there could be discharges from maintenance and inspection vessel traffic, but these would not result in irreversible or irretrievable impacts.
Marine Invertebrates and Fish, Benthic Habitats, and EFH	Yes	Yes	Under Alternatives 1, 2, and 3 there would be a permanent loss of jacket-associated habitat associated with complete or partial jacket removal, which would result in an irreversible and irretrievable loss of such habitat and associated fauna. Under Alternative 1, there would be a permanent loss of shell mound habitat. Pipeline and power cable removal under Alternative 1 would result in irretrievable but not irreversible impacts to benthic habitats. New reef habitat would be created under Alternative 3. Irreversible impacts could also occur if one or more individuals of a marine protected species are injured or killed from explosives use during jacket severance. Under Alternative 4, there would be no such impacts.
Sea Turtles	Yes	No	Under Alternatives 1, 2, and 3, irreversible impacts could occur if one or more individuals are injured or killed by a vessel strike or from explosives use during jacket severance. Irretrievable impacts would not occur as no population-level impacts are anticipated. Under Alternative 4, there could be irreversible impacts from vessel strikes.
Marine and Coastal Birds	Yes	No	Under Alternatives 1, 2, and 3, the removal of platform topsides would irreversibly remove roost sites and nesting habitat for some species but would not result in irretrievable population-level effects. Under Alternative 4, there would be no such commitment.
Marine Mammals	Yes	No	Under Alternatives 1, 2, and 3, irreversible impacts could occur if one or more individuals are injured or killed by a vessel strike or during use of explosives during jacket severance. Irretrievable impacts would not occur, as no population-level impacts are anticipated. Under Alternative 4, there could be irreversible impacts from vessel strikes.

TABLE 5-2 (Cont.)

Resource Area	Irreversible Commitment	Irretrievable Commitment	Explanation
Commercial and Recreational Fisheries	No	No	Potential impacts would be associated with space-use conflicts and would be localized and temporary.
Areas of Special Concern	No	No	Activities under any of the four alternatives are not expected to affect any of the AOCs. There would be no impacts on, or losses of, any AOCs.
Archeological and Cultural Resources	Yes	Yes	Under Alternative 1, during jacket, pipeline, and power cable removal, disturbance of previously identified or of unidentified offshore resources could result in irreversible or irretrievable impacts. Under all the action alternatives, during seafloor clearance, disturbance of previously identified or of unidentified offshore resources could result in irreversible or irretrievable impacts. Irreversible and irretrievable impacts could occur from the removal of any platforms eligible for listing in the NRHP. Under Alternative 4, there would be no such removal.
Visual Resources	No	No	Potential impacts would be localized and short-term.
Environmental Justice	No	No	Potential environmental justice impacts, expected to be negligible, would be localized and temporary.
Socioeconomics	No	No	Based on the nature and anticipated duration of decommissioning, contractor needs, housing needs, and supply requirements are not anticipated to result in irretrievable or irreversible commitments to area demographics, employment, and economics.
Recreation and Tourism	No	No	There would be no irreversible or irretrievable commitment of resources associated with recreation and tourism.
Navigation and Shipping	No	No	Potential impacts would be associated with space-use conflicts and would be localized and temporary.
Fossil Fuels	Yes	Yes	Fuel used to conduct decommissioning (including transport of platform infrastructure to GOM processing and disposal facilities) under Alternatives 1, 2, and 3 would be irreversible and irretrievable consumed. Under Alternative 4, No-Action, fuel would be consumed for vessel traffic associated with platform maintenance and inspection.

6 CONSULTATION AND COORDINATION

6.1 PROCESS FOR PREPARATION OF THE PEIS

This draft Programmatic Environmental Impact Statement (EIS) has been prepared to help inform decisions on the decommissioning of O&G facilities on the Pacific Outer Continental Shelf (POCS). This draft Programmatic EIS has been prepared in accordance with the Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500–1508) and U.S. Department of the Interior (DOI) regulations (43 CFR Part 46) implementing the National Environmental Policy Act (NEPA).

6.1.1 Scoping for the Draft PEIS

On July 23, 2021, the Bureau of Safety and Environmental Enforcement (BSEE) published a Notice of Intent (NOI) to prepare a Programmatic EIS (86 FR 39055). The NOI initiated a 45-day comment period to gather input on the scope of the Programmatic EIS (PEIS) and identify potentially relevant information, studies, and analyses to inform future decommissioning application decisions for offshore O&G platforms and associated infrastructure off the southern California coast. At the request of several stakeholders, the comment period (which ended on September 7, 2021) was re-opened to accept input through October 15, 2021. Supplemental information was made available at www.boem.gov/Pacific-decomm-PEIS to assist the public in providing scoping comments to inform a robust and efficient review of anticipated decommissioning applications for POCS facilities. Because of health restrictions associated with COVID-19, no in-person scoping meetings were held during the two scoping periods, and stakeholders were instructed to submit their comments in writing or through www.regulations.gov, per the direction provided in the NOI.

6.1.1.1 Summary of Public Comments

Approximately 174 unique comment documents, from 26 distinct entities, were received during both scoping periods. A comment document refers to an entire written submittal provided by a commentor. Each comment document, in turn, may have one or more individual comments on one or more different topics. A total of 4,509 comment documents were received during scoping, with 4,483 of these as form letters from Friends of the Earth affiliates; BOEM considered these form letters as a single comment document. Comment documents were also received from federal, state, and local agencies, non-governmental organizations, and individuals. The BSEE acknowledges the comments from all these submitters and considered their comments in the development of the PEIS. The five most common topics brought up in the comments were Indirect and Cumulative Impacts, Health and Safety, Fish and/or Essential Fish Habitat, Air Quality, and Benthic Communities and Shell Mounds.

A report summarizing the public comments received during scoping is available at https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Final_Summary%20of%20Comments%20Decom.pdf.

6.1.1.2 Cooperating Agencies

Federal agencies are required, per 43 CFR 46.225, to invite eligible government entities to participate as cooperating agencies during the development of an Environmental Impact Statement (EIS). As defined by CEQ regulations (40 CFR 1508.5), a cooperating agency may be any federal agency that has jurisdiction by law or special expertise with respect to environmental impacts resulting from a proposed activity. The NOI issued an invitation to other federal agencies as well as state, tribal, and local governments to consider becoming cooperating agencies in the preparation of the PEIS. Cooperating agency status is established via a formalized Memorandum of Understanding (MOU), which allows cooperating agencies to coordinate and collaborate during preparation of the PEIS. For this PEIS, BSEE established cooperating agency status with the U.S. Army Corps of Engineers (USACE).

6.1.2 Commenting on the Draft PEIS

BSEE will hold public meetings, likely in a virtual format, to solicit comments on the Draft PEIS; the meetings are an additional avenue to submit comments during the comment period. The meetings will provide the Bureaus with information from interested parties to help in the evaluation of potential effects of the Proposed Action and with development of Alternatives. Stakeholders may also, and are encouraged to, provide comments through www.www.regulations.gov. The Notice of Availability (NOA) for this Draft PEIS will announce the dates, times, and specific locations or virtual meeting room for the public meetings. This information will also be available at www.boem.gov/Pacific-decomm-PEIS. The Final PEIS will be prepared based on the consideration and analysis of the comments received on the Draft PEIS.

6.2 DISTRIBUTION OF THE DRAFT AND FINAL PEIS

As part of the notification of the comment period on the Draft PEIS, BSEE has:

- Published a Notice of Availability (NOA) for the Draft PEIS in the *Federal Register*, announcing a 45-day comment period. All comments received during the comment period will be included as part of the PEIS Administrative Record and considered during preparation of the Final PEIS;

- Provided the NOA of the Draft PEIS and “how to comment” information to groups and agencies that participated in scoping, as identified in the list below;

- Emailed a group notification concerning the NOA of the Draft PEIS and how to comment to all individuals who had provided their email address to BSEE during scoping or had requested to be on such a mailing list;

- Placed notices in print and online newspapers that serve local media markets in potentially affected areas, announcing availability of the Draft PEIS, all public meeting locations and times, and how to comment on the Draft PEIS;

- Posted the Draft PEIS on the project website and updated website information to notify the public about meetings and methods to comment (boemoceaninfo.com); and

- Mailed official letters to the State of California Governor's Office and to federally recognized tribes adjacent to the POCS associated with the Proposed Action that may have an interest in providing input on the Draft PEIS; and coordinated meetings; in accordance with BSEE's policy of consultation and coordination with state, local, and tribal governments.

The BSEE Office of Public Affairs (BSEE OPA) maintains a robust database of media and stakeholder contacts. The BSEE OPA will send out notification about availability of the Draft PEIS to appropriate contacts on those lists. Table 6-1 lists federal, state, and local agencies, federally recognized tribes, and interested stakeholders that will be notified of the availability of the Draft PEIS.

TABLE 6-1 List of Agencies and Other Stakeholder Groups Notified of the Availability of the Draft Programmatic EIS

Federal Government Agencies	
U.S. Army Corps of Engineers	U.S. Department of Commerce
U.S. Department of Defense	U.S. Department of Energy
U.S. Department of Homeland Security	U.S. Department of the Interior
U.S. Department of Justice	U.S. Department of State
U.S. Department of Transportation	U.S. Geologic Survey
Federal Energy Regulatory Commission	Marine Mammal Commission
National Aeronautics and Space Administration	

U.S. Congress			
Senate	Sen. Diane Feinstein	Rachel_Bombach@feinstein.sentate.gov	LD
-	-	Rishi_Sahgal@feinstein.senate.gov	Energy LA
Senate	Sen. Alex Padilla	David_Montes@padilla.senate.gov	COS
		Nate_Bentham@padilla.senate.gov	Energy LA
CA-24	Rep. Salud Carbajal	Wendy.Motta@mail.house.gov	
CA-25	Rep. Mike Garcia	Will.Turner@mail.house.gov	Energy LA
CA-26	Rep. Julia Brownley	Meghan.Pazik@mail.house.gov	Energy LA
CA-30	Rep. Brad Sherman	Johan.Propst@mail.house.gov	Energy LA
CA-33	Rep. Ted Lieu	Leah.Uhrig@mail.house.gov	Energy LA
CA-37	Rep. Karen Bass	Melvin.Sanchez@mail.house.gov	Energy LA
CA-38	Rep. Linda Sanchez	Cody.Willming@mail.house.gov	Energy LA
CA-40	Rep. Lucille Roybal-Allard	Isrrael.Garcia@mail.house.gov	Energy LA
CA-43	Rep. Maxine Waters	Kathleen.Sengstock@mail.house.gov	Energy LA
CA-44	Rep. Nanette Diaz Barragán	Matt.Dernoga@mail.house.gov	Energy LA
CA-46	Rep. J. Luis Correa	Elizabeth.Barrie@mail.house.gov	Energy LA
CA-47	Rep. Alan Lowenthal	Abbey.Engleman@mail.house.gov	Energy LA
CA-48	Rep. Michelle Steel	Kenneth.Clifford@mail.house.gov	Energy LA
CA-49	Rep. Mike Levin	Oliver.Edelson@mail.house.gov	Energy LA
CA-50	Rep. Darrell Issa	Jeff.Solsby@mail.house.gov	Energy LA
CA-52	Rep. Scott Peters	Tom.Erb@mail.house.gov	Energy LA

TABLE 6-1 (Cont.)

U.S. Congress (Cont.)			
CA-53	Rep. Sara Jacobs	Jordan.Nasif@mail.house.gov	Energy LA
	Senate Energy & Natural Resources Committee - staff	Sam_Runyon@energy.senate.gov	Democrat
		Jeremy_Ortiz@energy.senate.gov	Democrat
		Sarah_Durdaller@energy.senate.gov	Republican
		Brian_Faughnan@energy.senate.gov	Republican
	House Natural Resources Committee - staff	Peter.Gallagher@mail.house.gov	Democrat
		Vic.Edgerton@mail.house.gov	Democrat
		Ashley.Nichols@mail.house.gov	Republican
		Rebecca.Konolige@mail.house.gov	Republican

State and Local Government Agencies	
California Department of Fish and Wildlife	California Office of Historic Preservation
Ventura County Air Pollution Control District	Santa Barbara Air Pollution Control District
	California Natural Resources Agency – Ocean Protection Council, Executive Director, Mark Gold
California Coastal Commission, Deputy Director, Kate Hucklebridge	California State Lands Commission, Executive Officer, Jennifer Lucchesi
Federally Recognized Tribes/Tribal Organizations	
Santa Ynez Band of Chumash Indians	Santa Rosa Indian Community
Soboba Band of Luiseno Indians	Pala Band of Mission Indians
Nongovernmental Organizations	
Offshore Operators Committee	

Nongovernmental Organizations

Offshore Operators Committee

6.3 REGULATORY COMPLIANCE

This Draft PEIS will not approve any decommissioning permit applications. This Draft PEIS analyzes the potential effects of the Proposed Action and alternatives, in advance of any specific decommissioning permit application, to determine whether potential future effects may be significant, consistent with DOI and CEQ regulations implementing NEPA. The bureaus will continue to review every decommissioning permit application on an individual basis, conduct a site-specific NEPA review for each permit application received, determine whether existing consultations or compliance processes cover the permit application, engage in additional analyses and consultations as deemed appropriate, and prepare a record of compliance with NEPA and all other applicable environmental laws prior to making a permit application decision.

The development of this Draft PEIS will also facilitate compliance with other applicable laws, such as the Endangered Species Act, Marine Mammal Protection Act, and Coastal Zone Management Act. The bureaus will be undertaking consultation and other activities to comply with relevant laws, including but not limited to: review of decommissioning applications by the California Coastal Commission for consistency with the Coastal Zone Management Act (CZMA); consultation under the Endangered Species Act (ESA) for potential impacts to listed species or designated critical habitat; completion of an Essential Fish Habitat assessment pursuant to the Magnuson-Stevens Fishery Conservation and Management Act; and a request for comments and consultation with federally-recognized tribes pursuant to the National Historic Preservation Act and Executive Order 13175. This section describes the processes by which the Bureaus worked with other federal and state agencies, federally recognized tribal governments, and the public during the development of this Draft PEIS.

6.3.1 Coastal Zone Management Act

The CZMA (16 U.S.C. 1451 et seq.) was enacted by Congress to protect the coastal environment from increasing demands associated with commercial, industrial, recreational, and residential uses, including state and federal offshore energy development. Provisions in the CZMA help coastal states develop coastal management programs (CMPs) to manage and balance competing uses of the coastal zone. Requirements for the CZM consistency information are based on the approval of listed activities according to the National Oceanic and Atmospheric Administration (NOAA)'s Office of Coastal and Resource Management. If the activity is unlisted, the state must go through the process of the Office of Coastal and Resource Management for approving a state's unlisted activity request on a case-by-case basis (15 CFR 930.54). Federal agencies must follow the federal consistency provisions delineated in 15 CFR 930.

There are several standards of "federal consistency." Federal agency activities must be "consistent to the maximum extent practicable" with relevant enforceable policies of a state's federally approved CMP (15 CFR 930 Subpart C) (e.g., POCS lease sales, renewable energy competitive lease sales, and marine minerals negotiated competitive agreements). Private activities that require a federal permit or license must be "fully consistent" with enforceable policies (15 CFR 930 Subpart D) (e.g., renewable energy non-competitive permitted activities and negotiated non-competitive marine minerals agreement). The POCS plan activities must be "fully consistent" with enforceable policies (15 CFR 930 Subpart E) (e.g., exploration, development, and production activities, and renewable energy competitive plan). If an activity will have direct, indirect, or cumulative effects, the activity is subject to federal consistency rules.

The California Coastal Program, approved by NOAA in 1978, is comprised of three parts. The California Coastal Commission (CCC) manages development along the California coast except for San Francisco Bay, where the San Francisco Bay Conservation and Development Commission oversees development and is the designated coastal management agency. The third agency, the California Coastal Conservancy, purchases, protects, restores, and enhances coastal resources, and provides access to the shore. For federal consistency reviews under the CZMA, the CCC reviews federal agency, federally permitted, and federally funded (to state and local government) activities that affect the coastal zone, regardless of their location.

Pursuant to the CZMA, future, site-specific decommissioning applications will be submitted to the CCC by the applicants after certification by BSEE to ensure that the proposed activities are consistent with the enforceable policies of California's CMP. An applicant must include a consistency certification to BSEE when it submits a decommissioning application. The application must also include the necessary data and information for the CCC to determine that the proposed decommissioning activities comply with and are consistent with the enforceable policies of the California's CMP (16 U.S.C. 1456(c)(3)(A) and 15 CFR 930.76).

In accordance with the requirements of 15 CFR 930.76, the BSEE sends copies of the decommissioning permit application, including the consistency certification and other necessary data and information, to the CCC by receipted mail or other approved communication. If no CCC objection is submitted by the end of the consistency review period, BSEE shall presume consistency concurrence by California (15 CFR 930.78(b)). The BSEE can require modification of a plan.

If BSEE receives a written consistency objection from the CCC, BSEE will not approve the decommissioning permit application unless (1) the operator amends the permit application to accommodate the objection and concurrence is subsequently received or conclusively presumed; (2) upon appeal, the Secretary of Commerce, in accordance with 15 CFR 930, Subpart H, finds that the permit application is consistent with the objectives or purposes of the CZMA or is necessary in the interest of national security; or (3) the original objection is declared invalid by the courts.

6.3.2 Endangered Species Act

The Endangered Species Act (ESA) was enacted by congress on December 28, 1973, due to concern that many native plants and animals were in danger of becoming extinct (16 U.S.C. 1531 et seq.). The ESA requires a permit for the taking of any protected species. It also requires that all federal actions not significantly impair or jeopardize protected species or their habitats. The ESA mandates that BOEM and BSEE consult with other federal agencies in carrying out its regulatory responsibilities, including the U.S. Fish and Wildlife Service (USFWS) and NOAA's National Marine Fisheries Service (NMFS). At the time that decommissioning applications are submitted, BSEE will prepare a Biological Assessment specific to the structure removal and pipeline decommissioning activities described in the application in consultation with NMFS and USFWS.

6.3.3 Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA), which protects all marine mammals, was enacted on October 21, 1972. The MMPA was passed by Congress based on the following findings and policies: some marine mammal species or stocks may be in danger of extinction or depletion as a result of human activities; these species or stocks must not be permitted to fall below their optimum sustainable population level (depleted); measures should be taken to replenish these species or stocks; there is inadequate knowledge of the ecology and population dynamics; and marine mammals have proven to be resources of great international significance.

The MMPA prohibits, with certain exceptions, the “take” of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the United States. The term “take,” as defined in the MMPA, means to harass, hunt, capture, or kill any marine mammal or to attempt such activity. The MMPA defines harassment as any act of pursuit, torment, or annoyance that has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment) or disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment).

BSEE will consult with the NMFS and USFWS pursuant to the requirements of the MMPA when POCS operators submit decommissioning plans. In anticipation of future consultations, BSEE has prepared potential take estimates of MMPA species, provided as Appendix D of this PEIS. Estimates are provided for Level A and Level B harassment, as well as of non-auditory injury, including mortality.

BSEE will consult with the NMFS and USFWS pursuant to the requirements of the MMPA when POCS operators submit decommissioning plans. In anticipation of future consultations, BSEE has prepared potential take estimates of MMPA species, as provided as Appendix D of this PEIS. Estimates are provided for Level A and Level B harassment, as well as of non-auditory injury, including mortality.

In addition, BSEE will follow the mitigations required for decommissioning in the current ESA and MMPA guidance and the guidelines outlined in the BSEE Notice to Lessees and Operators (NTL) 2010-G05 “Decommissioning Guidance for Wells and Platforms” on the use of explosives during decommissioning activities and NTL 2020-P05 “Decommissioning of Pacific Outer Continental Shelf Region (POCSR) Facilities.” The latter NTL identifies environmental review of decommissioning applications by BSEE that will involve consultations with the NMFS and USFWS pursuant to the requirements of the ESA, MMPA, and the Magnuson-Stevens Fishery Conservation and Management Act (see Section 6.3.4).

6.3.4 Magnuson-Stevens Fishery Conservation and Management Act

The decommissioning of platforms and associated facilities under any of the three action alternatives evaluated in this PEIS is expected to have negligible impacts to essential fish habitat (EFH), which is defined as “those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity” (50 CFR 600.10). BSEE will consult with NMFS and the Pacific Fishery Management Council (PFMC) when a specific decommissioning application is submitted and its supporting NEPA review identifies potential adverse effects on EFH.

6.3.5 National Marine Sanctuary Act

Section 304(d) of the National Marine Sanctuary Act (NMSA) requires that federal agencies consult with NOAA’S Office of National Marine Sanctuaries when a proposed action is indicated likely to destroy, cause the loss of, or injure any National Marine Sanctuary (NMS) resource. BSEE has not requested such consultation in conjunction with the programmatic analysis in this PEIS. When a specific decommissioning permit application is submitted to BSEE, the potential for affecting a NMS will be examined during the application-specific NEPA process, and the need for a specific NMSA Section 304(d) consultation will be addressed at that time.

6.3.6 National Fishing Enhancement Act of 1984

The National Fishing Enhancement Act (NFEA) was signed into law (Public Law 98-623, Title II) in 1984. It includes the following: (1) recognition of social and economic values in developing artificial reefs, (2) establishment of national standards for artificial reef development, (3) creation of a National Artificial Reef Plan (NARP) under leadership of the U.S. Department of Commerce, and (4) establishment of a reef-permitting system under the USACE. The NARP was completed in 1985 and allows for the planning, siting, permitting, constructing, installing, monitoring, managing, and maintaining of artificial reefs with[in?] and seaward of state jurisdictions. In the NARP, O&G structures are identified as acceptable materials for artificial-reef development. The NFEA led to the creation of a national Rigs-to-Reef policy, plan, and program in the United States. It designates the Secretaries of Commerce and the USACE with lead responsibilities to encourage, regulate, and monitor development of artificial reefs in the navigable waters and waters overlying the outer continental shelf of the United States. The Secretary of Commerce is responsible for the plan and the USACE has regulatory oversight.

In addition to Department of Commerce and the USACE, numerous other federal agencies, including the USFWS, NMFS, Regional Fishery Management Councils, National Ocean Service (NOS), National Marine Sanctuary Program (NMSP), Office of Ocean and Coastal Resource Management, the U.S. Navy, Maritime Administration (MARAD), U.S. Coast Guard (USCG), and U.S. Environmental Protection Agency (EPA) have a role in the POCS artificial reef program by providing technical assistance in the form of consultation and coordination activities, charting reef sites, providing guidance on marking reef sites, or supporting other aspects of NFEA. California passed legislation in 2010 establishing the California Artificial Reefs Program, which is administered by the California Department of Fish and Game.

Section 203 of NFEA further defines standards for artificial reef development. Best scientific information should be used to site, construct, and subsequently monitor and manage artificial reefs. The reefs should be “managed in a manner which will: (1) enhance fishery resources to the maximum extent practicable; (2) facilitate access and use by U.S. recreational and commercial fishermen; (3) minimize conflicts among competing uses of water covered under this title and the resources in such waters; (4) minimize environmental risks and risks to personal health and property; and (5) be consistent with generally accepted principles of international law and shall note create any unreasonable obstruction to navigation.”

Because this Draft PEIS is programmatic in nature and does not address project specific decommissioning, consultation will not occur in conjunction with PEIS preparation. Instead, applicants will work directly with state reefing programs to meet the requirements of the NFEA when project-specific reefing activities are proposed.

6.3.7 Rivers and Harbors Act

The Rivers and Harbors Act (RHA), enacted in 1899, was the first federal water pollution act in the United States. Section 10 of the RHA is overseen by the USACE and prohibits the unauthorized obstruction or alteration of any navigable water of the United States (i.e., construction or placement of various structures that hinder navigable capacity of any waters), without the approval of Congress.

Section 10 of the RHA is applicable for structures, installations, and other devices on the POCS seabed, and is directly applicable to reefing platform components. Section 4 of the Outer Continental Shelf Lands Act (OCSLA) (43 USC. 1333 (e)) extended USACE's authority to prevent obstruction of navigation to the Outer Continental Shelf. In California, the Department of Fish and Game, as part of its responsibilities for the Rigs-to-Reefs program, applies to the USACE for an RHA permit. The USACE is the only agency that has the authority to decide to issue a Section 10 permit, based on the state agency application and USACE's determination that the proposed activity is not contrary to the public interest. Generally, proposed artificial reefs that in the opinion of the USACE constitute a hazard to/from shipping interests, general navigation, and/or military restricted zones would not be authorized.

Because this Draft PEIS is programmatic in nature and does not address project-specific information, it will not result in a permit application under the RHA. Instead, applicants will consult with the USACE to meet the requirements of the RHA when project-specific decommissioning activities (including Rigs-to-Reef activities) are proposed.

6.3.8 National Historic Preservation Act

In accordance with the National Historic Preservation Act (NHPA) (54 U.S.C. 300101 et seq.), federal agencies are required to consider the effects of their undertakings on historic properties. The implementing regulations for NHPA Section 106, issued by the Advisory Council on Historic Preservation (ACHP) (36 CFR Part 800), specify the required review process. The bureaus will complete a Section 106 review process once they have performed the necessary site-specific analysis of proposed decommissioning activities described in a decommissioning permit application. Additional consultations with the ACHP, State Historic Preservation Offices (SHPO), federally recognized tribes, and other consulting parties may take place at that time, if appropriate.

6.3.9 Government-To-Government Tribal Consultation

In accordance with Executive Order 13175, "Consultation and Coordination with Federally Recognized Indian Tribal Governments," federal agencies are required to establish regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications to strengthen the United States' government-to-government relationships with Indian Tribes, and to reduce the imposition of unfunded mandates upon Indian Tribes. On July 21, 2021, August 17, 2021, and February 19, 2022, BSEE sent formal letters to four federally recognized Indian Tribes in California notifying them of the development of the decommissioning PEIS. The letter was intended to be the first step of a long-term and broad consultation effort between BSEE and the California-area tribes, inclusive of all BSEE decommissioning activities in the Pacific Region. On October 19, 2021, another formal letter was sent by BSEE announcing and soliciting consultation regarding the Draft PEIS. As of this writing, one response was received from the Santa Ynez Band of Chumash Indians and a virtual consultation took place on February 1, 2022. Nothing else has been received in response to letters; however, informal discussions with designated tribal representatives are ongoing to determine if any of the individual tribes desire continued consultations. The Pala Band of Mission Indians, Santa Rosa Santa Rosa Indian Community, and Soboba Band of Luiseno Indians have deferred to the Santa Ynez Band of Chumash Indians for any consultations.

7 LIST OF PREPARERS

Table 7-1 presents information on the preparers of the *Draft Programmatic Environmental Impact Statement for Oil and Gas Decommissioning Activities on the Pacific Outer Continental Shelf*. The list of preparers is organized by agency or organization, and information is provided on their contribution to the Environmental Impact Statement. Table 7-2 presents the BSEE and BOEM subject matter experts who provided technical reviews on preliminary versions of the Draft PEIS.

TABLE 7-1 List of Preparers

Name	Education/Experience	Contribution
Bureau of Safety and Environmental Enforcement		
David Fish	B.A. International Relations, M.A. Public Policy; BSEE Senior Advisor and Chief, Environmental Compliance Division; 40 years of experience in safety and environmental preparedness, response, and enforcement, including Federal On-Scene Coordinator for the U.S. Coast Guard and BSEE.	BSEE Project Manager; subject matter expert; technical expertise, support, and review.
James Salmons	B.S. Aeronautics, M.B.A. Human Resources Management and Organizational Development, M.Sc. Environmental Science and Policy, Juris Doctorate; Licensed CA attorney; 17 years of experience in environmental and social impact analyses; BSEE Regional Environmental Officer.	Subject matter expert; technical expertise, support, and review.
Juliette Giordano	B.S. Animal Science, M.S. Marine Science, M.P.P. Public Policy; 12 years of experience in environmental science and policy.	Project management, support, and compliance.
Bureau of Ocean Energy Management		
Richard Yarde	B.S. Wildlife Science, M.S. Renewable Natural Resource Studies, J.D.; 25 years of experience in environmental analysis and policy; BOEM Pacific Regional Supervisor, Office of Environment.	BOEM Project Manager; general document and process support.
Linette Makua	B.S. Public Policy/Ecology and Evolutionary Biology, M.E.M. Coastal Environmental Management; 11 years of experience in environmental assessment, compliance, and project coordination.	NEPA Coordinator; Cooperating Agency liaison and review.
Lisa Gilbane	B.S. in Biology, M.S. in Biology; 10 years of experience in benthic and biological sciences; 3 years of experience in environmental analysis; BOEM Environmental Assessment Chief.	Technical expertise; benthic support, and review.

TABLE 7-1 (Cont.)

Name	Education/Experience	Contribution
Argonne National Laboratory		
Kurt Picel	Ph.D. Environmental Health Sciences; 44 years of experience in environmental health analysis; 24 years in environmental assessment.	Project Manager; water quality, and overall technical and document review.
Ihor Hlohowskyj	Ph.D. Zoology; 43 years of experience in ecological research; 41 years in environmental assessment.	Assistant Project Manager; areas of special concern, shipping and navigation, and overall technical and document review.
Young Soo Chang	Ph.D. Chemical Engineering; 30 years of experience in air quality and noise impact analysis.	Air quality and noise.
Mark Grippo	Ph.D. Biology; 15 years of experience in aquatic resource studies and impact analysis.	Benthic resources, marine and coastal fish, and essential fish habitat.
John Hayse	Ph.D. Zoology; 33 years of experience in ecological research and environmental assessment.	Recreational and commercial fisheries.
Carolyn Steele	B.S. English, B.S. Rhetoric; 16 years of experience in technical editing.	Lead technical editor.
William Vinikour	M.S. Biology with environmental emphasis; 44 years of experience in ecological research and environmental assessment	Marine mammals, marine and coastal birds, and sea turtles.
Emily Zvolanek	B.A. Environmental Science; 12 years of experience in GIS mapping.	Technical lead for GIS mapping and analysis.
Tim Allison	M.S., Mineral and Energy Resource Economics; M.A., Geography; 34 years of experience in regional analysis and economic impact analysis.	Socioeconomics and environmental justice.
Kendra Kennedy	M.A. Historical Archeology; 19 years of experience in terrestrial and maritime archaeology and cultural resource management.	Archeology and cultural resources.
Jordon Secter	MLA landscape architecture; 23 years of professional practice in landscape architecture, visual resource assessment and research.	Visual resources.
Louis Martino	M.S. Environmental Toxicology; 42 years of experience in environmental remediation and assessment	Decommissioning technology descriptions.

TABLE 7-2 List of Reviewers

Name	Subject Matter Area of Expertise and Reviewer Responsibilities
Bureau of Safety and Environmental Enforcement	
Jack Lorrigan	BSEE Tribal Consultations
Irina Sorset	Archeological and Cultural Resources, Section 106 Consultation
Robert Zaragoza	Oil and Fuel Spills
Herb Leedy	Section 106 Consultation
Theresa Bell	Strategic Operations
Andrea Heckman	Environmental Science
Stefany Grieco	Environmental Compliance
James Sinclair	Marine Biology, Environmental Monitoring
Michelle Fitzgerald	Environmental Engineering
Graham Tuttle	Ecology
Tarice Taylor	Ecology
Bureau of Ocean Energy Management Reviewers	
Katsumi Keeler	Air Quality, Environmental Justice
Karen Villatoro	Socioeconomics, Recreation, and Tourism
David Ball	Archeological and Cultural Resources
Hayley Karrigan	Marine Mammals and Sea Turtles
Alicia Caporaso	Benthic Ecology
John Schiff	Water Quality
Donna Schroeder	Fish and Fisheries
Susan Zaleski	Benthic Ecology
Dave Pereksta	Bats, Marine and Coastal Birds
Frank Pendleton	GIS Support
Casey Rowe	NEPA
John McCarty	Visual Resources
Arianna Baker	Navigation Analyst
Stan Labak	Acoustic Analyst
U.S. Army Corps of Engineers Reviewers	
Aaron Allen	Chief North Coast Branch, Regulatory Division,
Theresa Stevens	Compliance Senior Project Manager, Compliance

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8.5 REFERENCES FOR CHAPTER 5

None.

8.6 REFERENCES FOR CHAPTER 6

None.

8.7 REFERENCES FOR CHAPTER 7

None.