

# **The Economic Benefits of Increasing U.S. Access to Offshore Oil and Natural Gas Resources in the Pacific**

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Prepared for:

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Prepared by:



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## Section 1 – Key Findings

This report projects the economic benefits to the Pacific states and the U.S. in general that would stem from opening the Pacific OCS (outer continental shelf) to new and expanded oil and natural gas development. The analysis assumes new seismic activity in 2017 and new lease sales in 2018. Quest estimates that oil and natural gas production from new projects could begin by 2023. This report estimates the economic benefits of this activity through 2035.

Developing oil and natural gas resources in the Pacific OCS could lead to an estimated \$163 billion in cumulative investment and operational spending between 2017 and 2035. Approximately \$140 billion would be spent inside the U.S., mostly in the Pacific Coast states of California, Oregon, and Washington. By 2035, Pacific OCS oil and natural gas development could produce an incremental 1.2 million barrels of oil equivalent per day (MMboe/d), generate over 330,000 jobs, contribute over \$28 billion per year to the U.S. economy and generate \$81 billion in cumulative government revenue. The amount of revenue accrued to state governments would be dependent on any legislated federal/state revenue sharing agreements.<sup>1</sup> (Table 1)

**Table 1: Projected Economic Impacts<sup>2</sup> due to Pacific Oil and Natural Gas Exploration and Production – Total Area**

Economic Impact	2020	2025	2035	Cumulative 2017 to 2035
Capital Investment and Spending (\$Millions)	\$789	\$3,534	\$19,626	\$139,820
Employment	14,531	50,894	331,284	n/a
Contributions to Economy - GDP (\$Millions)	\$1,283	\$4,428	\$28,671	\$190,752
Federal / State Government Revenue (\$millions)	\$799	\$1,104	\$15,707	\$81,123
Natural Gas and Oil Production (MMboe)	.042/d	.065/d	1.193/d	2,343

Source: Quest Offshore Resources, Inc.

<sup>1</sup> The report assumes a 37.5/62.5 percent state / federal revenue sharing

<sup>2</sup> All spending, contributions to economy, and government revenues are constant 2012 dollars

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## Section 2 – Executive Summary

### 2.1 - Executive Summary

Total offshore oil and natural gas production in federal waters was a combined 1.93 million barrels of oil equivalent per day in 2013 or around nine percent of total U.S. production. The U.S. offshore oil and natural gas industry is a significant contributor to domestic energy production, the national economy, employment, and government revenues. New offshore oil and gas exploration and development in the U.S. is currently limited to the Central and Western Gulf of Mexico. There is limited legacy production off the coasts of California and Alaska. In total, approximately 85 percent of the total acreage in federal offshore waters is inaccessible to offshore oil and natural gas development, either through lack of federal lease sales or outright moratoriums. The Pacific OCS is currently inaccessible to the lack of any future planned lease sales within the region – all current production and active leases were purchased prior to the last lease sale in 1984.

Seismic acquisition in the Pacific OCS has coincided with the limitations on lease sales, and subsequent limitations on expected growth within the area. Historic seismic acquisitions is mainly dated to the 1960s and 1970s and focused on 2-D and gravitational/magnetic surveys. No oil and gas surveys have been committed to in the past decade, while 3-D acquisitions have taken place on only 52 blocks.

Although there are other assessments, this report uses as a starting place the Pacific OCS oil and natural gas resources that are outlined in the Bureau of Ocean Energy Management's (BOEM) Assessment of Technically Recoverable Oil and Gas Resources of the Nation's Outer Continental Shelf, 2011.

This report constructs a scenario of oil and natural gas development in the Pacific OCS based on the resource potential of the area, geologic analogs, and the full value chain of oil and natural gas development and production. It quantifies the capital and other investments projected to be undertaken by the oil and natural gas industry, identifies linkages to the oil and gas supply chain at both the state and national levels, estimates both job creation and contributions to economies associated with oil and natural gas development, as well as government revenues due to lease bids, rents, and production royalties. The report relies on the Quest Offshore Resources, Inc. (Quest) proprietary database<sup>3</sup> on the offshore oil and natural gas supply chain.

### 2.2 - Leasing

This study assumes that leasing will begin in the Pacific OCS in 2018 coinciding with the first full year of the next BOEM five year leasing program. According to the study's analysis, demand from operators for Pacific OCS leases would parallel the strength of historic lease sales from other parts of the OCS. Leasing activity in 2018 is projected at around 310 leases sold. Subsequent years are expected to slowly descend to a low of around 270 leases as projects are developed and the pool and quality of available leases shrinks.

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<sup>3</sup> See Appendix 7.1 "Overview of Quest Offshore Data"

## 2.3 - Drilling

Drilling is the key activity both in the discovery of oil and natural gas resources as well as their preparation for production. With leasing starting in 2018, Pacific OCS drilling would be expected to begin shortly after in 2019. Total exploratory and development wells drilled are projected to average about 35 wells per year from 2017 to 2035 of which around 63 percent would be in deepwater areas. Drilling in the area is projected to trend upwards as infrastructure is developed and a higher percentage of development wells are drilled each year. In the last five years of the forecast (2031-2035) an average of around 75 wells would be expected to be drilled annually.

## 2.4 - Projects

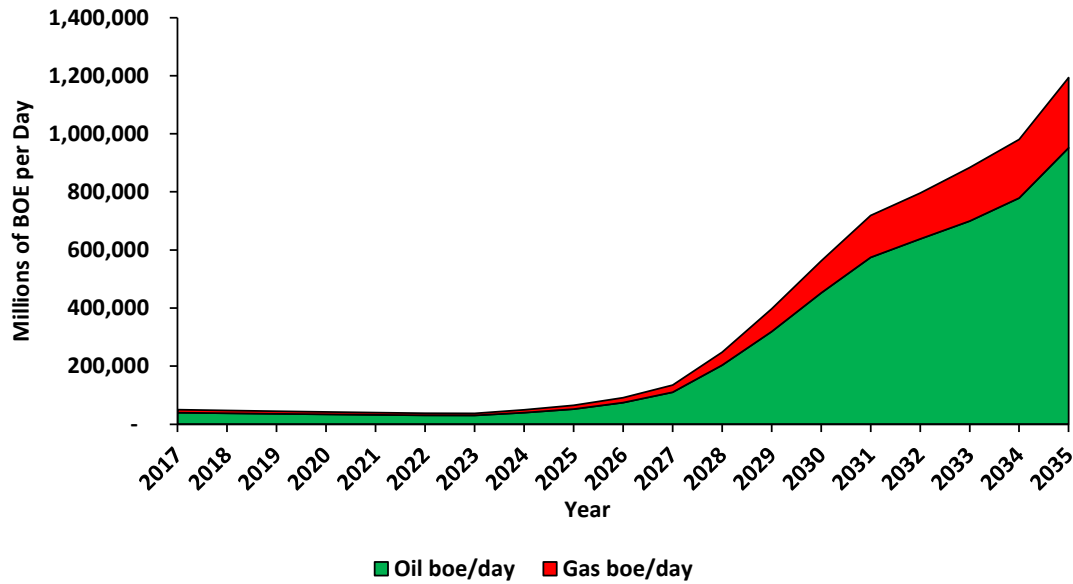
Offshore project development is the key factor in oil and natural gas production. It is also the main factor in the capital and operational expenditures that lead to increases in employment and economic activity. Offshore projects are complex, requiring a multitude of engineers, contractors, and equipment suppliers working over a number of years prior to the start of production. For the purposes of this study, offshore project development was generalized into six project types based on project size and water depth. This study estimates that 86 projects could begin oil and natural gas production in the Pacific OCS between 2017 and 2035, of which 54 would be deepwater projects and 32 would be shallow water projects.

## 2.5 - Oil and Natural Gas Production

Opening the Pacific OCS to new offshore oil and natural gas production would lead to an increase in domestic energy production. If leasing started in 2018, the first new oil and natural gas production from the Pacific OCS is projected to start in 2023. Within three years of initial new production, Pacific OCS production is projected to increase to over 90 thousand BOED an increase of around 50 thousand barrels from projected production from currently existing projects. Production is projected to reach nearly 1.2 million BOED by 2035, with production expected to be around 80 percent oil and 20 percent natural gas. (Figure 1)

Around 60 percent of production is expected to be from deepwater projects in 2035.

Figure 1: Projected Production by Type &amp; Year

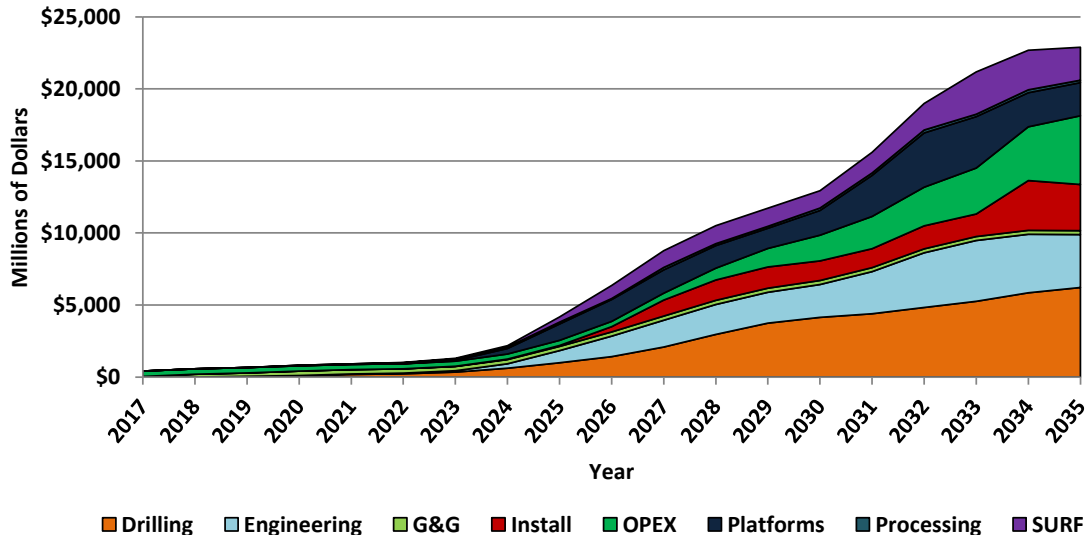


Source: Quest Offshore Resources, Inc.

## 2.6 - Spending

Total cumulative spending from 2017 to 2035 due to Pacific OCS oil and natural gas activity is projected to be around \$163 billion. Spending is projected to grow from an average of \$675 million during the first five years of initial leasing, seismic, and exploratory drilling to over \$22.8 billion per year in 2035. The largest amounts of expenditures are for drilling, operational expenditures, engineering, manufacturing and fabrication of platforms and equipment. Cumulative operational expenditures (OPEX), which occur after a well's initial production, are projected to be nearly \$25 billion over the course of the study period. (Figure 2)

Figure 2: Projected Overall Spending by Spending Type



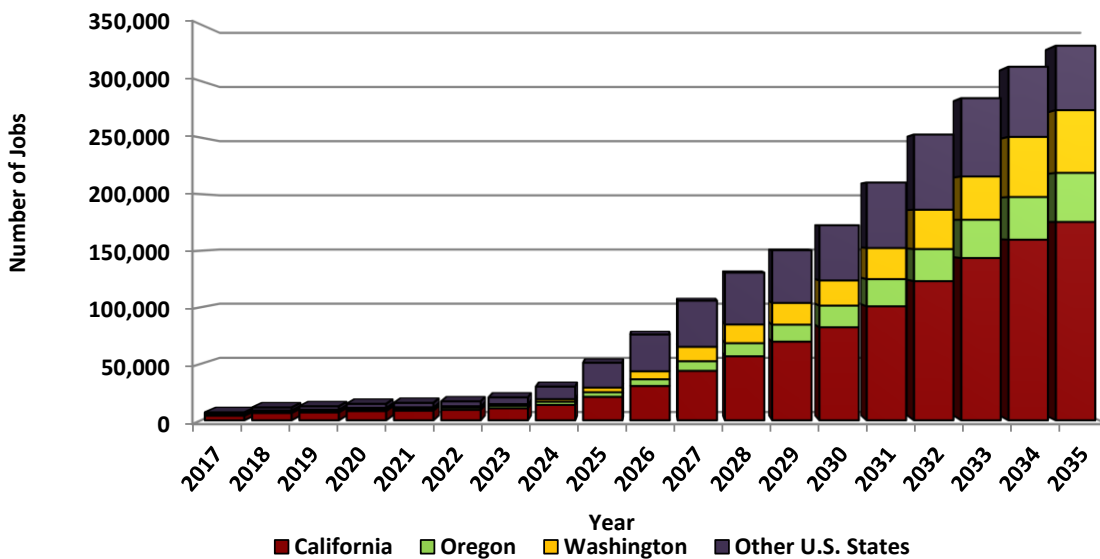
Source: Quest Offshore Resources, Inc.

The Pacific Coast states are projected to receive 57 percent of the total spending on Pacific OCS oil and gas activity from 2017 to 2035, with other U.S. states receiving 28 percent and international spending accounting for the remainder. In 2035, as the supply chain for the goods and services used to develop the Pacific OCS fields shifts towards the region, the benefits to Pacific Coast states are expected to increase to 66 percent of total spending.

## 2.7 - Employment

Pacific OCS oil and natural gas development is expected to lead to significant employment gains, both in the Pacific Coast region and nationally. Employment impacts are expected to grow throughout the forecast period, with total incremental U.S. employment reaching over 330 thousand jobs by 2035.<sup>4</sup> Total Pacific Coast employment in 2035 is projected to reach nearly 275 thousand jobs. States outside the region are projected to see employment gains of over 55 thousand jobs by 2035. The largest employment impacts of Pacific OCS oil and natural gas activity are projected to go to California, followed by Washington, then Oregon. (Figure 3)

Figure 3: Projected Employment by State



Source: Quest Offshore Resources, Inc.

The resulting impact of Pacific OCS oil and natural gas development upon the economy will be widespread among industries. In 2035, employment directly in the oil and gas sector is projected to be nearly 40 thousand jobs. Other industries which are directly involved in oil and natural gas activities such as manufacturing; professional, scientific, and technical services (engineering); and construction (installation) are also expected to see the large employment effects with a combined 100 thousand jobs in

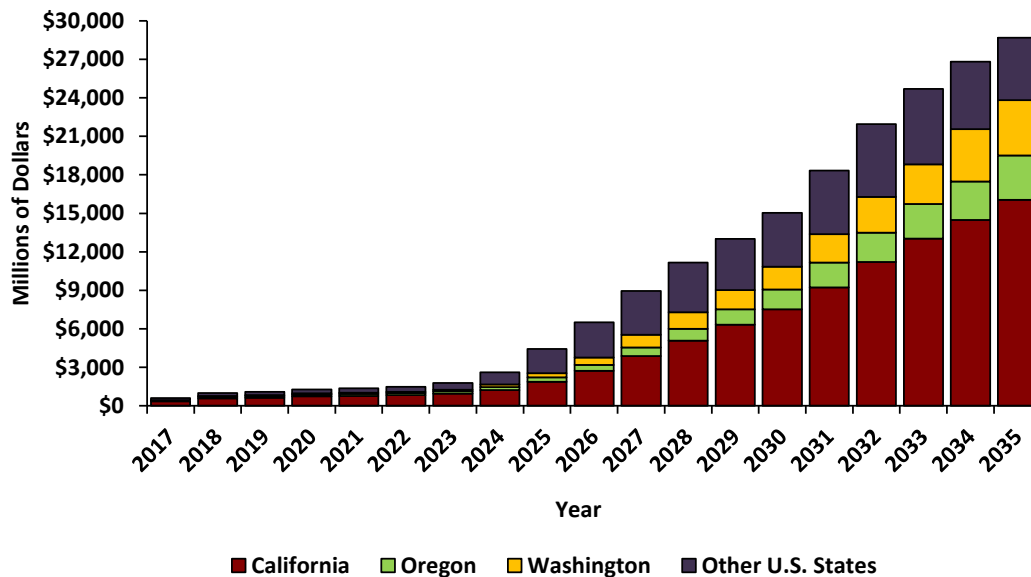
<sup>4</sup> Includes total supported jobs; direct, indirect, and induced. See section 4.6.

2035. However, sectors not directly related to oil and gas development or the supply chain will also see impacts<sup>5</sup> mainly due to a general increase of income in the economy.

## 2.8 - Contributions to the Economy and Government Revenues

Spending by the oil and gas industry, as well as the impact of increased revenues to state governments is expected to lead to a significant increase in the nation's GDP. Total contributions to the economy are projected to be over \$28.5 billion per year in 2035, with nearly \$24 billion of the total expected impact to occur in the Pacific Coast states. The largest contributions to states' economies are expected to be seen in California, followed by Washington and Oregon. (Figure 4)

Figure 4: **Projected Contributions to State Economies Pacific Coast vs. Other U.S. States – Total**



Source: Quest Offshore Resources, Inc.

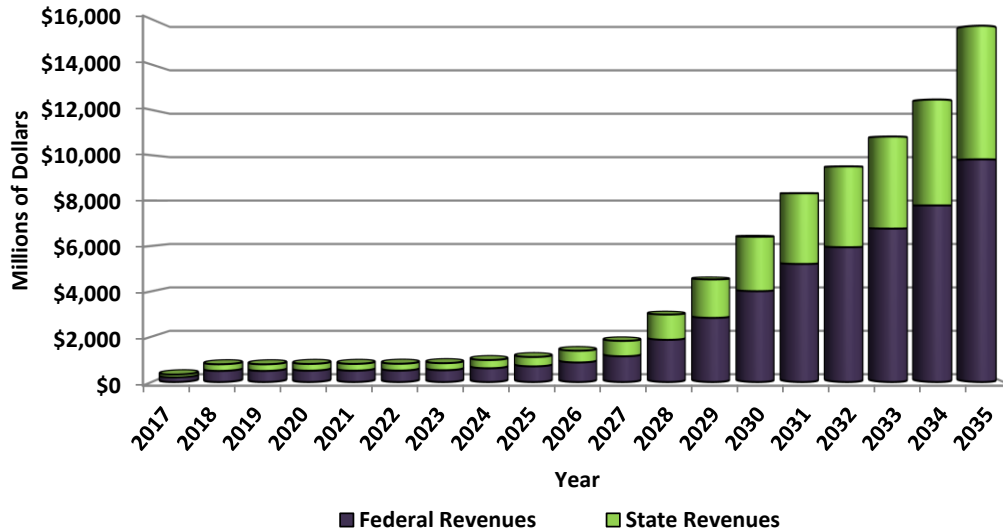
Pacific OCS oil and natural gas development has the potential to increase government revenue from royalties, bonus bids, and rents on leases by an estimated \$81 billion cumulatively from 2017 to 2035, and total government revenues are projected to reach nearly \$16 billion per year in 2035<sup>6</sup>. The majority of cumulative revenues are from royalties on produced oil and natural gas at around \$72 billion. Leasing bonus bids are projected to account for around \$7.3 billion while rental income from offshore blocks is expected to account for approximately \$2 billion. This report assumes that associated government revenue is split 37.5 percent to the coastal states and 62.5 percent to the Federal government. This is similar to the arrangement in place with currently producing Gulf of Mexico states without an associated cap on state government revenue. Actual revenue proportion going to state governments, if any, would be determined

<sup>5</sup> For example the retail sector is projected to increase by over 26,000 jobs in 2035. Estimated employment by industry sector can be found in section 4.6.

<sup>6</sup> Calculated potential government revenues do not include payroll taxes, individual, and corporate income taxes.

by future legislation. Cumulative state revenues through 2035 for the Pacific Coast states could reach over \$30 billion. (Figure 5)

Figure 5: **Projected Government Revenues from Rentals, Royalties, and Bonus Bids, State and Federal – Total**



Source: Quest Offshore Resources, Inc.

## 2.9 - State Results

Although the employment, economic, and government revenue impacts of Pacific OCS oil and natural gas development would be felt nationwide, the majority of the effects would be expected to go to the states along the Pacific Coast. California would be expected to see largest benefits, followed by Washington and Oregon. Each state is expected to see cumulative spending by the industry ranging from \$9 billion to \$67 billion from 2017 to 2035. Each state is also expected to see employment ranging from 43 thousand to 175 thousand jobs by 2035. Contributions to their economies are projected to range from \$3.5 million to \$16 billion per year by 2035.

California is expected to see the largest effects of Pacific OCS offshore oil and gas development with spending reaching \$10.6 billion per year in 2035, employment reaching 175 thousand jobs, and government revenues reaching \$3.3 billion per year. Washington and Oregon are projected to see the second and third largest effects with spending reaching \$3 billion and nearly \$1.5 billion. Employment in these states is expected to reach 55 thousand jobs and 43 thousand jobs respectively, with government revenues from royalty sharing reaching \$800 million and \$1.7 billion respectively. (Table 2)

**Table 2: Projected Spending, Employment, Contributions to Economy and Government Revenue by State – Total Area**

State	2017-2035 Cumulative Spending (\$Millions)	2035 Employment	2035 Contributions to Economy (\$Millions)	2017-2035 Cumulative State Government Revenue* (\$Millions)
California	\$67,294	175,420	\$16,039	\$17,261
Oregon	\$9,080	43,412	\$3,456	\$8,956
Washington	\$17,450	55,462	\$4,309	\$4,205
Other U.S. States	\$45,996	56,990	\$4,866	\$0
Total	\$139,820	331,284	\$28,671	\$30,421

Source: Quest Offshore Resources, Inc.

\*Assumes the State Federal Percentage Split

Allowing access to the Pacific OCS for oil and natural gas development would increase employment, economic activity, and government revenues with comparatively little additional spending required by federal and state governments. The nation as a whole, but especially the Pacific Coast states would likely see large employment gains, increased economic activity and additional government revenue. In addition, the nation will see increased domestic oil and natural gas production, which will continue to improve the nation's energy security.

## Section 3 – Introduction

### 3.1 - Introduction

Oil and natural gas account for over 60 percent of U.S. primary energy consumption. Oil and natural gas development contributes significantly to the U.S. economy. These impacts are felt throughout the nation and all sectors of the economy. Despite the benefits of oil and natural gas development, a significant portion of the oil and natural gas resources of the United States are currently inaccessible, most notably 85 percent of the U.S. outer continental shelf's (OCS). These offshore areas are limited due to a lack of lease sales by the Federal government or outright moratoriums. Included in the regions restricted through limited lease sales is the Pacific OCS, which held its last sale in 1984 for offshore southern California. Offshore lease sales in northern California, Oregon, and Washington have not occurred since the early 1960's.

Despite the time that has surpassed between the last lease sales, offshore southern California continues to produce oil, while the estimated undiscovered technically recoverable resources (UTRR) within the region has grown from 7 billion BOE in 1987, to more than 13 billion BOE in 2011. This reservoir base growth coupled with the continued interest within the region suggests that providing companies with additional opportunities to conduct safe, well regulated, exploration and production from this area would further enhance the nation's energy security while providing significant employment and economic benefits both to the affected region as well as the country as a whole.

### 3.2 - Purpose of the Report

Quest Offshore Resources, Inc. (Quest) was commissioned by the American Petroleum Institute (API) and the National Ocean Industries Association (NOIA) to provide a comprehensive evaluation regarding the development of America's offshore oil and gas resources within the Pacific OCS. Quest is a full-service market research and consulting firm focused on the global offshore oil and natural gas industry.

The report estimates the economic and employment impacts if the Pacific OCS's oil and natural gas resources were developed. The report assumes a favorable regulatory environment such as regular lease sales and a reasonable rate of permit approvals for projects and drilling. The analysis uses existing USGS and Bureau of Ocean Energy Management (BOEM) resource estimates. This analysis identifies key areas of economic activity as follows: resources and production, project development and spending, and economic and governmental impacts.

This scenario in no way covers all previous or possible future proposals for the Pacific OCS oil and natural gas activity. The report projects a reasonable scenario for the timing and magnitude of potential oil and gas development activities, analyzes the spending patterns that would be associated with these activities, and assesses the economic and employment effects of this spending on the economies of the directly affected states as well as the nation as a whole. The analysis tracks the full lifecycle of oil and natural gas development that is projected to take place following the opening of the Pacific OCS. The report therefore projects spending from leasing and seismic imaging to exploration drilling, onto project



development and through production. The associated ongoing spending needed to maintain and operate projects is also estimated.

The report assumes that the first new lease sale for the Pacific OCS takes place in 2018, the first full year of the upcoming 2017-2022 5-year plan. Initial seismic activity is assumed to begin one year earlier in 2017. The study projects activity, spending, employment, economic impacts, and government revenues associated with these activities from 2017 through 2035.

Calculated economic and employment impacts from expected industry spending are based on the report's forecasted timing of oil and natural gas exploration and production activity as well as projections for where the development activity and associated economic activity will take place. The report also projects estimated state and federal government revenues from sources such as bids, rents, and royalties. Potential economic and employment impacts due to increased state government revenue are also estimated.

### 3.3 - Report Structure

The report is structured as follows; preceding this introductory section is the Key Findings and Executive Summary sections outlining all principal results and findings of this report. Immediately following this section is Data Development outlining Quest's methods for data aggregation and analysis, including a comprehensive overview of the project and model flow. Data Development may further be broken down into subsets based on; resource and production modeling, project spending inputs encompassing capital expenditures (CAPEX) and operational expenditures (OPEX), allocated spending into individual states, economic development representing job growth, and governmental revenues. Applications of the model and its results are presented in further detail within the Results section of the paper. Included within Results are the distributions of production, spending, economic, and governmental effects upon the nation, region, and states. The final Conclusions section provides further assessment and analysis drawn from Quest. Additional essential information can be found within the appendix sections following the report.

For the purpose of this report the directly affected states along the Pacific Coast are defined as: Washington, Oregon, and California.

### 3.4 - Current status of Offshore Oil & Natural Gas Production

Within the past decade, technological advancement coupled with the development of deeper waters and new regions have driven development in world offshore oil and natural gas production. Production from offshore now accounts for nearly one third of the world's oil and natural gas production and 55 percent of non-OPEC reserves according to the International Energy Administration (IEA).<sup>7</sup> Continuing growth will require expanding into additional deeper water depths and new regions. These untapped regions exist within the U.S.; including the Eastern Gulf, Atlantic OCS, Pacific OCS, and basins offshore Northern Alaska to name a few. Expansion of offshore oil and natural gas activities into these regions has the

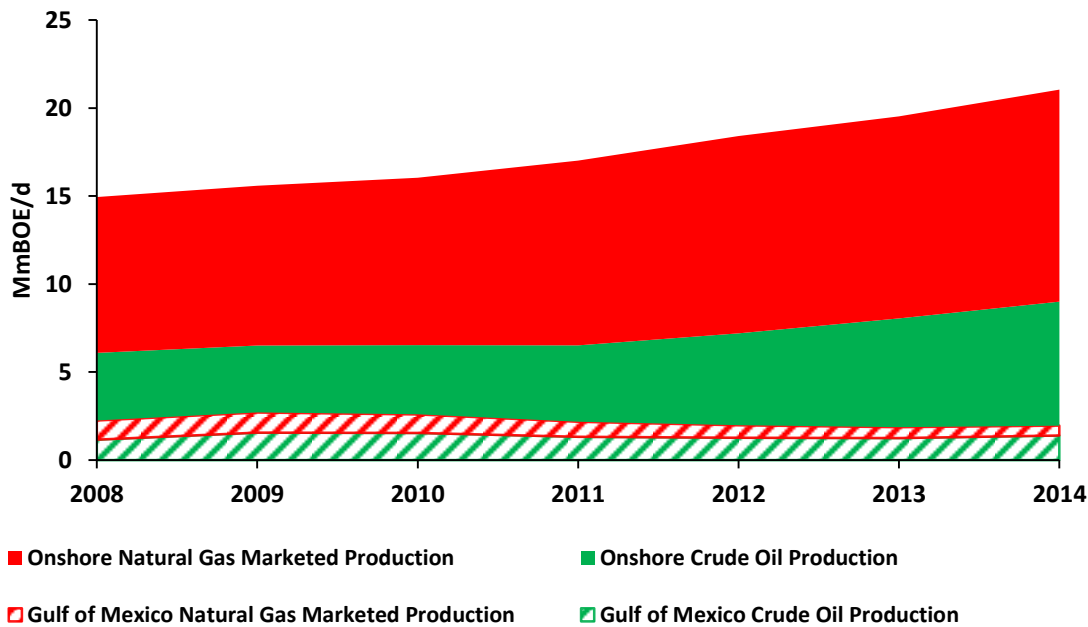
<sup>7</sup> International Energy Agency. *World Energy Outlook 2012*. International Energy Agency, 12 Nov. 2012.

potential to foster increased energy production and support job growth to a diverse range of industries and states, while also granting additional revenues to federal and state governments.

### 3.5 - Current U.S. Oil and Natural Gas Production

Total U.S. oil and natural gas production has significantly increased in recent years. From January of 2008 to May of 2014, average U.S. crude oil production has increased 3.25 million barrels per day at a compound annual growth rate (CAGR) of 7.96%, while natural gas production has increased 19.53 Bcf per day in the same period, with a CAGR of 4.7%. However, this is almost entirely due to rising onshore production from shale gas and tight oil formations. U.S. offshore oil and natural gas production, predominately from the Gulf of Mexico, has recently declined. (Figure 6)

Figure 6: U.S. Oil and Natural Gas Production 2008-2014



Source: Energy Information Administration

As of May 2014, U.S. domestic crude production has grown to 8.36 MMboe/d (million barrels of oil equivalent per day), distributed through:

- 1.33 MMboe/d from the Gulf of Mexico Federal Outer Continental Shelf
- .049 MMboe/d from offshore California and Alaska
- 7.18 MMboe/d from offshore State waters and onshore (including shale)

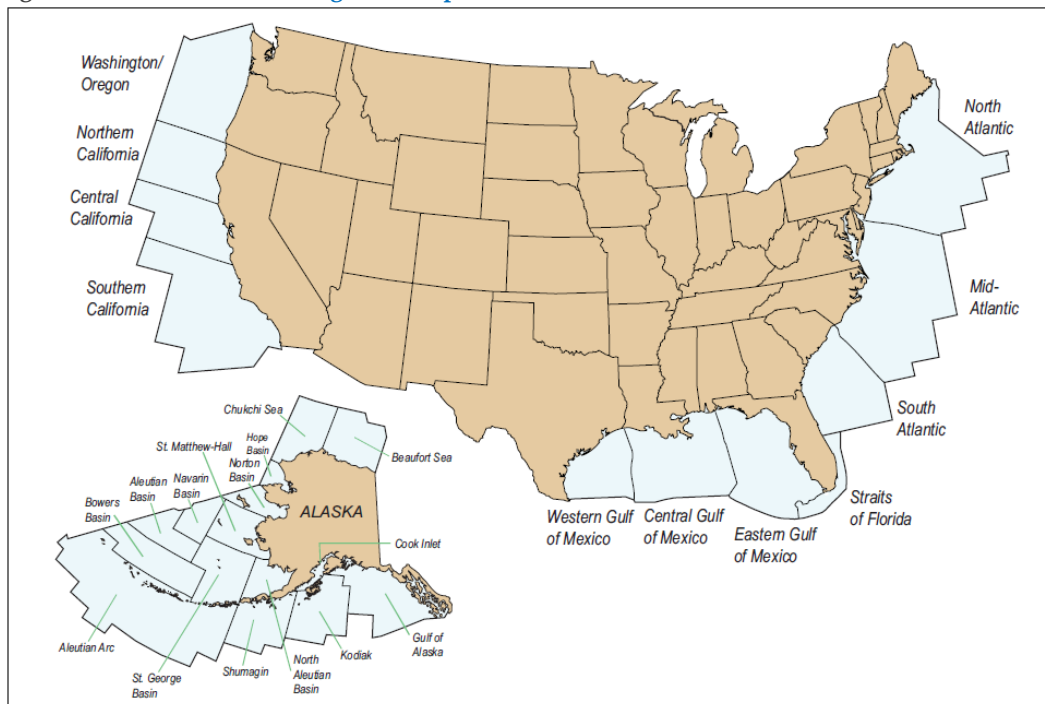
Marketed natural gas production nationwide has paralleled this growth, eclipsing 73 BCF/d (billion cubic feet of gas per day), while production offshore in the Gulf of Mexico has declined to 3.6 BCF/d in 2013

and is projected to be 3.2 BCF/d in 2014. It is further estimated that the oil and gas industry currently supports 9.8 million jobs nationwide<sup>8</sup>.

### 3.6 - The Pacific OCS

The Pacific OCS is the third largest OCS comprising 248 million acres of federal waters. Covering the entirety of the Pacific Coast, it is inclusive of Washington, Oregon, and California. Currently all leases, excluding 43 historic leases, remain inaccessible under the most recent 5-year leasing plan. Within the Pacific OCS, delineation is made to subdivide the region into four planning areas; Washington/Oregon, Northern California, Central California, and Southern California. Historically the majority of activity within the regions has focused on Southern California, with 41 of 43 active leases as well as all federal production within the OCS taking place here, although additional leases and exploration efforts were undertaken throughout the regions prior to 1990. For additional maps on individual areas within region, please see section 7.2 within the appendix.

Figure 7: Federal OCS Planning Area Map



Source: Bureau of Ocean Energy Management

### 3.7 - Lease History

Federal lease sales within the Pacific OCS took place between the years of 1961-1984, with only Central and Southern California being offered after 1964. Overall, twelve lease sales have been completed within federal waters, while four additional sales were canceled between 1986 and 1989.

<sup>8</sup> PWC, "Economic Impacts of the Oil and Natural Gas Industry on the U.S. Economy in 2011", American Petroleum Institute, July 2013

Presently there are 43 outstanding leases within federal waters that encompass 241 thousand acres of offshore waters - all within California. Of these leases, 43 are currently connected to offshore production, with 32 providing actively producing wells. Further information regarding the presently outstanding leases and infrastructure can be found within section 7.2 in the appendix.

### 3.8 - Seismic

According to the BOEM's seismic inventory<sup>9</sup>, oil and gas related seismic within the Pacific OCS is dated and limited in scope in comparison to developed regions - approximately 315k miles of geophysical data has been acquired through all acquisition types. Within this data set, 132k miles are 2-D, 110k miles are gravitational/magnetic, 42k miles are interpretations, and 30k miles are HRD. Dates of seismic acquisitions all precede 1989 with the exception of 52 blocks of 3-D seismic and 484 miles of 2-D being acquired in the 1990's.

### 3.9 – Drilling & Production

The most recent drilling within the area, in 2011, has been restricted to additional platform drilling on installed infrastructure, while new activity relating to undeveloped projects, inclusive of the last installation of a new structures as well as the last exploration well within the region, has been halted since 1989.

Since 1963, the BOEM reports a total of 1146 wells have been drilled along the Pacific Coast – inclusive of 1080 development and 336 exploration wells with some wells being double counted as both exploration and development wells. The distribution of wells is heavily weighted towards Southern California, where all development has taken place, although several wells have been drilled further north into Oregon and Washington – as well as additional Canadian wells nearby in Vancouver Island. Due to the technological limitations at the time, the majority of wells were drilled in shallow waters and to limited vertical depths by today's standards - the greatest water depth and deepest total vertical depth (TVD) within the region are presently 1,911 feet and 18,318 respectively.

Development and production within the region has focused on a select number of historical opportunities in the shallow waters of California particularly along the Santa Barbara coast. These projects have represented the area for numerous decades, the first being installed in 1967. Production today still continues from six companies, operating 12 fields, 23 platforms, and 106 well, and 213 miles of pipelines – presently providing approximately 48,000 boe/d of production from the region.

### 3.10 –Resources

For this report, Quest has assumed the amount and general location of oil and natural gas resources based on the combination of historical BOEM reports. While multiple sources were identified, the 1995 and 1999 National Assessment of United States Oil and Gas Resources Assessment of the Pacific

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<sup>9</sup> Geological & Geophysical Data Acquisition – Outer Continental Shelf through 2009-2010-2011. Dellagiardino & Racicot (2012)

Outer Continental Shelf Region (Dunkel and Piper, 1997) provides a framework for play delineation, and the Assessment of Undiscovered Technically Recoverable Oil and Gas Resources of the Nation's Outer Continental Shelf as of 2011, provided a framework for UTRR presently available.

Throughout the region, potential mixture of oil and gas bearing geologies vary as one moves along the coast line and into deeper water depths. The report projects that the northern area of Oregon-Washington is likely to contain more gas rich prospects in shallower waters, while as one moves south, the mixture of oil-to-gas is likely to increase as well as the reserves contained in deeper water depths. More detailed maps of the individual plays can be found from section 7.2 within the appendix section.

The play by play reserve assessments presented in the study by the BOEM are the basis for both the resource and production models used to formulate this study as further discussed in the data development section and resource sections. (Table 3)

**Table 3: BOEM 2011 Resource Estimates by Play and Resource Type**

UTRR by Play	Oil (Bbbl)	Gas (Tcf)	Oil %	Gas %	BOE (Bbbl)*
Pacific Northwest Province	.41	3.91	37%	63%	1.10
Central California Province	4.81	4.86	85%	15%	5.65
Santa Barbara – Ventura Basin Province	1.53	2.31	77%	23%	1.98
Los Angeles Basin Province	.26	.16	93%	7%	.27
Inner Borderland Province	1.79	2.07	83%	17%	2.16
Outer Borderland Province	1.4	2.79	74%	26%	1.90
<b>Total Pacific OCS</b>	<b>10.2</b>	<b>16.1</b>	<b>57%</b>	<b>43%</b>	<b>13.06</b>

Source: Bureau of Ocean Energy Management

All resources are not enclosed within the Pacific OCS

\*Resources by play have been redistributed from the '95 estimates to reflect '11 totals

### 3.11 - Excluded From This Study

This paper has been limited in scope to the assessment of the development of oil and natural gas resources from known Pacific OCS formations in Federal waters identified in the BOEM report. Any potential benefits from the development of onshore midstream, downstream infrastructure, or decommissioning are not included. In addition, the calculated government revenue potential does not include personal income taxes, corporate income taxes, or local property taxes. The development of additional oil and natural gas resources not identified in the BOEM report are not included even though new formations will likely be found as the area is developed.

## Section 4 – Data Development

### 4.1 - Data Development

Quest's data development scenario focused on constructing a tiered "bottom-up" model that separates the complete life cycle of offshore operations and subsequent effects into three main categories and five sub categories. The three main categories are as follows: an "Activity" model assessing potential reserve information under the expectation of estimating the possible number of projects based on the resources within the Pacific OCS, a "Spending" model based on the requirements to develop projects within the "Activity Forecast", and an "Economic" model focused on the economic impact on employment and government revenue from the "Spending" model. Individual subsections of each of the three major models were further examined under six additional criteria that create an individual "Project" model. These categories include: reserves, seismic, leasing activity, drilling, infrastructure & project development, and production & operation. (Table 4)

**Table 4: Oil and Gas Project Development Model**

	Activity Forecast	Spending Model	Economic Model
<b>Reserves</b>	<ul style="list-style-type: none"> <li>Total Pacific OCS Reserves</li> <li>Reserves by Play</li> <li>Reserves by Field</li> <li>Fields into Projects</li> </ul>	N/A	N/A
<b>Seismic</b>	<ul style="list-style-type: none"> <li>Pre-Lease Seismic</li> <li>Leased Block Seismic</li> <li>Shoot Type</li> </ul>	<ul style="list-style-type: none"> <li>Cost per acre</li> </ul>	<ul style="list-style-type: none"> <li>Economic activity due to seismic spending within states</li> </ul>
<b>Leasing</b>	<ul style="list-style-type: none"> <li>Yearly Lease Sales</li> </ul>	<ul style="list-style-type: none"> <li>Bonus Bid Prices</li> <li>Rental Rates</li> </ul>	<ul style="list-style-type: none"> <li>Federal and state revenues created through lease sales</li> <li>Economic activity due to increased state/personal spending</li> </ul>
<b>Exploration Drilling</b>	<ul style="list-style-type: none"> <li>Number of wells drilled</li> <li>Water depth of wells drilled</li> <li>Number of drilling rigs required</li> </ul>	<ul style="list-style-type: none"> <li>Cost per well</li> </ul>	<ul style="list-style-type: none"> <li>Economic activity due to exploration drilling within states vicinity</li> </ul>
<b>Project Development &amp; Operation</b>	<ul style="list-style-type: none"> <li>Project size</li> <li>Project development timeline</li> </ul>	<ul style="list-style-type: none"> <li>Spending per project</li> <li>Per project spending timeline</li> </ul>	<ul style="list-style-type: none"> <li>Division of state spending</li> <li>Economic activity due to project development within states vicinity</li> </ul>
<b>Production</b>	<ul style="list-style-type: none"> <li>Production type and amount</li> </ul>	<ul style="list-style-type: none"> <li>Oil and gas price forecast</li> </ul>	<ul style="list-style-type: none"> <li>Federal and state revenues created royalty sharing</li> <li>Economic activity due to increased state/personal spending</li> </ul>

Source: Quest Offshore Resources, Inc.

### 4.2 - Resources

Methodology used in the calculation of resources was derived from previous reports of the Bureau of Ocean Energy Management (BOEM) and its predecessor agencies on estimated resources in place. Given the predictive nature of these reports, Quest deemed it reasonable to extrapolate from BOEM estimates to closer reflect undiscovered technically recoverable reserves (UTRR) growth patterns within developed regions. This important step was principally modeled through analysis on historical reserve assessment growth within the developed areas of the Gulf of Mexico, Alaska, and the North Sea. A resulting

multiplier of 2.08 and UTRR alternative case of 27,050 MMboe were calculated using this methodology. (Table 5)

Table 5: **Adjusted Reserves by Pacific OCS**

UTRR by Play - Adjusted	Oil (Bbbl)	Gas (Tcf)	Oil %	Gas %	BOE (Bbbl)
Pacific Northwest Province	.85	8.09	37%	63%	2.28
Central California Province	9.97	10.06	85%	15%	11.69
Santa Barbara – Ventura Basin Province	3.17	4.78	77%	23%	4.11
Los Angeles Basin Province	.53	.33	93%	7%	.57
Inner Borderland Province	3.71	4.28	83%	17%	4.47
Outer Borderland Province	2.90	5.78	74%	26%	3.93
<b>Total Pacific OCS</b>	<b>21.13</b>	<b>33.32</b>	<b>78%</b>	<b>22%</b>	<b>27.05</b>

Source: The Bureau of Ocean Management and Quest Offshore Resources, Inc.

All resources are not enclosed within the Pacific OCS

After recalculating UTRR play resources, further subdivision was assigned based on USGS field size distributions within similar geological plays. The combination of field sizing and number of fields allows for the distribution estimation of possible discoveries within each play, while the potential reserves within each discovery were then further discounted based on a recovery factor of similar geological plays. Quest's assessments of potential field developments led to the creation of multiple project development scenarios dependent on the field sizing, with the assumption that large fields are more likely to be discovered first. Through the allocation of field discoveries into project categories based on individual play reserve expectations, Quest concluded a forecast of the number of projects expected within each play. It is important to note the uncertainty around the location of fields and projects within each play, and thereby placing them within the associated vicinity of states becomes a challenge. In order to account for this, Quest drew a 200 mile buffer around each individual states border, reweighting reserves and spending for each project based on the reserves in proximity to a state's border.

Projects were developed under two major criteria that allowed for six development scenarios. These criteria were separated between deepwater and shallow water projects and furthermore between small, medium, and large projects. This allowed for further delineation between projections, as each individual scenario has defined characteristics behind timing, spending, and production that drive later modeling. These delineations allowed for smaller projects to be developed under a shorter time-frame, require less hardware and engineering, as well as produce lower volumes for fewer years, while the opposites hold true for larger projects.

Project timing was developed based on collected data relating to historic offshore projects, as each project was given an individual timeline representing the required time for a generic project of that size and scope. Assumptions were made for different development scenarios given the infrastructure currently in place within the Pacific OCS. Timelines and infrastructure requirements were adjusted as infrastructure grew within certain areas, allowing for increased subsea tie-backs for deepwater projects and increased project numbers given decreasing infrastructure requirements and increasing project economics. Once in

place, projects are expected to produce based on a set production curve based on historical ramp-up and peak production data for existing fields, while declines were expected to follow an Arps equation<sup>10</sup>.

### 4.3 - Project Spending

This spending analysis accounts for all capital investment and operational spending through the entire “life cycle” of operations. Every offshore oil or natural gas project must go through a series of steps in order to be developed. Initial expenditures necessary to identify targets and estimate the potential recoverable resources in place include seismic surveys (G&G) and the drilling and evaluation of exploration & appraisal (E&A) wells. For projects that are commercially viable, the full range of above surface and below water (subsea) equipment must be designed and purchased. Offshore equipment includes production platforms and potentially on-site processing facilities as well as below water equipment generally referred to as SURF (Subsea, Umbilicals, Risers and Flowlines). Finally, the equipment must be installed and additional development wells must be drilled. Once under production, further operational expenditures (OPEX) are required to perform ongoing maintenance, production operations and other life extension activities as necessary for continued field production and optimization.

Spending for individual projects was subdivided into sixteen categories covering the complete life cycle of a single offshore project, excluding decommissioning, as well as two additional groups for natural gas processing and operation. Timing and cost for individual categories were assigned based on the previously mentioned project types where prices scale given the complexity and size of the project. (Table 6)

Table 6: Oil and Gas Project Spending Model

	Activity Model	Spending Model	Economic Model
Seismic (G&G)	<ul style="list-style-type: none"> <li>• Number of leases</li> <li>• 2D vs. 3D</li> </ul>	<ul style="list-style-type: none"> <li>• Cost per acre</li> </ul>	<ul style="list-style-type: none"> <li>• Operation requirements</li> </ul>
SURF	<ul style="list-style-type: none"> <li>• Trees, manifolds, and other subsea equipment</li> <li>• Umbilicals</li> <li>• Pipelines, flowlines, and risers</li> </ul>	<ul style="list-style-type: none"> <li>• Cost per item</li> <li>• Cost per mile</li> </ul>	<ul style="list-style-type: none"> <li>• Fabrication locations</li> </ul>
Platforms	<ul style="list-style-type: none"> <li>• Fixed Platforms</li> <li>• Floating Production System</li> </ul>	<ul style="list-style-type: none"> <li>• Unit size</li> </ul>	<ul style="list-style-type: none"> <li>• Fabrication locations</li> </ul>
Installation	<ul style="list-style-type: none"> <li>• Surf Installation</li> <li>• Platform Installation</li> </ul>	<ul style="list-style-type: none"> <li>• Number of vessels</li> <li>• Type of vessels</li> <li>• Vessel dayrate</li> </ul>	<ul style="list-style-type: none"> <li>• Operation requirements</li> <li>• Shorebase locations</li> </ul>
Drilling	<ul style="list-style-type: none"> <li>• Exploration drilling</li> <li>• Development drilling</li> </ul>	<ul style="list-style-type: none"> <li>• Rig type</li> <li>• Rig dayrate</li> </ul>	<ul style="list-style-type: none"> <li>• Operating requirements</li> <li>• Shorebase locations</li> </ul>
Engineering	<ul style="list-style-type: none"> <li>• FEED</li> </ul>	<ul style="list-style-type: none"> <li>• CAPEX</li> <li>• OPEX</li> </ul>	<ul style="list-style-type: none"> <li>• Technological centers</li> </ul>
Operating Expenditures (OPEX)	<ul style="list-style-type: none"> <li>• Supply and personnel requirements</li> <li>• Project maintenance</li> <li>• Project reconfiguration</li> </ul>	<ul style="list-style-type: none"> <li>• Type of project</li> </ul>	<ul style="list-style-type: none"> <li>• Shorebase locations</li> </ul>

Source: Quest Offshore Resources, Inc.

<sup>10</sup> Arps represents the hyperbolic shaped decline curve of an oil and gas field after peak production. Arps, J.J. "Analysis of Decline Curves" Trans. AIME (1944) 160, 228-47.



Upon compiling the scenario of overall spending estimates, Quest deconstructed the “local content” of oil and gas operations within the studied region. Individual tasks were analyzed on a component by component basis to provide an estimate of the percentage of regional, national, and international construction required by offshore operations. Once compiled, further modeling was prepared to forecast changing distributions as oil and gas development activity increases within new regions of the Pacific OCS. Additionally, delineations were made at the regional level in order to project spending for individual states. Considerations were based on the proximity to reserves and production, strategic locations such as shore bases and ports, as well as Bureau of Economic Analysis (BEA) data pertaining to each state’s present economic distribution.

#### 4.4 - Economic Data Development

Development of GDP and job data were calculated using the BEA’s RIMs II Model providing an input-output multiplier on spending at the industry and state levels for each defined category. Model outputs considered from spending effects include number of jobs and GDP multiplier effects. Further delineation is presented in the form of direct, indirect, and induced job numbers, which encompass the number of jobs relating to the spending in that category versus indirect and induced jobs that are created from pass-through spending.

Rims Categories used:

- Architectural, Engineering, and Related Services
- Construction
- Drilling Oil and Gas Wells
- Fabricated Metal Product Manufacturing
- Mining and Oil and Gas Field Machinery Manufacturing
- Natural Gas Distribution
- Oil and Gas Extraction
- Steel Product Manufacturing from Purchased Steel
- Support Activities for Oil and Gas Operations

#### 4.5 - Governmental Revenue Development

Governmental revenue data is presented in three categories; bonus bids from lease sales, rents from purchased but not yet developed leases, and royalty payments from producing leases. The projected revenue was calculated assuming the current operating structure of the Gulf of Mexico where applicable. Lease sales and rental rates were calculated through the simulation of lease sales within each individual area, while the number of leases acquired has been modeled on historical rates and based on the estimated amount of reserves in the region. Given the uncertainty around the form of lease sales that may be presented within the Pacific OCS, Quest has modeled yearly area wide sales within each region.

The federal / state government revenue split of leases, rents and royalties were modeled assuming a similar percentage split as in GOMESA (Gulf of Mexico Energy Security Act). Under GOMESA 37.5

percent of OCS bonus bid, rent, and royalty income is distributed to the appropriate states. GOMESA has an annual revenue cap per state. No such cap was assumed in this analysis.

**Currently there is no legislated federal / state revenue sharing agreement under GOMESA. Calculations in this report were made to distinguish the potential State government revenue impacts among all Pacific Coast states. These revenue estimates will need to be adjusted based on future legislated sharing arrangements if and when they occur.**

Production pricing was calculated using the EIA estimates for both Brent crude spot and Henry Hub natural gas prices<sup>11</sup>. Additional governmental revenues such as income and corporate taxes were considered outside of the scope of this study, and are likely to provide additional government revenues throughout the studied period.

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<sup>11</sup> United States. Energy Information Administration. *Annual Energy Outlook 2013*. Energy Information Administration, 2 May 2013.

## Section 5 – National Results

There has been no new oil and natural gas development along the Pacific Coast Outer Continental Shelf (OCS) for several decades because the last lease sale was in 1984. Production and drilling activity has been limited to a few legacy production platforms off Southern California. Opening the Pacific OCS to new oil and natural gas activity would be expected to provide large contributions to employment, gross domestic product, and state and federal government revenues. These benefits would be felt throughout the Pacific Coast states as well as the country as a whole. This study examines the total activities and impacts expected to result from resumed Pacific OCS oil and gas development. Offshore oil and natural gas exploration and production requires diverse activities such as seismic imaging of reservoirs, drilling of wells, manufacturing equipment, and installing specialized equipment, all of which require large capital and operational expenditures. Together with increased government revenues from royalties and other payments, these activities are projected to lead to increased employment and economic activity nationwide.

### 5.1 – Seismic and Leasing Activity

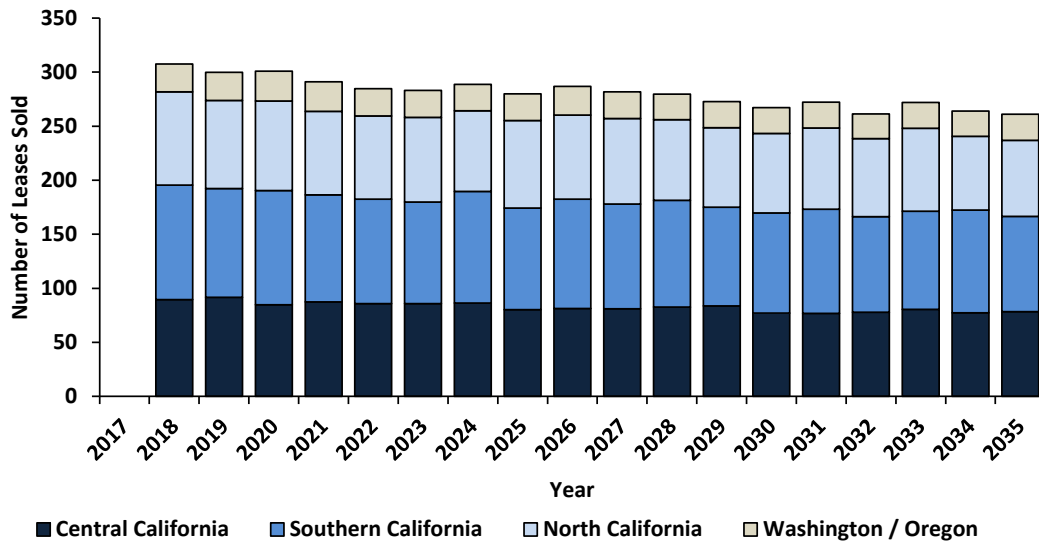
In contrast with other OCS areas that are inaccessible for offshore oil and natural gas production, the Pacific OCS has some limited production off the southern California coast. Currently, 43 leases are held and active in the Southern California planning area, with these leases acquired between 1967 and 1982<sup>12</sup> when the last lease sale took place. These historical sales and associated seismic as well as production activities mean that the geology of certain parts of the Southern California planning area are reasonably well known. However, in other portions of the Pacific OCS, seismic surveys have either been sparse, or have never been carried out, so the geology is less understood.

Given that seismic activity is normally the first step required for offshore exploration, both to enable oil companies to make bids on lease blocks and to identify drilling targets after leasing, some pre-leasing seismic activity is expected in the region. Upon the beginning of wide-spread sustained leasing in the Pacific OCS, seismic and leasing activity would be expected to increase. This study assumes that widespread leasing begins in 2018, coinciding with the first full year of the next five-year leasing schedule while seismic activity is assumed to start one year earlier in 2017.

Given the level of knowledge on the area's geology, leasing will most likely initially be most active in the Southern and Central Pacific regions. However, the study assumes that leasing in all areas begins at the same time. Lease sales in the Pacific OCS are expected to draw significant interest from oil and gas operators due to the significant resource potential of the area. The number of leases sold each year in the study's scenario is the estimated amount necessary to develop the projected number of projects, given historical leasing trends in other areas. In 2018, with leasing taking place across all areas, just over 300 leases are projected to be sold. (Figure 8)

<sup>12</sup> Of the 31 leases acquired in 1983 and 1984, no leases were developed.

Figure 8: Projected Leases Sold by Pacific OCS Planning Area



Source: Quest Offshore Resources, Inc.

Due to the history of production and known geology of the region and the expected resource potential, the Southern California planning area is expected to see the most robust leasing activity with around 35 percent of total leases sold. Strong initial leasing around existing infrastructure is also expected, with operators likely to attempt to bring on production quickly using existing infrastructure. The Central and North Pacific planning areas are expected to see similarly robust activity levels with around 29 and 27 percent of total leases sold respectively. The slowly declining trend in leases purchased is primarily a function of less leases being offered in later lease sales as the number of leases owned by operators grows.

## 5.2 – Projects

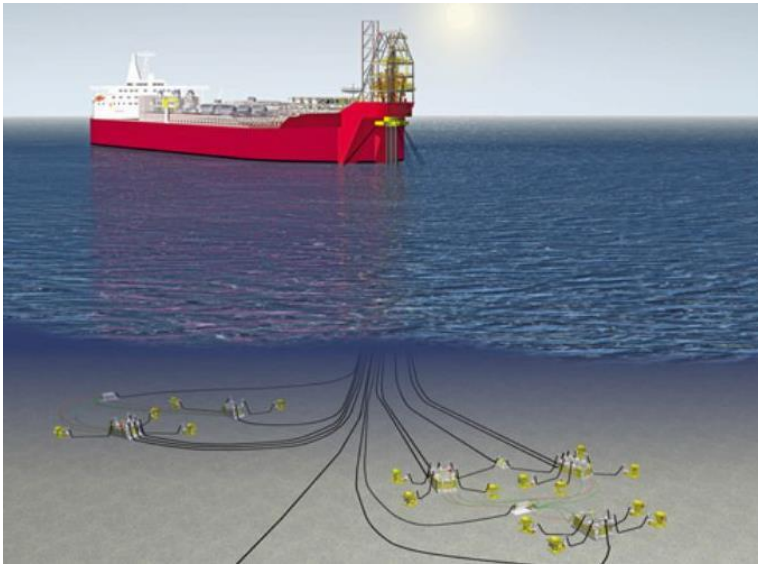
Offshore project development is the key determinant of oil and natural gas production. Developing offshore projects is complex and requires time, planning and high levels of capital investment. An offshore oil and natural gas project is based on one or more discoveries of oil and natural gas fields, often after further delineation or appraisal drilling. Although seismic and other surveys can identify possible oil and natural gas deposits, it is only through drilling that confirmation of oil and natural gas in a given location can take place. After confirmation of a viable oil and natural gas field that meets stringent technical and economic constraints, project development may begin.

Although no two offshore oil and natural gas projects are exactly alike, for the purposes of this study, offshore project developments were generalized into six generic project types based on project size and water depth. Water depth range is one of the key determinants of project development, as field development scenarios vary greatly from shallow to deepwater fields. In shallow water fields, so called “fixed” infrastructure is most often used with drilling, processing, and production taking place from one or more platform or platforms that are fixed directly to the seafloor (fixed platforms). (Figure 9)

**Figure 9: Fixed Platform**

Source: McDermott International, Inc.

Deepwater projects are typically more complex and thus more capital intensive. Most deepwater projects utilize floating production and subsea infrastructure. Due to their increased complexity, deep water projects typically have longer development timeframes. (Figure 10)

**Figure 10: Deepwater Project using Floating Production and Subsea Hardware**

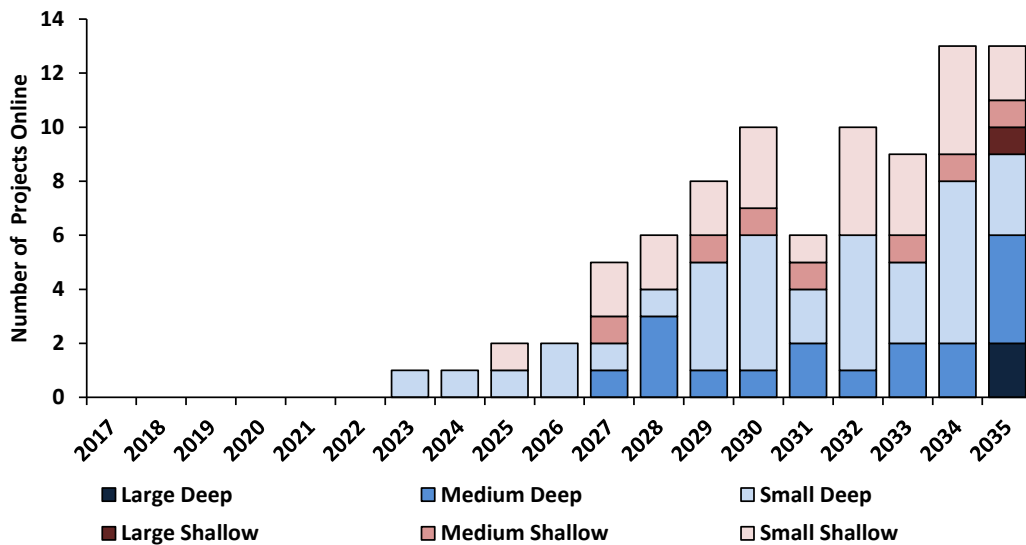
Source: Royal Dutch Shell

Apart from water depth, project size is typically defined by reservoir characteristics, hydrocarbon volumes and expected production, which collectively define the timeline and capital investment required to develop the project. Larger projects typically require more wells, a longer development period, increased material resources and larger equipment such as platforms, trees and pipelines. Smaller projects, on the other hand, often rely on larger nearby projects for certain types of infrastructure such as pipelines or

processing facilities. As a result, smaller projects are normally delayed; however, in areas near existing infrastructure in the Southern California planning area, small projects could be brought on rapidly if discoveries were made by tying back to existing platforms or pipelines.

During the 2017 to 2035 period the study projects that 86 projects could begin oil and natural gas production in the Pacific OCS. Given the location of the resource potential, more of these projects are expected to be deepwater projects, with 54 deepwater projects and 32 shallow water projects projected. (Figure 11)

Figure 11: Projected Number of Projects by Start-Up Year, Size and Water Depth



Source: Quest Offshore Resources, Inc.

If Pacific OCS leasing begins in 2018, new projects could begin producing oil and natural gas by 2023. The number of projects anticipated to start up each year is expected to vary between one and thirteen annually. Project startup is dependent on variables such as discovery timing, water depth, and available infrastructure already in place and project development lead times.

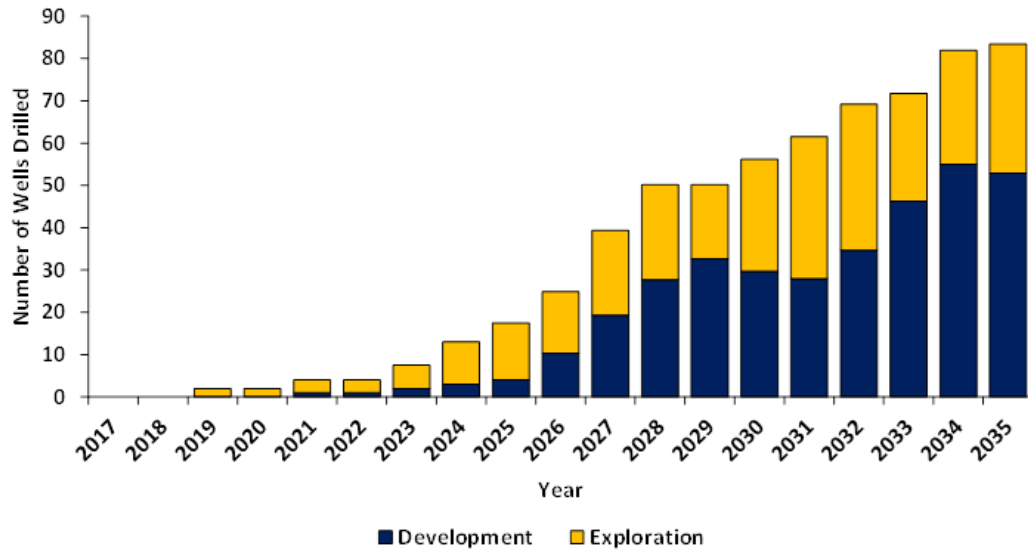
### 5.3 – Drilling Activity

Exploration and production drilling is used to identify, confirm, delineate, and produce oil and natural gas, making it one of the most important offshore activities. Drilling is a very capital intensive process, employing drilling rigs that require large crews as well as significant quantities of consumables ranging from food and fuel to drill pipe and fluids. Drilling rigs (mobile offshore drilling units – MODU's) must constantly be resupplied and crewed, and as a result, lead to high levels of activity in the areas and ports that support offshore drilling rigs.

Drilling activity in the Pacific OCS is expected to be highly robust upon the commencement of offshore oil and natural gas activity. Exploratory drilling is expected to begin in 2019 or one year after lease sales begin. Starting in 2021, development drilling is expected to begin with an initial focus on projects close

to existing infrastructure, but eventually taking place throughout the whole Pacific OCS. Total drilling activity is projected to level off at about 70 to 80 wells per year after 2032 with some volatility between years. During this time the proportion between development and exploratory wells is expected to shift to around 60 and 40 percent respectively, which is in line with other mature provinces. (Figure 12)

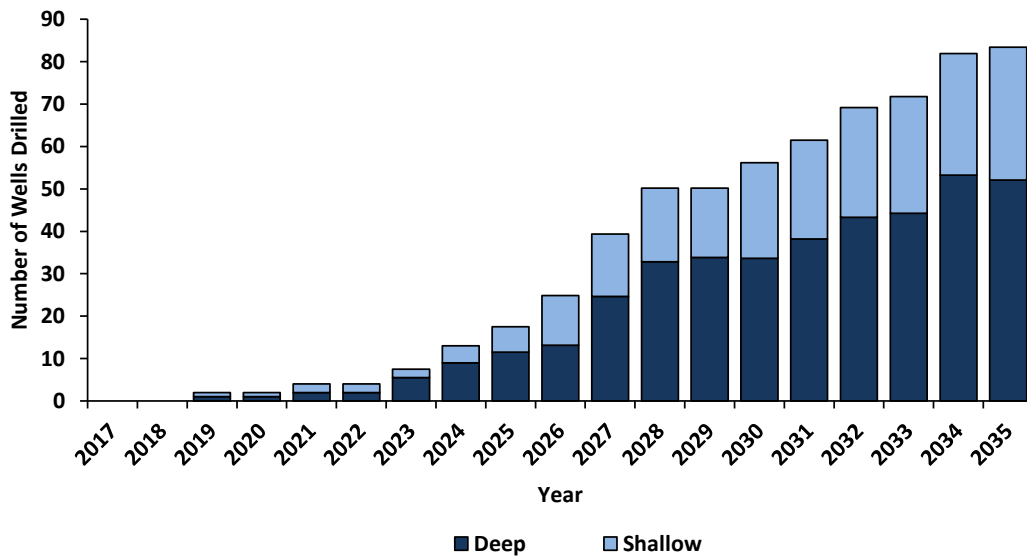
Figure 12: **Projected Number of Wells Drilled by Well Type - Exploration and Development**



Source: Quest Offshore Resources, Inc.

Due to the interconnected nature of exploration, drilling, and development, Pacific OCS drilling follows a trend similar to project development regarding the water depths of wells. As the basin matures, drilling is projected to trend to a 60 to 40 ratio of deepwater to shallow water wells. The increase in later years of deepwater water wells projected for the Pacific OCS is driven by the expansion of shallow water infrastructure which is expected to allow deepwater projects to be developed more easily. As with projects, deepwater drilling is more capital intensive than shallow water drilling; most deepwater wells are drilled from floating drilling rigs (semis and drillships) in contrast to jack-up or fixed platform rigs that rest on the seafloor. These floating rigs command significantly higher day rates than non-floating rig types. (Figure 13)

Figure 13: Projected Number of Wells Drilled by Water Depth and Year



Source: Quest Offshore Resources, Inc.

A total of around 640 wells are projected to be drilled from 2017 to 2035 with 63 percent of the wells expected in deepwater and 37 percent expected in shallow water.

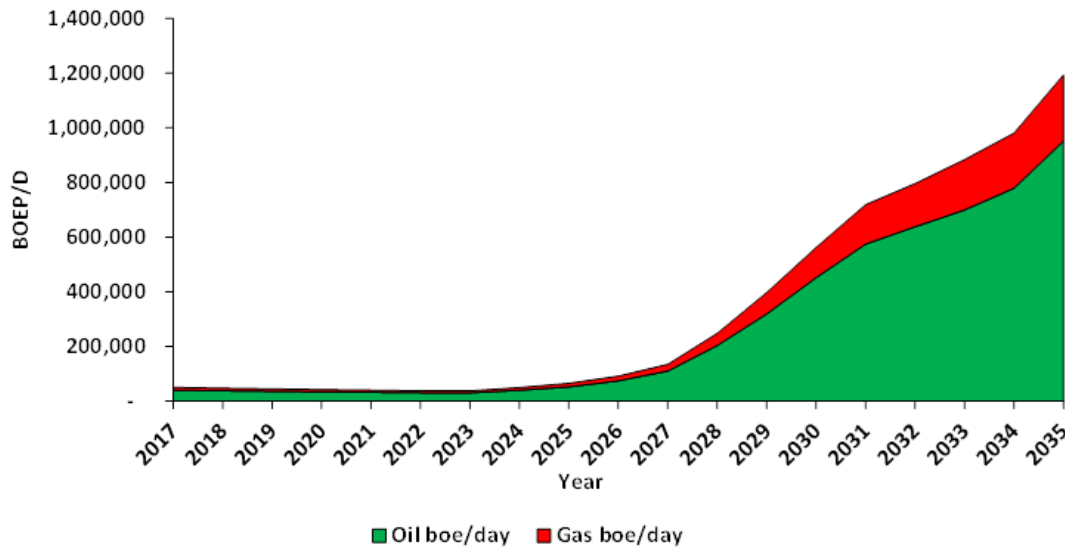
#### 5.4 – Production Activity

The number of projects developed, coupled with reservoir size and reservoir productivity, is the main determinant of oil and natural gas production levels. Most oil and natural gas reservoirs contain a combination of oil, natural gas, condensate, water, and many other substances in varying ratios. Some reservoirs may contain nearly all oil or all natural gas. All of the resource plays defined by BOEM studies are constructed under the expectation that both oil and natural gas are present, with the relative ratios defined on a play by play basis. Oil / gas ratios for individual fields are likely to vary, though for the purpose of this study, they were modeled as consistent within each play. Production for each project was modeled based on standard production curves taking into account the start-up, ramp-up, peak, and decline timing, as well as the expected hydrocarbon mix.

This study projects that first oil and natural gas production from new projects in the Pacific OCS would take place in 2023, 6 years after the beginning of leasing in the area. Initial annual new production would be just over 1500 barrels of oil equivalent per day (BOED) as the first projects come online at low initial levels of production. This would add to the projected production from existing legacy projects of about 36 thousand barrels for a total just about 37 thousand barrels of oil equivalent of production per day. By the second year new production is projected to increase to over 15 thousand BOED. Total production is then projected to grow relatively consistently throughout the period at a compound annual growth rate of over 33 percent per year from 2026 to 2035. Total production is projected to reach 1.19 million BOED by 2035, with approximately 80 percent of production being oil (950 thousand BOED) and 20 percent of the production being natural gas (240 thousand BOED or 1.39 billion cubic feet per day). (Figure 14)



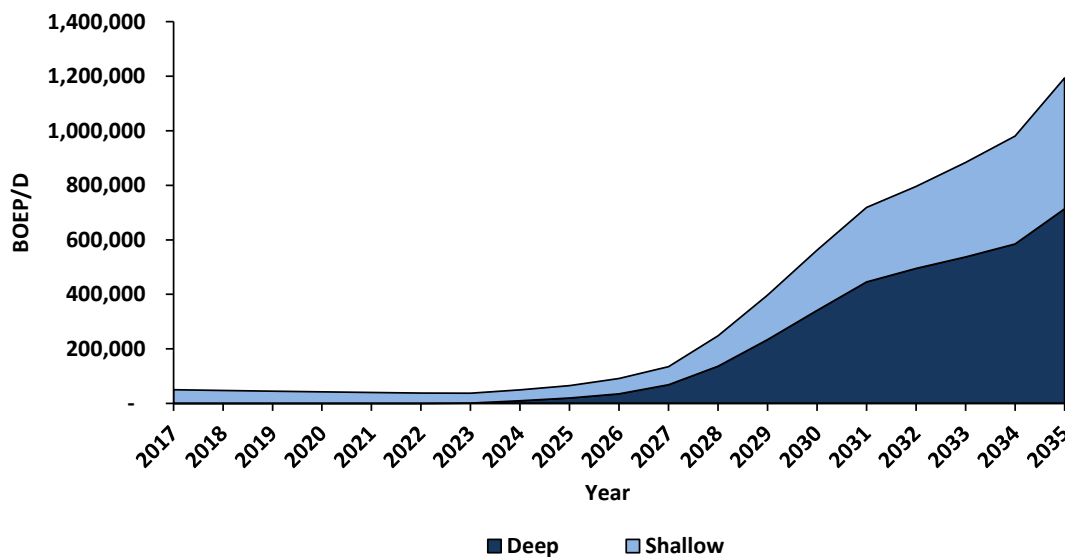
Figure 14: Projected Production by Type



Source: Quest Offshore Resources, Inc.

Since project development and drilling are expected to be more active in deepwater, deepwater production is expected to outweigh shallow water production by a healthy margin. Deepwater production is expected to account for 60 percent of production in 2035, compared to 40 percent of production for shallow water fields. For the overall period from 2017 to 2035, deepwater accounts for a smaller larger share at 56 percent of production to shallow water's 44 percent due to the projected early startup of fields near existing shallow water infrastructure. (Figure 15)

Figure 15: Projected Production by Water Depth



Source: Quest Offshore Resources, Inc.

## 5.5 – Spending Activity

Offshore oil and natural gas development is highly capital intensive. Offshore projects require exploratory seismic surveys and drilling, production equipment, services such as engineering, operational expenditures including the ongoing supply of consumables, and maintenance. The combined effects of one individual project flow through the entire economy, driving employment and economic growth. From 2017 to 2035, total cumulative spending on Pacific OCS oil and natural gas development is projected to be over \$163 billion. Total spending in the first five years is projected to average just \$675 million per year, but spending per year is expected to increase as projects are built and development drilling begins. Total drilling activity is projected to grow at a compound annual growth rate of just over 20 percent from 2025 to 2035. By 2030 total spending is projected to reach around \$22 billion per year. For the purposes of this report, spending is divided into eight main categories, with each category encompassing a major type of exploration and production activity.

Seismic (G&G)<sup>13</sup> spending is normally associated with the imaging of possible reservoirs prior to exploration drilling and thus takes place primarily at the early stages of a project's lifecycle. Although critically important, seismic spending is a relatively low percent of overall spending at an average of \$266 million or 3 percent of overall spending from 2017 to 2035.

As a result of the expense and logistics requirements of offshore drilling, where rigs command large day rates in conjunction with high operational supply costs, drilling expenditures represent one of the largest sources of spending for any offshore project. Total expenditures from exploration and development drilling in shallow and deep waters from 2017 to 2035 are projected to average nearly \$2.3 billion per year, and drilling spending from 2031 to 2035 is expected to average over \$5.3 billion per year.

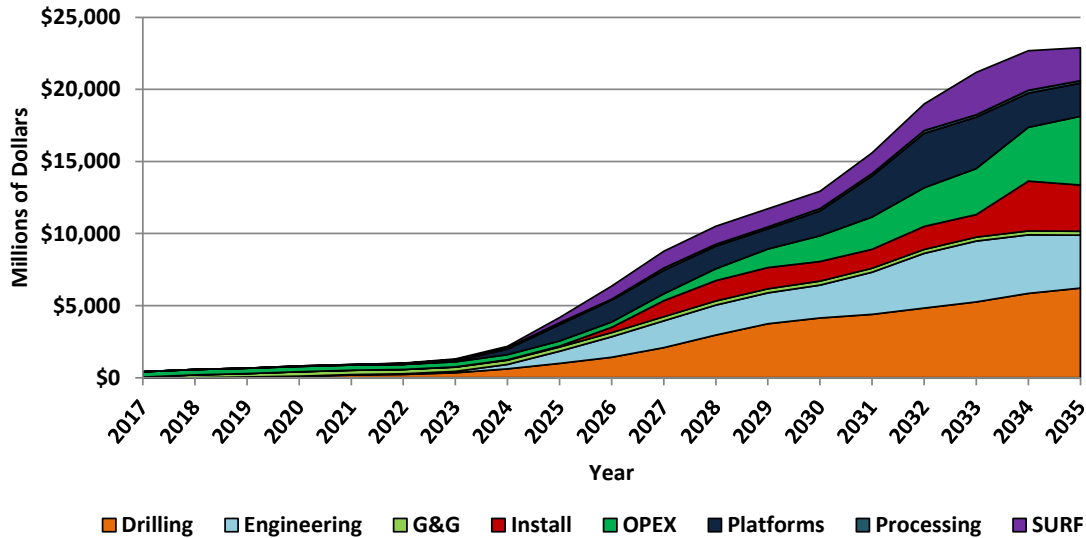
Engineering spending takes place at all stages of an offshore project's lifecycle from exploration to project development as well as during a project's operational phase. Engineering activities vary from overall project-focused engineering to the engineering of very specific equipment and components. Engineering spending is projected to average nearly \$1.6 billion per year from 2017 to 2035, increasing as the Pacific OCS is developed. Engineering spending from 2031 to 2035 is projected to average just over \$3.7 billion per year.

Most of the equipment utilized in developing offshore oil and natural gas fields falls into either the platform (both fixed and floating) or SURF (subsea equipment, umbilicals, risers and flowlines) categories. This equipment is traditionally purchased and constructed prior to production of oil and natural gas. The types of equipment include complicated structures like floating platforms that weigh tens of thousands of tons, complex subsea trees that control wells at the ocean floor and miles of pipeline that transport product back to shore. Some of the equipment required, like offshore accommodation modules and equipment such as mats (which are metal frames placed on the seafloor to hold other equipment, are less complex and significantly cheaper. Due to the varying timelines for procurement of equipment, spending for platforms

<sup>13</sup> G&G is defined as geological and geophysical and is primarily the study of the structure and composition of subsurface formation, especially using seismic imaging to identify possible oil and natural gas deposits.

and SURF equipment is more variable year to year than most other offshore exploration and development spending. Platform spending is expected to average over \$1.2 billion per year from 2017 to 2035 and nearly \$2.7 billion per year in the last five years of the forecast. SURF spending is projected to average over \$925 million per year from 2017 to 2035, and \$2.2 billion per year from 2031 to 2035. (Figure 16)

Figure 16: Projected Overall Spending by Category<sup>14</sup>



Source: Quest Offshore Resources, Inc.

Installation of platforms and SURF equipment is normally carried out by multiple vessels, each with specialized functions such as pipe-laying or heavy-lift. Some vessels might lay large diameter pipelines (14 inch+), while other vessels lay smaller diameter infield lines (2-10 inches) or lift equipment, and install hardware. Other specialized vessels supply drill-pipe, food, fuel and other fluids. Nearly everything installed offshore must first be prepared onshore at specialized bases in the region prior to installation. Equipment is sometimes transported to the field on the installation vessels themselves and at other times is brought to the field in specialized barges or transportation vessels. Installing offshore equipment often requires complex connection or integration operations and uses vessels that can command day rates of over \$1 million. Between 2017 and 2035, average annual installation spending is projected to be nearly \$900 million per year, with 2031 to 2035 installation spending projected to average \$2.2 billion per year.

Once the initial wells have been drilled and the necessary equipment installed, a field can enter the operational phase. The operation phase requires manning and operating the facilities and equipment, continuously supplying essential fluids and general maintenance. These operational expenditures (OPEX) are a significant source of ongoing spending by oil and gas companies within the region. From a base of around \$375 million per year from currently producing projects, operational expenditures are expected to grow to nearly \$1.8 billion by 2030, climbing to nearly \$4.8 billion per year by 2035.

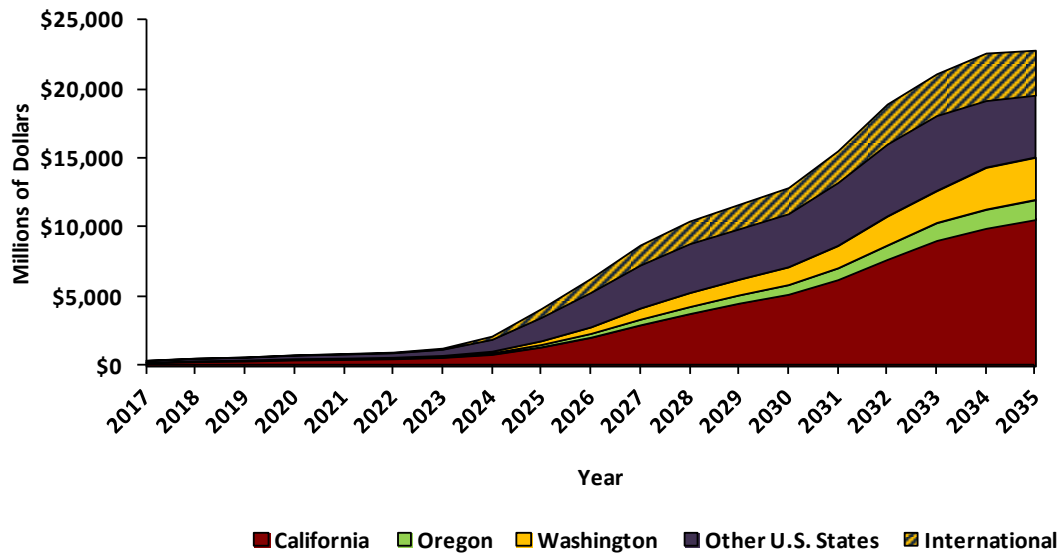
<sup>14</sup> OPEX is defined as operational expenditures, SURF is defined as subsea, umbilical, riser and flowline equipment, processing is defined as onshore natural gas processing. Please see previous footnote for definition of G&G

Due to significant amounts of natural gas production expected from the Pacific OCS, investment in gas processing infrastructure will be needed to receive produced gas from offshore fields. Although some limited natural gas processing occurs offshore, onshore natural gas processing plants are necessary to separate other gases and liquids to meet quality specifications of the onshore pipeline and gas distribution system. As the Pacific Coast has only limited facilities along the California coast, expenditures to build and operate these plants would be necessary to enable offshore natural gas production. On average from 2017 to 2035 construction of natural gas processing plants is expected to account for spending of around \$110 million per year or \$2 billion total over the 2017 to 2035 period, representing the ability to handle approximately 7 billion cubic feet per day of additional natural gas production by 2035.

The location of spending for Pacific OCS oil and natural gas development will be dependent on a variety of factors, including the type of equipment and services, the location of the projects being developed, and the time period in which the spending takes place. Developing an offshore oil and gas project requires a complex supply chain with suppliers located all over the country and often the world. Depending on the activity type, some spending can take place far from the activity area while other spending must be undertaken geographically close to projects. For instance, activity such as G&G seismic or drilling must take place in the waters of the affected region, with support required from nearby shorebases and ports to supply items such as fuel, food and other consumables. Specialized equipment may be manufactured in far off states or even foreign countries with more developed oil and natural gas supply chains, especially in the early years of development in a new offshore oil and gas production region.

From 2017 to 2022 when activity is expected to be focused on exploratory drilling, seismic and developing resources near existing infrastructure, an average of 65 percent of total domestic Pacific OCS oil and natural gas spending is projected to take place along the Pacific Coast. However, as projects begin to be developed and spending on platforms and SURF equipment begin, the Pacific Coast's share of spending is projected to dip to a low of 51 percent in 2025, with high value SURF equipment and platforms expected to be supplied by other states and countries. (Figure 17)

Figure 17: Projected Overall Spending Pacific Coast vs. Other U.S. States vs. International



Source: Quest Offshore Resources, Inc.

As the Pacific OCS is developed, it is projected that suppliers of offshore oil and natural gas equipment will take advantage of the high-tech manufacturing capabilities of the Pacific Coast states, as well the extensive port infrastructure already in place. An increased amount of equipment and services will originate from Pacific Coast states. Production in the region will lead to significantly lower transportation costs, as well as allowing suppliers to diversify their workforce nationally. In 2035, 77 percent of domestic spending on Pacific OCS oil and natural gas developments is projected to accrue to the Pacific Coast states reaching over \$15 billion per year in 2035. Other U.S. state spending in 2035 is projected to be just over \$4.5 billion per year, below the peak of nearly \$5.5 billion per year in 2030 due to increased operational expenditures and higher levels of Pacific state content for capital goods.

Over the 2017 to 2035 period, the largest share of spending due to Pacific OCS oil and natural gas development occurs in the Pacific Coast states, with nearly \$140 billion of cumulative spending projected over that time period. Approximately \$46 billion is projected to be spent in states outside the region cumulatively. (Table 7)

**Table 7: Projected Overall Spending Pacific Coast States and Other U.S. States (Millions of Dollars per year)**

State	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
California	\$227	\$316	\$356	\$434	\$470	\$520	\$617	\$833	\$1,361	\$2,058
Oregon	\$18	\$27	\$31	\$43	\$47	\$53	\$69	\$101	\$179	\$283
Washington	\$17	\$25	\$29	\$41	\$44	\$49	\$70	\$128	\$272	\$474
Other U.S. States	\$146	\$192	\$225	\$270	\$310	\$340	\$465	\$877	\$1,721	\$2,526

State	2027	2028	2029	2030	2031	2032	2033	2034	2035
California	\$2,956	\$3,774	\$4,534	\$5,180	\$6,243	\$7,718	\$9,096	\$9,981	\$10,619
Oregon	\$414	\$514	\$599	\$702	\$854	\$1,037	\$1,292	\$1,377	\$1,440
Washington	\$807	\$1,013	\$1,134	\$1,283	\$1,611	\$2,086	\$2,297	\$3,017	\$3,050
Other U.S. States	\$3,140	\$3,567	\$3,675	\$3,874	\$4,586	\$5,240	\$5,465	\$4,861	\$4,517

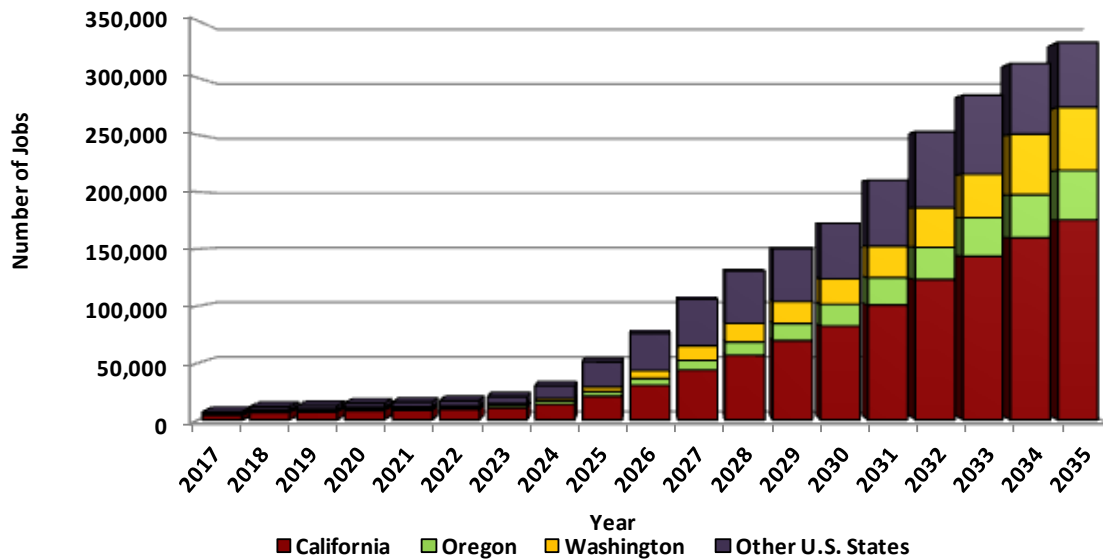
Source: Quest Offshore Resources, Inc.

Spending among the Pacific Coast states is projected to vary based on the location of offshore oil and natural gas reserves, projects and production as well as the makeup of the individual state's economies. The location of spending for activities that require operations to be located in or near an oil and gas development are primarily driven by geographic factors, while spending on manufacturing equipment that can be more easily transported is driven by both the make-up of the Pacific Coast's states economies as well as geography. States with strong manufacturing, fabrication, engineering or other relevant industries are projected to be more likely to undertake these activities for Pacific OCS oil and gas exploration and production.

## 5.6 – Employment

Spending on goods and services to develop oil and natural gas in the Pacific OCS is expected to provide large employment gains both nationally and regionally. Employment generally follows spending patterns. Employment effects are expected to steadily grow, reaching over 330 thousand jobs in 2035. Total Pacific Coast employment in 2035 is projected to reach nearly 275 thousand jobs in 2035, with employment spread across the region. U.S. states outside the Pacific Coast region are projected to see employment of approximately 55 thousand jobs in 2035, down from a peak of around 70 thousand jobs in 2033 as more employment shifts into the Pacific Coast region. (Figure 18)

Figure 18: Projected Employment by State

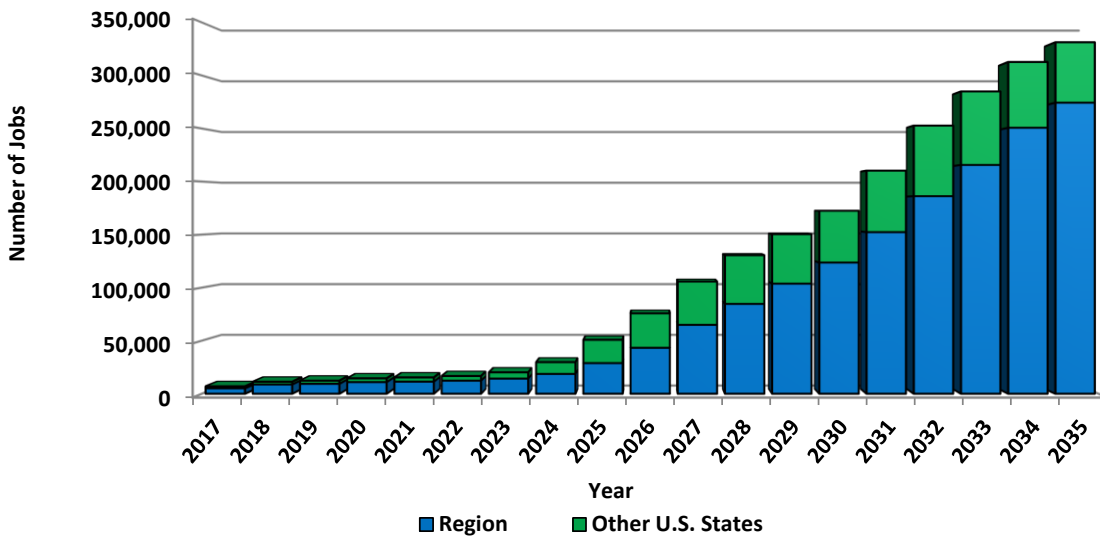


Source: Quest Offshore Resources, Inc.

The largest impact on 2035 employment by number of jobs, 175 thousand, is expected to be seen in California. Washington and Oregon are all also projected to see employment of 55 and 43 thousand jobs respectively by 2035.

As the Pacific OCS is developed, the oil and gas industry is expected to take advantage of the skilled workforce and extensive infrastructure in place within the region. The mix between Pacific Coast and other U.S. state employment effects are projected to be highly dependent on the type of activity taking place in a given year, as well as the projected in-region supply chain shift over time. In 2025 and 2026, as initial project development within the region begins and large amounts of capital goods are imported from other states, the region's share of overall jobs is project to fall to 57 percent, but by 2035 the Pacific Coast states are projected to account for 83 percent of the employment effects of Pacific OCS development. (Figure 19)

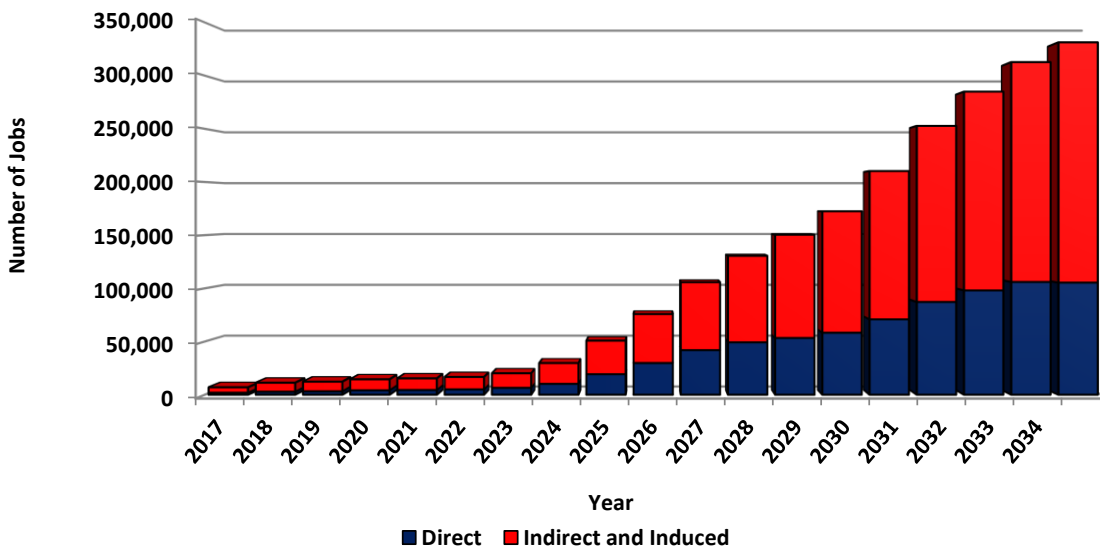
Figure 19: Projected Employment Pacific Coast vs. Other U.S. States



Source: Quest Offshore Resources, Inc.

The opening of the Pacific OCS to offshore oil and natural gas production is expected to increase employment not only through direct employment in the industry, but also indirectly. Indirect employment occurs through the purchases of needed goods and services and the induced employment impact of greater income in the overall economy. Direct employment by oil and natural gas companies and their suppliers is projected to reach nearly 105 thousand jobs in 2035. Jobs generated through the purchase of goods and services coupled with the income effects of increased employment are expected to contribute a further 225 thousand jobs. (Figure 20)

Figure 20: Projected Employment Direct vs. Indirect and Induced

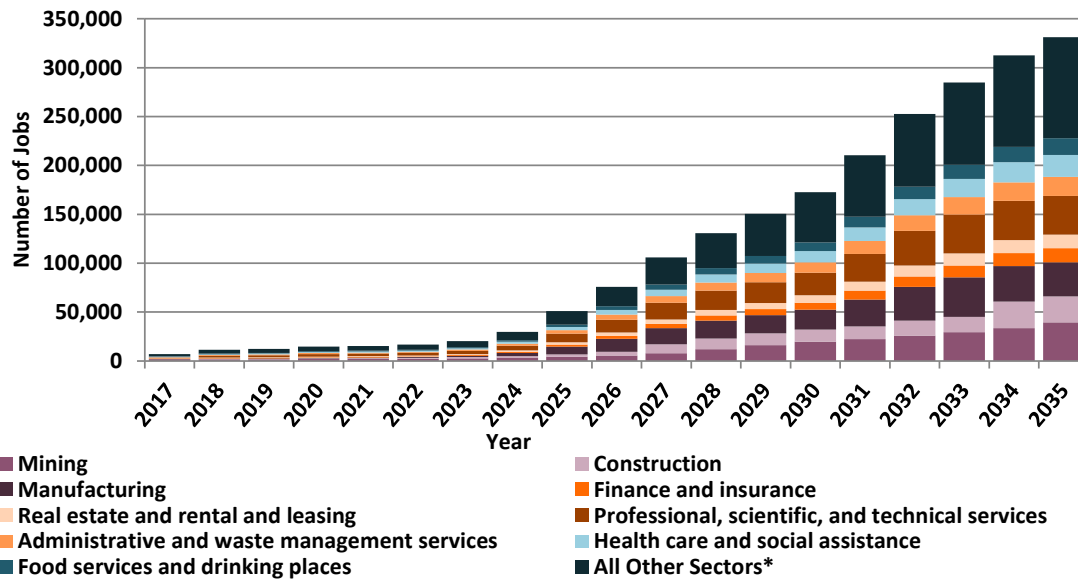


Source: Quest Offshore Resources, Inc.



Offshore oil and natural gas development in the Pacific OCS is expected to benefit a diverse spectrum of industries both nationally and in the Pacific Coast states. Industry sectors which are directly involved in oil and natural gas activities (as defined by the Bureau of Economic Analysis) such as mining (which includes the oil and gas industry); manufacturing; professional, scientific, and technical Services (engineering); and Construction (installation), are expected to see the largest employment impacts with over 100 thousand combined jobs in 2035. Additionally, employment impacts are expected to be significant for a variety of other industries outside oil and gas, with 230 thousand jobs projected outside of these four categories in 2035. (Figure 21)

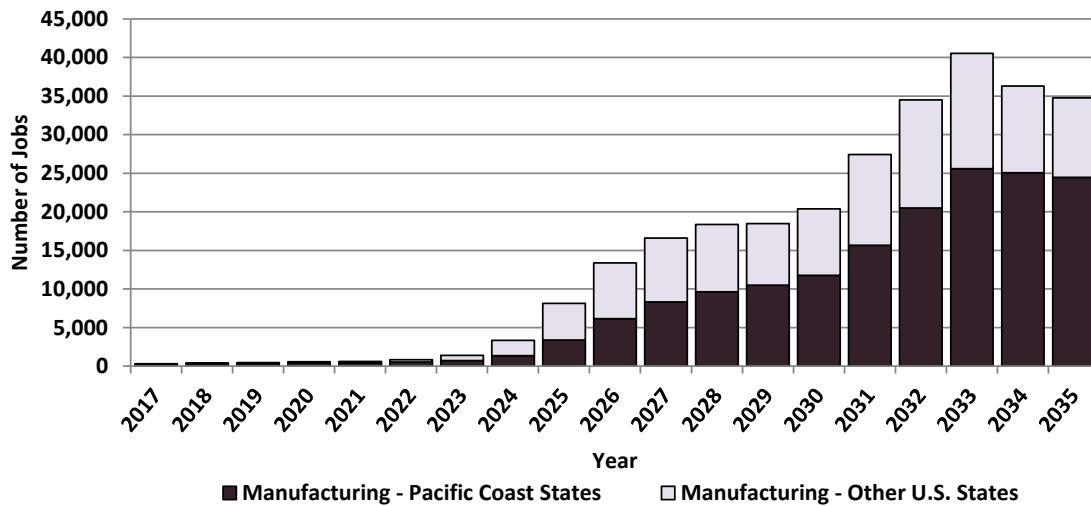
Figure 21: **Projected Employment by Industry Sector**



Source: Quest Offshore Resources, Inc.

The manufacturing sector includes those businesses that manufacture and fabricate oil and gas equipment and platforms and otherwise produce the goods required to develop oil and natural gas fields. Manufacturing is projected to see some of the largest gains due to Pacific OCS oil and natural gas production, with about 35 thousand jobs created by 2035, of which about 25 thousand jobs are in Pacific Coast states and over ten thousand are in the rest of the U.S. (Figure 22)

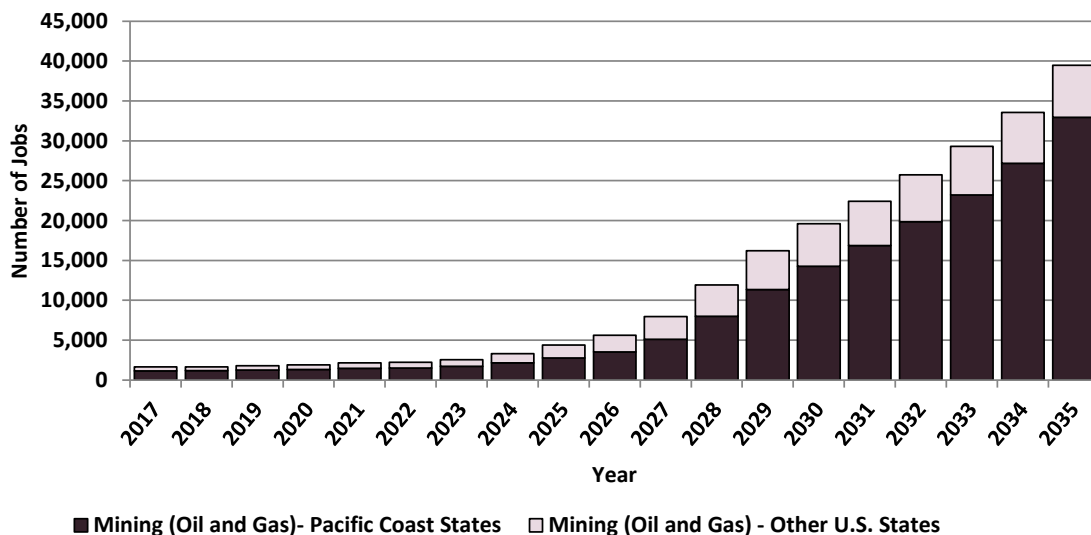
Figure 22: Projected Manufacturing Employment



Source: Quest Offshore Resources, Inc.

Employment in the mining sector, which includes the oil and gas industry, is also expected to see significant growth. In 2035 total employment is projected to reach nearly 40 thousand jobs, of which nearly 33 thousand jobs are expected in the Pacific Coast states and over six thousand jobs in the rest of the U.S. (Figure 23)

Figure 23: Projected Mining (Oil &amp; Gas) Employment

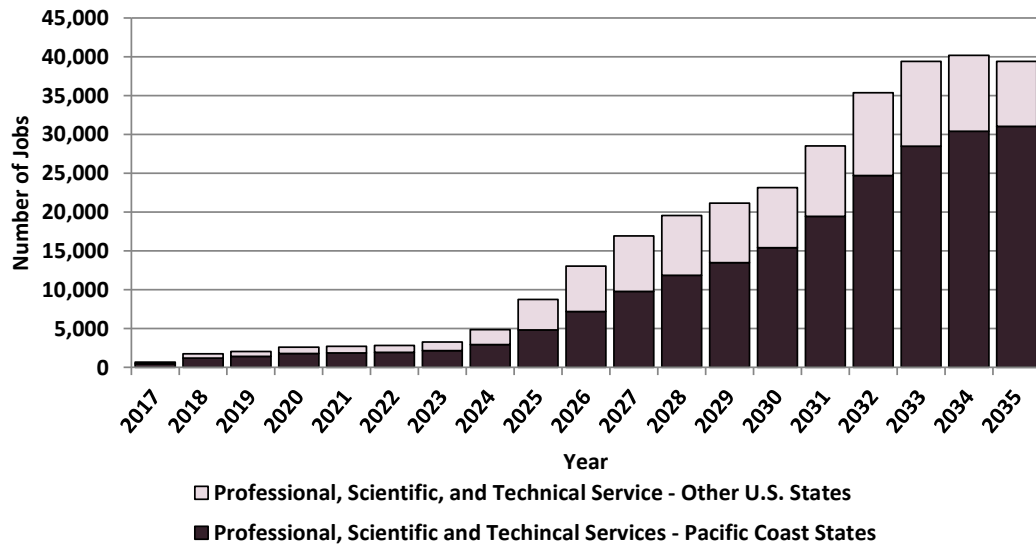


Source: Quest Offshore Resources, Inc.

Another employment sector expected to see large gains as a result of Pacific OCS oil and natural gas activity is the professional, scientific, and technical services sector which includes high value engineering employment. This sector is projected to see nearly 40 thousand additional jobs in 2035, with

over 31 thousand jobs in the Pacific Coast states and over eight thousand jobs in other U.S. states. (Figure 24)

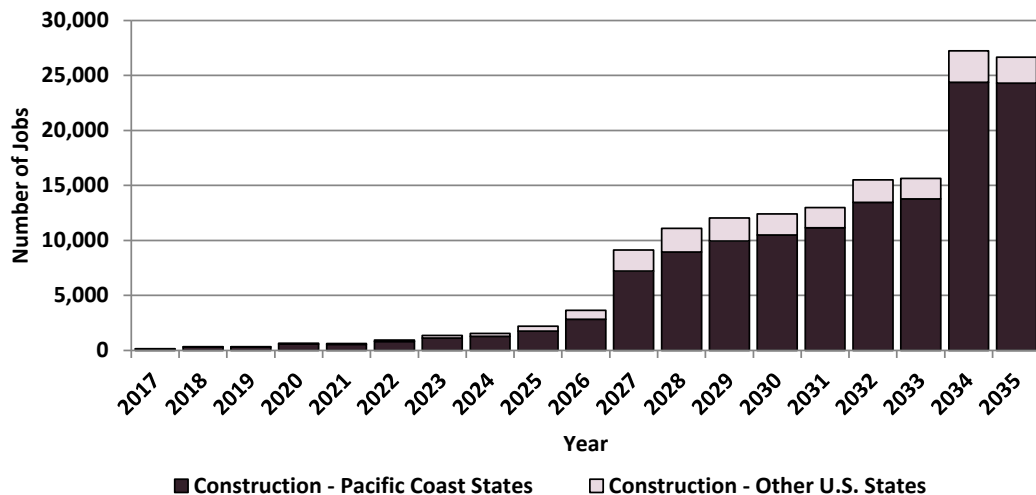
Figure 24: **Projected Professional, Scientific, and Technical Service Employment**



Source: Quest Offshore Resources, Inc.

The construction sector, which includes industrial construction activities such as offshore installation and construction of natural gas processing infrastructure, is also expected to see large employment gains. By 2035, employment in the construction sector is expected to reach nearly 27 thousand jobs. (Figure 25)

Figure 25: **Projected Construction Employment**



Source: Quest Offshore Resources, Inc.

Many employment sectors of the economy outside oil and gas development or the direct supply chain will also be impacted, mainly due to greater income in the economy. The most affected sectors are

projected to be retail (with nearly 27 thousand jobs created in 2035), health care and social assistance (with over 22 thousand jobs created), administrative and waste management services (with nearly 20 thousand jobs), food services and drinking places (with nearly 17 thousand jobs), finance and insurance, and real estate rental and leasing with both industries individually projected to see the creation of over 14 thousand jobs by 2035.

As production increases along the coast of the Pacific OCS, employment relating to oil and gas production is expected to migrate towards the Pacific Coast states, with employment highest in California where over 175 thousand jobs are expected to be created. Over 55 thousand jobs are expected to be created in Washington by 2035, with over 43 thousand jobs expected to be created in Oregon by the same year. (Table 8)

**Table 8: Projected Employment Pacific Coast States and Other U.S. States**

State	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
California	3,931	6,397	6,917	8,120	8,505	9,254	10,614	13,589	20,724	30,315
Oregon	788	1,538	1,596	1,822	1,860	1,963	2,248	2,869	4,119	5,941
Washington	433	834	882	1,056	1,084	1,159	1,445	2,243	4,082	7,078
<b>Region</b>	<b>5,151</b>	<b>8,770</b>	<b>9,394</b>	<b>10,998</b>	<b>11,448</b>	<b>12,376</b>	<b>14,306</b>	<b>18,701</b>	<b>28,925</b>	<b>43,335</b>
Other U.S. States	1,876	2,548	2,934	3,533	3,954	4,351	5,919	11,095	21,968	32,510
<b>Totals</b>	<b>7,026</b>	<b>11,318</b>	<b>12,328</b>	<b>14,531</b>	<b>15,403</b>	<b>16,726</b>	<b>20,226</b>	<b>29,796</b>	<b>50,894</b>	<b>75,845</b>

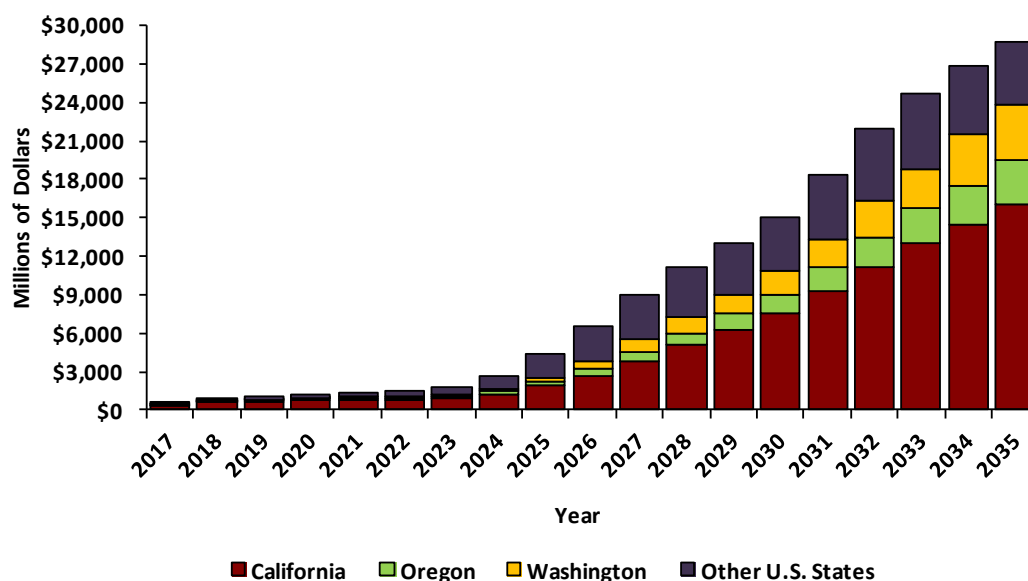
State	2027	2028	2029	2030	2031	2032	2033	2034	2035
California	43,714	56,586	69,522	82,224	100,794	123,047	143,495	159,732	175,420
Oregon	8,537	11,612	15,027	19,186	24,052	28,370	33,861	37,736	43,412
Washington	12,676	16,525	19,240	22,247	27,498	34,788	38,275	53,183	55,462
<b>Region</b>	<b>64,927</b>	<b>84,724</b>	<b>103,788</b>	<b>123,657</b>	<b>152,343</b>	<b>186,205</b>	<b>215,631</b>	<b>250,651</b>	<b>274,294</b>
Other U.S. States	40,856	45,861	46,628	48,833	57,964	66,540	69,287	62,041	56,990
<b>Totals</b>	<b>105,783</b>	<b>130,585</b>	<b>150,416</b>	<b>172,490</b>	<b>210,307</b>	<b>252,745</b>	<b>284,918</b>	<b>312,692</b>	<b>331,284</b>

Source: Quest Offshore Resources, Inc.

## 5.7 – Economic Impacts

Along with employment benefits, significant contributions to the state and national gross domestic product are expected due to Pacific OCS oil and natural gas development. Total contributions to state economies are projected at \$28.7 billion per year in 2035, with 83 percent of the total expected impact projected to occur in Pacific Coast states and 17 percent in the rest of the U.S. From 2017 to 2035, Pacific Coast states' share of the increased GDP is expected to be slightly lower than in later years, averaging 74 percent of the effect compared to 26 percent for the rest of the U.S. (Figure 26)

Figure 26: Projected Contributions to State Economies Pacific Coast vs. Other U.S. States



Source: Quest Offshore Resources, Inc.

Presented below are the projected economic effects of Pacific OCS exploration and production. The largest contributions are expected to mimic spending at the state level. California is expected to receive the largest share of contributions to the states' economies, with Washington and Oregon also projected to see significant gains. (Table 9)

Table 9: Projected Contributions to State Economies Pacific Coast States and Other U.S. States

State	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
California	354	581	632	737	777	838	957	1,242	1,883	2,727
Oregon	60	126	130	146	150	157	178	229	328	471
Washington	38	74	78	93	96	102	125	192	344	576
<b>Region</b>	<b>452</b>	<b>781</b>	<b>840</b>	<b>976</b>	<b>1,022</b>	<b>1,097</b>	<b>1,260</b>	<b>1,663</b>	<b>2,556</b>	<b>3,774</b>
Other U.S. States	160	219	255	307	350	381	514	960	1,872	2,736
<b>Totals</b>	<b>613</b>	<b>1,000</b>	<b>1,096</b>	<b>1,283</b>	<b>1,372</b>	<b>1,478</b>	<b>1,774</b>	<b>2,622</b>	<b>4,428</b>	<b>6,510</b>

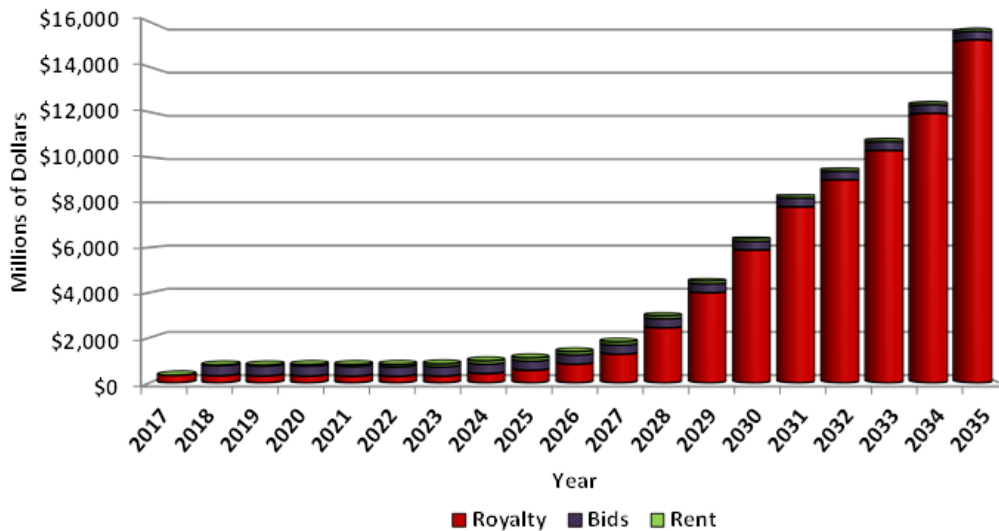
State	2027	2028	2029	2030	2031	2032	2033	2034	2035
California	3,876	5,090	6,326	7,528	9,230	11,213	13,021	14,472	16,039
Oregon	668	915	1,193	1,534	1,931	2,274	2,701	2,996	3,456
Washington	986	1,284	1,508	1,772	2,213	2,787	3,086	4,093	4,309
<b>Region</b>	<b>5,529</b>	<b>7,290</b>	<b>9,028</b>	<b>10,834</b>	<b>13,374</b>	<b>16,274</b>	<b>18,808</b>	<b>21,560</b>	<b>23,804</b>
Other U.S. States	3,414	3,872	3,985	4,194	4,953	5,664	5,874	5,253	4,866
<b>Totals</b>	<b>8,944</b>	<b>11,162</b>	<b>13,013</b>	<b>15,027</b>	<b>18,327</b>	<b>21,938</b>	<b>24,681</b>	<b>26,814</b>	<b>28,671</b>

Source: Quest Offshore Resources, Inc.

In addition to economic and employment growth, expanding current oil and gas production in the Pacific OCS would increase government revenue. Extrapolating from the current Gulf of Mexico regulatory

environment, total government revenues are projected to reach over \$15.7 billion dollars per year in 2035, with the majority of revenues from royalties on produced oil and natural gas at \$15.2 billion. In 2035, leasing bonus bids are projected to account for around \$380 million per year in government revenue, while rental income from offshore blocks is expected to account for around \$130 million. From 2017 to 2035, as oil and natural gas production lags behind bonus bids and rents, these revenues account for 9 and 2.5 percent respectively of the total government revenues of around \$81 billion dollars cumulative through 2035. (Figure 27)

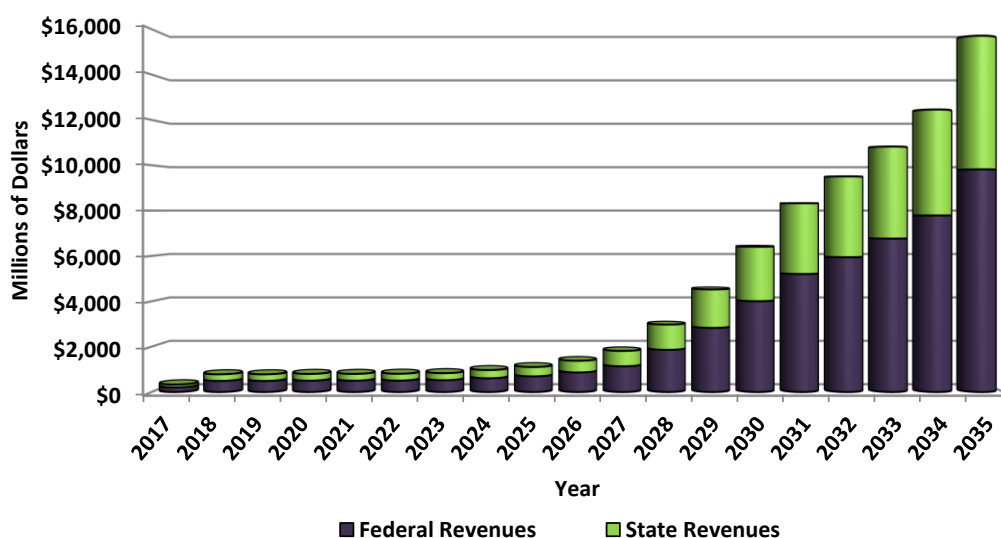
Figure 27: **Projected Government Revenues – Rentals, Royalties, and Bonus Bids**



Source: Quest Offshore Resources, Inc.

There is a possibility that revenue generated from Pacific oil and natural gas development will be shared between the federal government and the various state governments, although there currently is no revenue sharing agreement in place for the region. However, an assumption that government revenues would be split on the basis of 62.5 percent for the federal government and 37.5 percent for state governments was assumed for this analysis to compare potential revenue streams among the Pacific Coast states. This is in-line with the percentage split currently in place with states in the Gulf of Mexico, but with no annual revenue cap. Such projected state government revenue streams will need to be adjusted proportionally when or if a legislated agreement occurs. Given the 37.5 percent revenue share to the Pacific Coast states, federal government revenues from Pacific OCS oil and natural gas production are projected to reach over \$9.8 billion per year in 2035, while combined state revenues for the Pacific Coast states are projected to be nearly \$5.9 billion per year. (Figure 28)

Figure 28: Projected Government Revenues from Rentals, Royalties, and Bonus Bids, State and Federal



Source: Quest Offshore Resources, Inc.

Given the location of the potential oil and natural gas production, California is projected to receive the largest share of revenue under any sharing agreement with revenues of over \$3.3 billion in 2035. Cumulatively from 2017 to 2035 the state is expected to receive over \$17.2 billion in revenue. Oregon is projected to receive the second highest share of state revenues with over \$1.7 billion expected to be received in 2035; cumulative revenue from 2017 to 2035 is projected to be nearly \$9 billion. Washington is projected to receive over \$800 million in revenue in 2035, with cumulative revenues from 2017 to 2035 expected to be over \$4.2 billion. (Table 10)

Table 10: Projected Government Revenues from Rentals, Royalties, and Bonus Bids by State and Federal<sup>15</sup>

State	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
California	\$70	\$167	\$166	\$170	\$170	\$172	\$177	\$206	\$235	\$293
Oregon	\$36	\$86	\$86	\$88	\$88	\$89	\$92	\$107	\$122	\$152
Washington	\$17	\$41	\$41	\$41	\$41	\$42	\$43	\$50	\$57	\$71
<b>Total</b>	<b>\$124</b>	<b>\$294</b>	<b>\$293</b>	<b>\$300</b>	<b>\$300</b>	<b>\$302</b>	<b>\$312</b>	<b>\$364</b>	<b>\$414</b>	<b>\$517</b>

State	2027	2028	2029	2030	2031	2032	2033	2034	2035
California	\$386	\$633	\$963	\$1,363	\$1,771	\$2,023	\$2,303	\$2,650	\$3,342
Oregon	\$200	\$329	\$499	\$707	\$919	\$1,049	\$1,195	\$1,375	\$1,734
Washington	\$94	\$154	\$234	\$332	\$431	\$493	\$561	\$646	\$814
<b>Total</b>	<b>\$680</b>	<b>\$1,116</b>	<b>\$1,696</b>	<b>\$2,402</b>	<b>\$3,122</b>	<b>\$3,565</b>	<b>\$4,058</b>	<b>\$4,671</b>	<b>\$5,890</b>

Source: Quest Offshore Resources, Inc

<sup>15</sup> For comparison purposes only for potential revenue among states. Assumes 37.5 percent of bonuses, rents and royalties go to state governments. There is no current revenue sharing agreement in place.

## Section 6 – Conclusions

### 6.1 – Conclusions

The offshore U.S. oil and natural gas industry is a key component of the nation's energy supply, as well as a significant source of employment, economic activity and government revenue throughout the nation. Despite the demonstrated impact of domestic offshore oil and gas development in the Gulf of Mexico and the Pacific Coast in the past, large portions of the nation's federal waters are currently inaccessible to oil and gas operators, including all but 43 previously purchased leases in the Pacific OCS. The last lease sale to take place in the region was more than 30 years ago in 1984. Allowing oil and gas operators increased access to the Pacific OCS and its resources would be expected to benefit employment, the national economy, government revenue, and domestic energy security through increased oil and natural gas production.

- If leasing in the Pacific OCS was to begin in 2018 and seismic surveys preceded it in 2017, annual capital investment and other spending due to offshore oil and natural gas development would be projected to grow from nearly \$3.5 billion per year in 2025 to over \$19.6 billion per year in 2035. Cumulative capital investments and other spending from 2017 to 2035 are projected to be nearly \$140 billion.
- Pacific OCS oil and gas activities can create over 50 thousand jobs by 2025, of which almost 30 thousand would be in the Pacific Coast states.
- By 2035, total national employment due to Pacific OCS oil and gas exploration and production would reach over 330 thousand jobs, with nearly 275 thousand of these jobs in Pacific Coast states.
- Development of the Pacific OCS's offshore oil and natural gas resources would lead to production of nearly 1.2 million barrels of oil equivalent per day by 2035.
- Pacific OCS activity would contribute over \$4.4 billion per year to the national economy in 2025, with Pacific Coast states receiving contributions of nearly \$2.5 billion per year.
- In 2035 total national contributions to the economy could reach over \$28.6 billion per year, with Pacific Coast states receiving combined contributions of nearly \$23.8 billion per year.
- Combined state and federal revenues from bonuses, rents and royalties are projected to reach over \$1.1 billion per year in 2025, with these revenues projected to grow to over \$15.7 billion per year in 2035.
- If a legislated state / federal revenue sharing agreement is enacted, the Pacific Coast states could see significant gains to their state budgets. With a 37.5 percent sharing agreement, state revenues



are projected to be around \$415 million per year by 2025, and grow to nearly \$5.9 billion per year by 2035, leading to further increases in economic activity and employment.<sup>16</sup>

Under the development scenario put forth by Quest Offshore Resources, it is clear that the Pacific OCS displays significant potential to grow the American economy across numerous industries and areas. Allowing access to the entire Pacific OCS for oil and gas exploration and production activities is likely to lead to large capital investments and operational spending by oil and gas operators to develop key resources. This spending would likely lead to large increases in employment and economic activity both in Pacific Coast states and nationally. Additionally, this activity is projected to lead to a large increase in domestic energy production and the associated royalties and income, which are expected to lead to healthy increases in revenues to state and federal governments.

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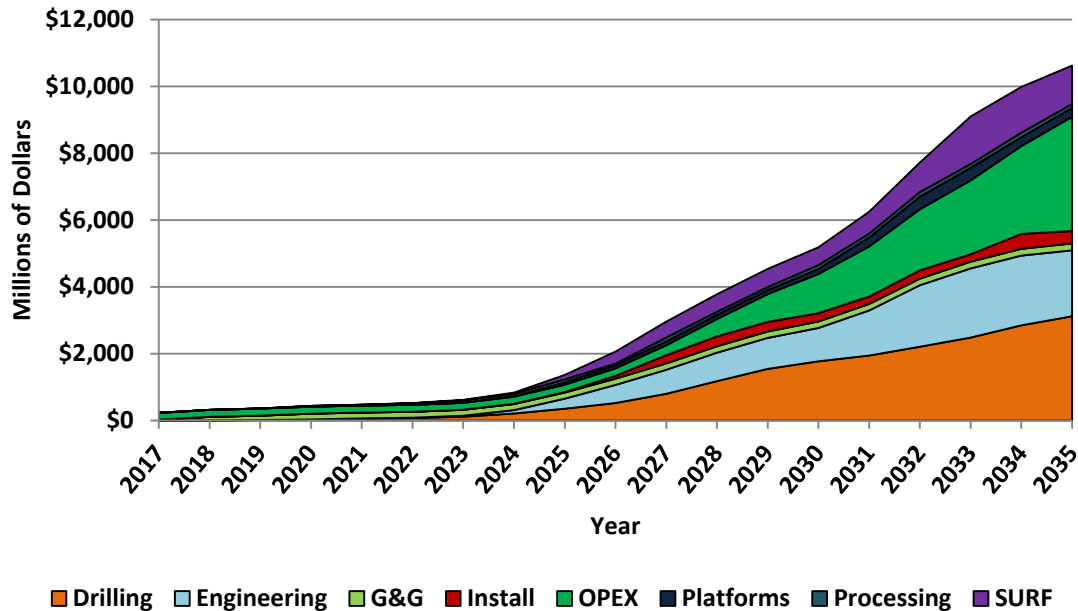
<sup>16</sup> Under assumed effective 67.5 / 32.5 percent revenue sharing

## Section 7 – State Results Appendix

### 7.1 - California

California is expected to receive the greatest benefits from the opening of the Pacific Coast to offshore oil and natural gas exploration and production activity. Annual spending in 2035 in the state is projected to be over \$10.6 billion per year with spending primarily focused on drilling, operational expenditures and engineering. (Figure 29)

Figure 29: Projected California Spending by Sector

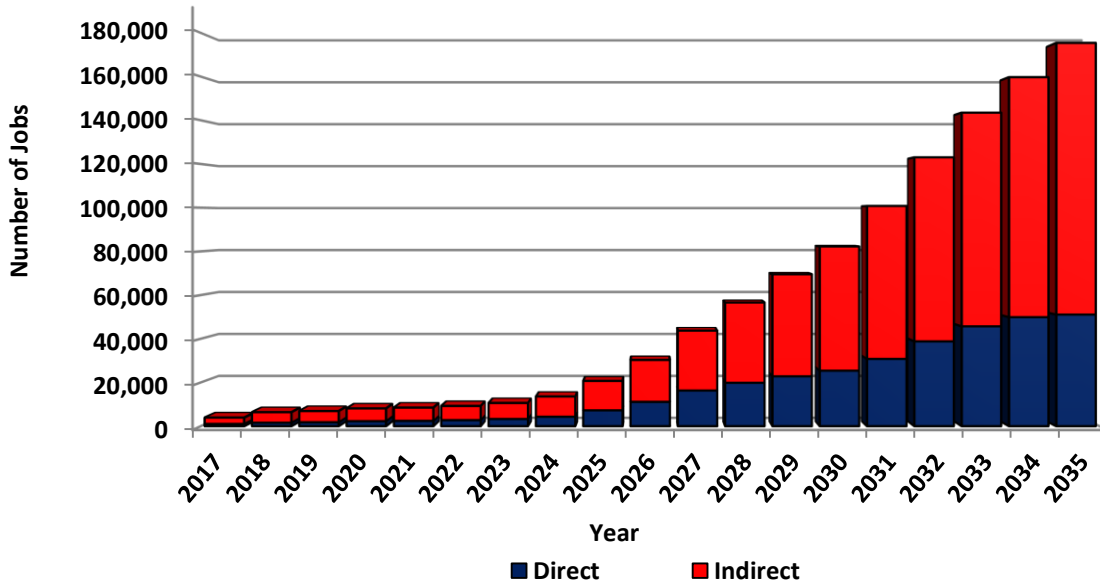


Source: Quest Offshore Resources, Inc.

In 2035, spending on drilling is expected to reach over \$3.1 billion, operational expenditures are projected to reach over \$3.4 billion per year, and engineering spending near \$2 billion per year is expected. California is home to Chevron, a major player in the offshore Gulf of Mexico, which is headquartered in San Ramon, California. In addition, California has had a long historical involvement in oil and natural gas production. Existing offshore oil and gas production means that California is home to companies such as Ship Services and C&G Boats which provide supply and transportation services to offshore platforms from cities such as Huntington Beach and Santa Barbara. Its base of high tech industries supports a large number of equipment manufacturers and technology providers. Examples include companies such as Teledyne Technologies that produce sophisticated electronics and instrumentation for the industry and Schilling Robotics (a subsidiary of FMC Technologies) which manufactures remotely operated vehicles used extensively in the offshore industry. Seacon Advanced Products based out of El Cajon, which manufactures underwater connectors and cable systems utilized in the offshore industry, is another example of the types of high tech manufacturers that supply components that are used throughout offshore developments in important equipment such as platform topsides and subsea hardware.

Employment in California due to spending on Pacific Coast oil and natural gas activity is projected to reach over 175 thousand jobs in 2035. Direct employment due to offshore oil and natural gas exploration and production is expected to reach over 50 thousand jobs in 2035, with indirect and induced employment of nearly 125 thousand jobs expected in the same year. (Figure 30)

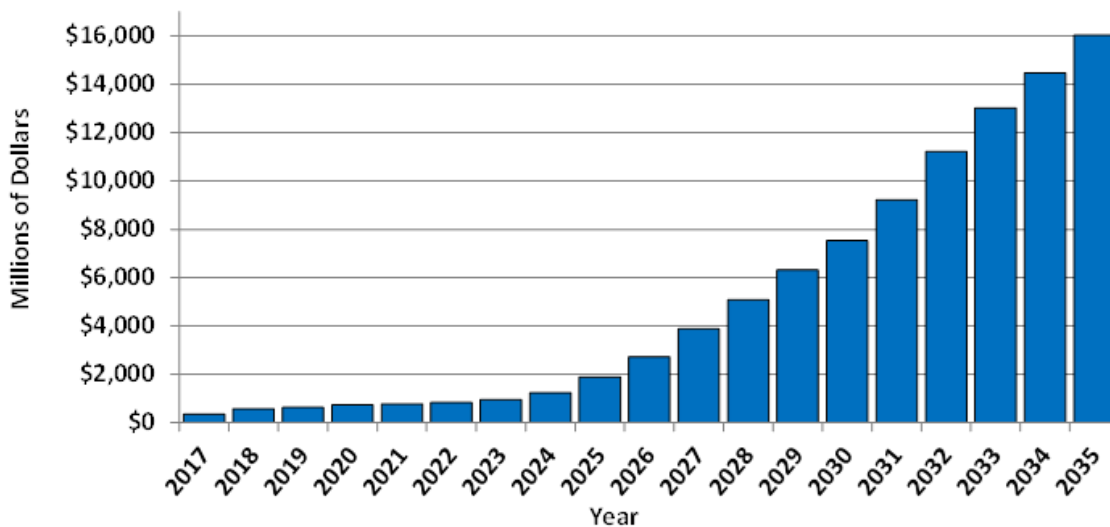
Figure 30: Projected California Employment Direct vs. Indirect and Induced



Source: Quest Offshore Resources, Inc.

Contributions to California's state economy due to spending by the Pacific Coast oil and natural gas industry are projected to be over \$16 billion per year by 2035. (Figure 31)

Figure 31: California Contributions to the State Economy



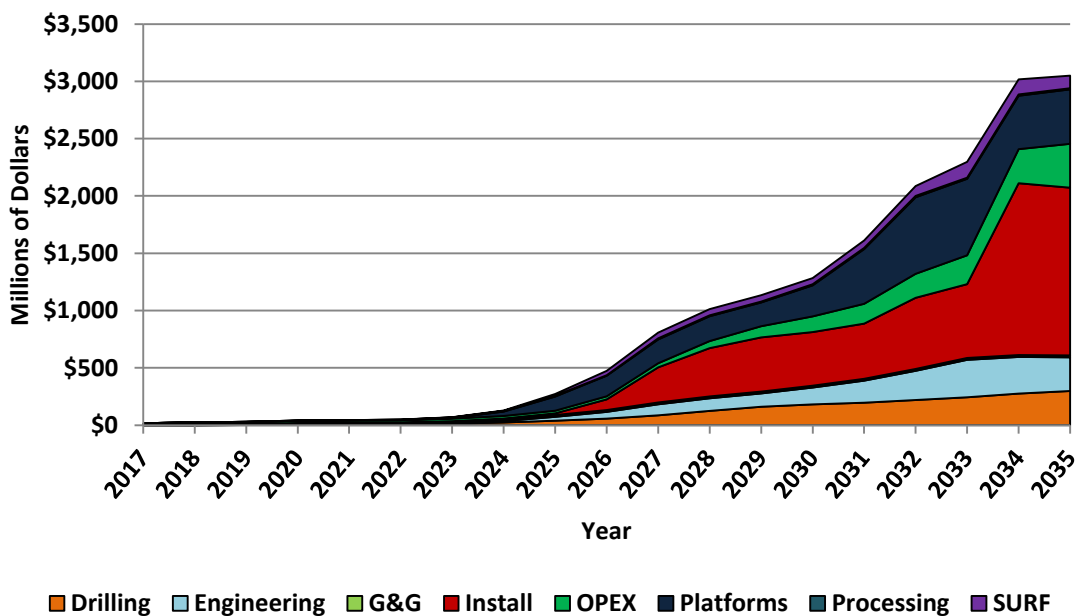
Source: Quest Offshore Resources, Inc.

With an assumed 37.5 percent revenue sharing agreement in place, Pacific Coast oil and natural gas activities are projected to contribute over \$3.3 billion per year to California's budget in 2035; cumulative contributions from 2017 to 2035 are projected to be over \$17.2 billion. If a different revenue percentage were enacted, projected state revenues should be adjusted proportionally.

## 7.2 - Washington

Washington is projected to see the second largest benefits from the opening of the Pacific Coast to offshore oil and natural gas exploration and production activity. Annual spending in 2035 in the state is projected at over \$17.4 billion per year. Spending is expected to primarily be strongest from the installation, platform fabrication, and engineering segments. (Figure 32)

Figure 32: **Projected Washington Spending by Sector**

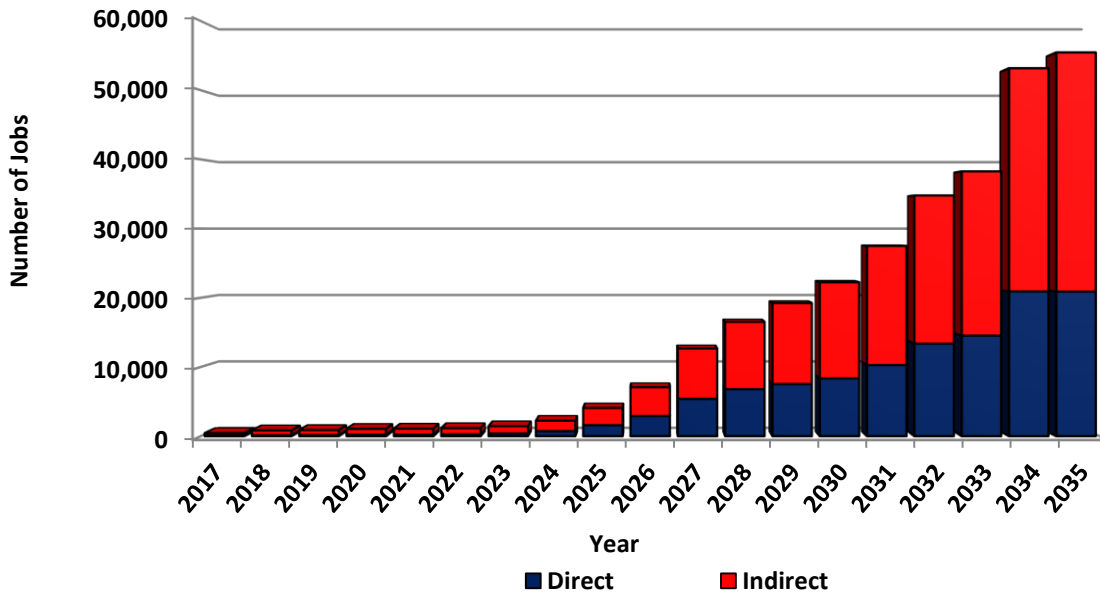


Source: Quest Offshore Resources, Inc.

Spending on installation is expected to reach over \$1.4 billion per year, with platform spending at nearly \$475 million per year in 2035, and engineering spending is projected to reach nearly \$300 million per year. Washington is already home to suppliers to the oil and natural gas industry and has been especially involved in efforts to drill offshore Alaska. Companies such as Vigor International have multiple facilities focused on offshore shipbuilding and repair, with facilities in Seattle and Tacoma which recently completed the repair and refitting of two drilling ships. The state is also home to Foss Maritime which has a fleet of offshore supply vessels, crew boats and anchor handlers. Lake Union Drydock Company also has dry dock facilities which could be utilized for offshore vessel and platform repair and fabrication. Cameron, through its One Subsea joint venture, is one of the largest suppliers of subsea production equipment and has two facilities focused on measurement systems already located in the state. The state is also home to Stabbert Maritime, a supplier of vessel services to the oil and gas industry with a fleet of six construction, diving and survey vessels.

Employment in Washington due to spending on Pacific Coast offshore oil and natural gas development is projected to reach over 55 thousand jobs in 2035. Direct employment due to offshore oil and natural gas exploration and production is expected to reach nearly 21 thousand jobs in 2035, with indirect and induced employment of nearly 35 thousand jobs expected in the same year. (Figure 33)

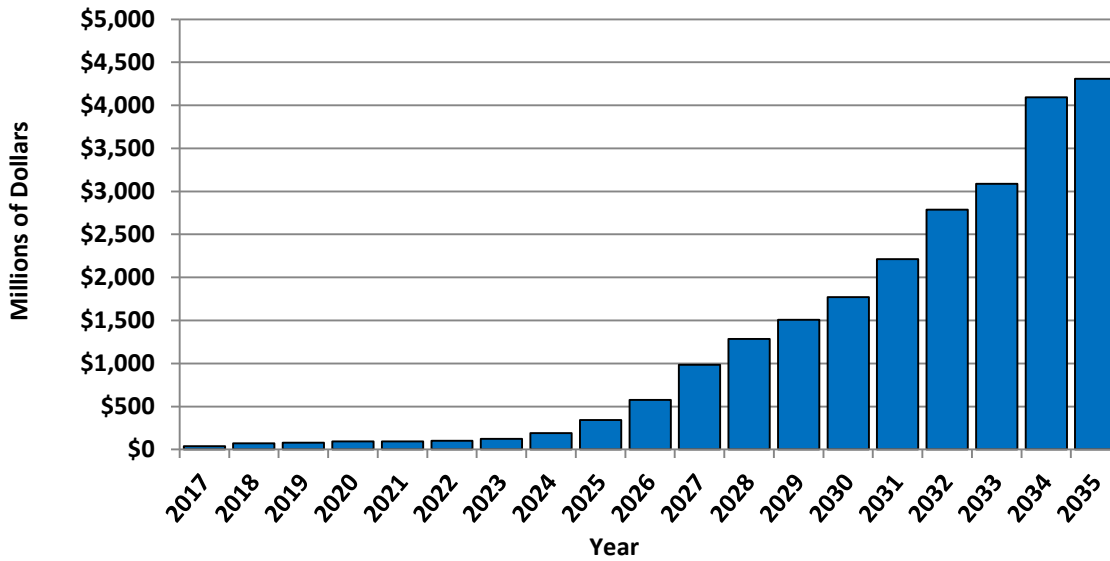
Figure 33: **Projected Washington Employment Direct vs. Indirect and Induced**



Source: Quest Offshore Resources, Inc.

Contributions to Washington's state economy due to spending on Pacific Coast oil and natural gas exploration and development industry are projected to be over \$4.3 billion per year by 2035. (Figure 34)

Figure 34: Projected Washington Contributions to the State Economy



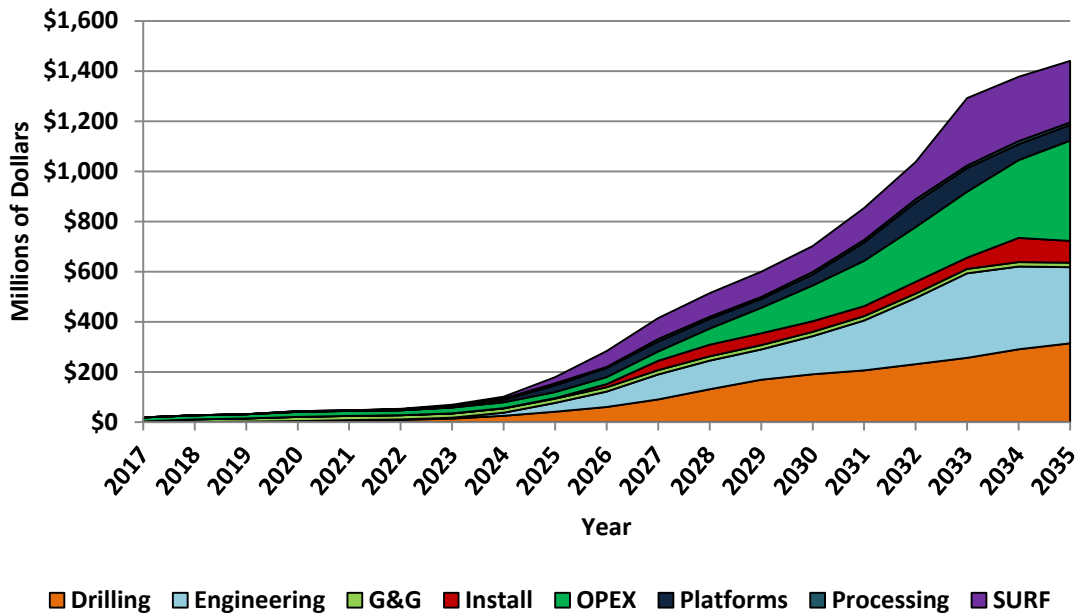
Source: Quest Offshore Resources, Inc.

With an assumed 37.5 percent revenue sharing agreement in place, Pacific Coast oil and natural gas activities are projected to contribute nearly \$815 million per year to Washington's budget in 2035; cumulative contributions from 2017 to 2035 are projected to be over \$4.2 billion. If a different revenue percentage were enacted, projected state revenues should be adjusted proportionally.

### 7.3 – Oregon

Oregon is expected to receive the third highest levels of spending, employment and gross domestic product due to offshore oil and natural gas activity in the Pacific OCS. Spending in the state is projected to reach just over \$1.4 billion per year in 2035. (Figure 35)

Figure 35: Projected Oregon Spending by Sector

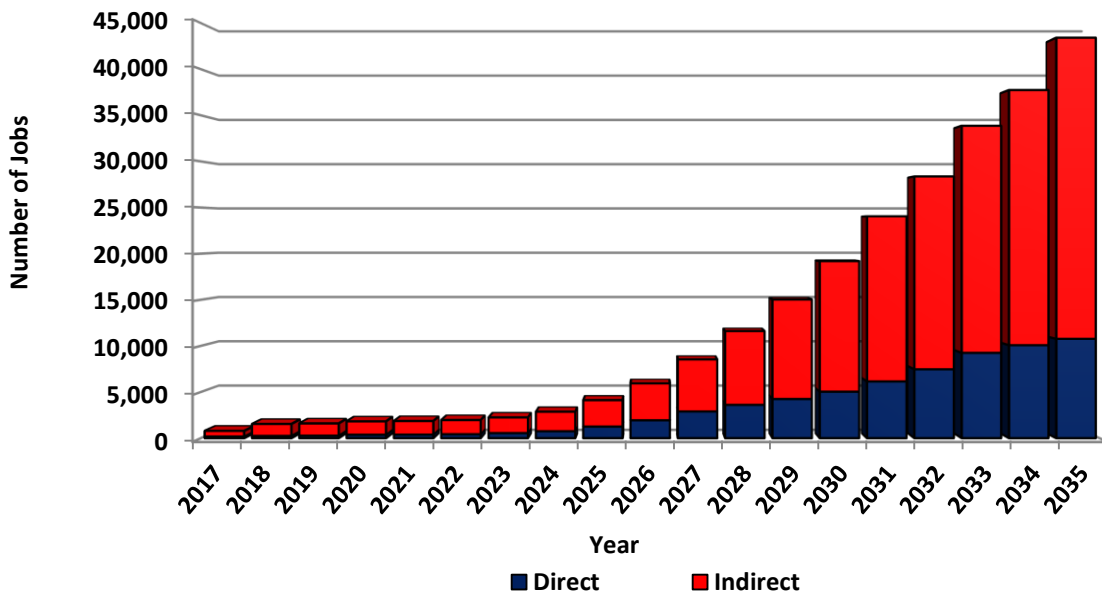


Source: Quest Offshore Resources, Inc.

Spending in Oregon is expected to be driven by drilling, engineering and operational expenditures, with these categories accounting for around \$315 million, \$400 million, and \$300 million per year in spending in 2035. Spending on fabrication of SURF equipment is also projected to reach nearly \$250 million in the same year. Oregon is already home to suppliers to the oil and natural gas industry such as Vigor International's Portland yard which constructs workboats, tugs, barges and other vessels used offshore. Sulzer pumps which supplies pumps used throughout the oil and natural gas production process has a manufacturing facility in Portland. The Ulven companies are one of the largest machining and forging companies in the U.S. and are already supplying the building blocks of equipment such as drilling equipment and pumps. Columbia Industries, based in Hillsboro, provides custom fabrication and other systems to the oil and gas industry.

Employment in Oregon due to Pacific OCS oil and gas production is projected to reach nearly 45 thousand jobs in 2035, with direct employment expected to reach nearly eleven thousand jobs, and indirect and induced employment of nearly 33 thousand jobs expected in the same year. (Figure 36)

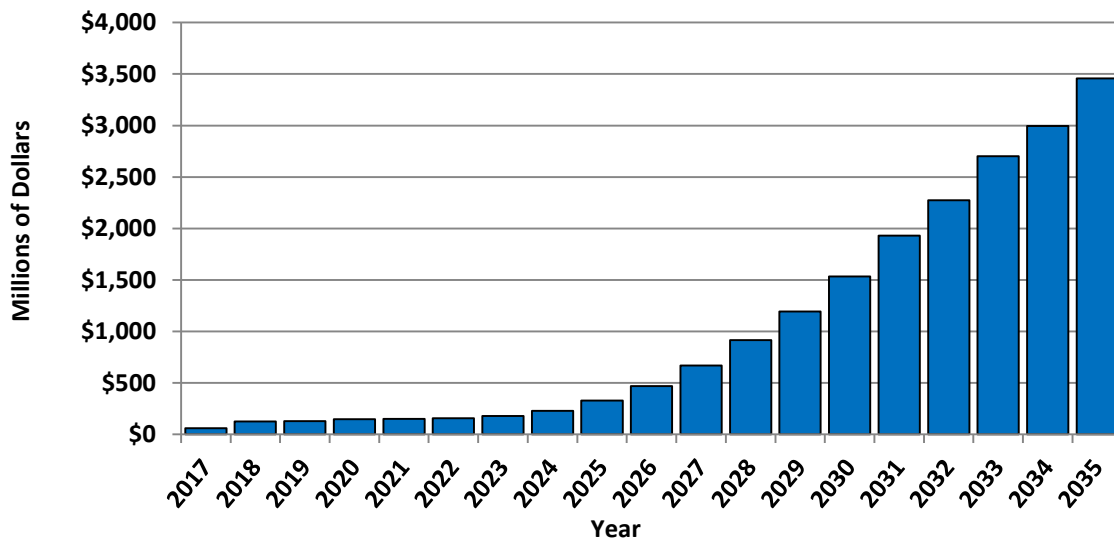
Figure 36: Projected Oregon Employment Direct vs. Indirect and Induced



Source: Quest Offshore Resources, Inc.

In 2035, contributions to the state economy from Pacific Coast offshore oil and natural gas exploration and production in Oregon are projected to reach nearly \$3.5 billion per year. (Figure 37)

Figure 37: Projected Oregon Contributions to the State Economy



Source: Quest Offshore Resources, Inc.

Governmental revenues collected under a 37.5 percent state/federal revenue sharing agreement would be expected to create over \$1.7 billion per year in new revenues for the state of Oregon in 2035, with



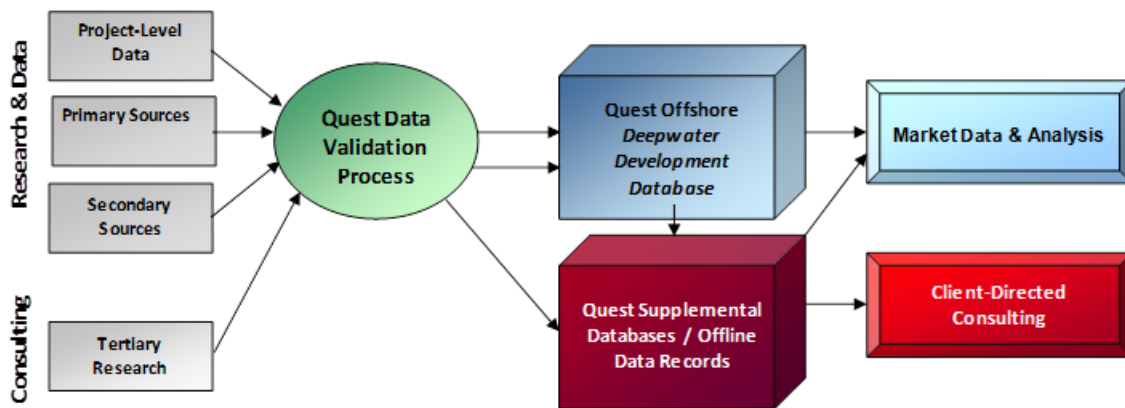
cumulative revenues from 2017 to 2035 projected to be nearly \$9 billion. If a different revenue percentage were enacted, projected state revenues should be adjusted proportionally.

## Section 8 – Other Appendices

### 8.1 Overview of Quest Offshore Data

Quest Offshore Resources, Inc. is a full-service market research and consulting firm focused on the global deepwater oil and natural gas industry. As a function of Quest's core business, the company is engaged daily in the collection and analysis of data as it relates to the offshore oil and natural gas industry. Quest serves the global community of operating oil and natural gas companies, their suppliers, financial firms, and many others by providing detailed data and analysis on capital investment and operational spending undertaken by the offshore industry. Quest collects and develops market data from a variety of sources at the project level for projects throughout the world. (Figure 38)

Figure 38: Generalized Quest Offshore Data Gathering Methodology



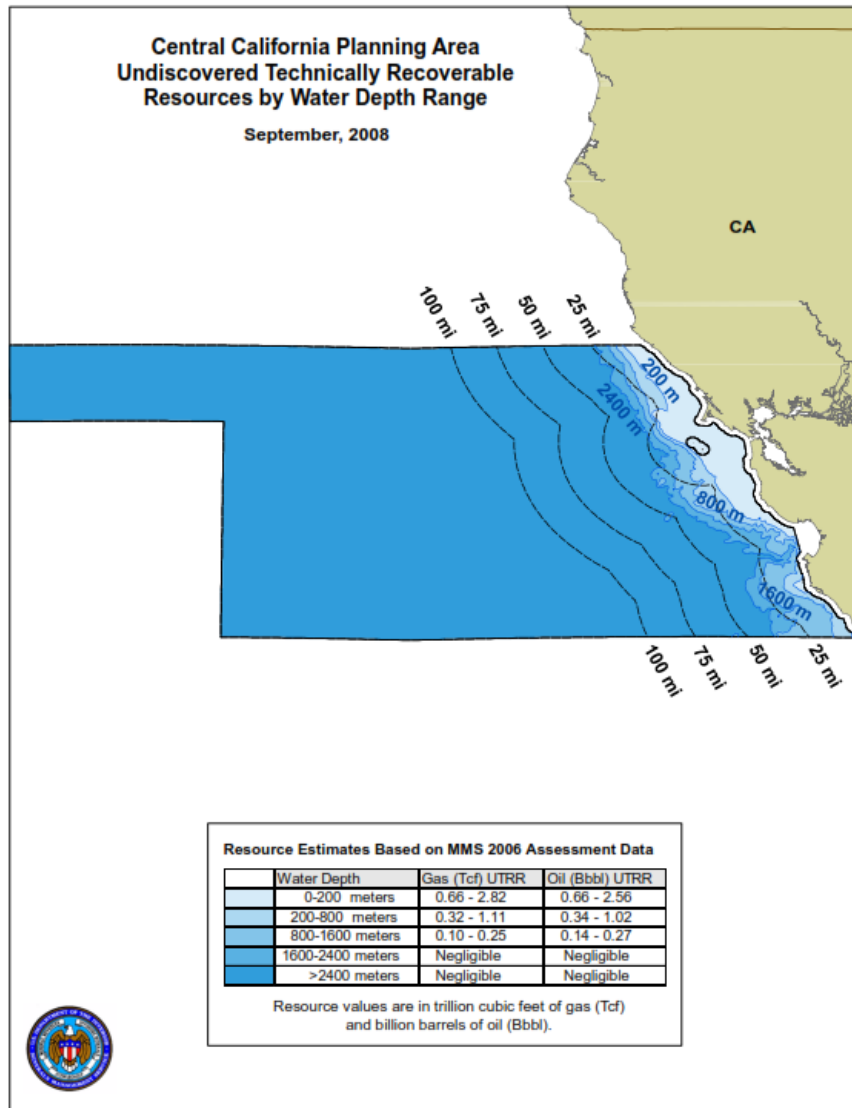
Source: Quest Offshore Resources, Inc.

A unique feature of this analysis, which lends it credibility, is its reliance on primary data through direct contact with the industry's supply chain. This connection with oil and natural gas companies and equipment and service providers throughout the world imparts a high quality and degree of accuracy to the data. Data is tracked in Quest's proprietary Quest Enhanced Deepwater Development Database as well as additional proprietary databases related other facets of the global supply chain worldwide. Quest aggregates capital and operating expenditures on a project by project basis for projects worldwide, with detailed information recorded on the supply of the equipment and services necessary to develop individual offshore oil and natural gas projects. Quest Offshore tracks not only existing or historical projects, but also projects that are in all stages of development from the prospect (or undrilled target) stage through to producing and decommissioned projects. For projects without firm development information, Quest utilizes benchmarking based on Quest's proprietary databases to forecast development timing and scenarios appropriate to the type of development, the developments' characteristics and region. This information, coupled with operators expected exploration and appraisal programs, is used to take into account yet to be discovered and delineated fields that may be developed in the forecast time frame. Secondary data development was also undertaken in this analysis and refers to any source of information and data that is not collected via direct contact with the industry, such as press releases, financial reports, other SEC filings, industry white papers, industry presentations, and other publicly available sources.

This proprietary approach allows Quest to ensure a comprehensive “canvassing” of the industry worldwide, which in turn facilitates a high level of validation and quality control needed to produce accurate analysis and forecasts. Once collected and verified, the data is housed and maintained in Quest Offshore’s Deepwater Development Database. The primary components of this proprietary database are the numerous pieces of offshore oilfield equipment and services that are used in the development of an offshore project.

## 8.2 Planning Area & Play Maps

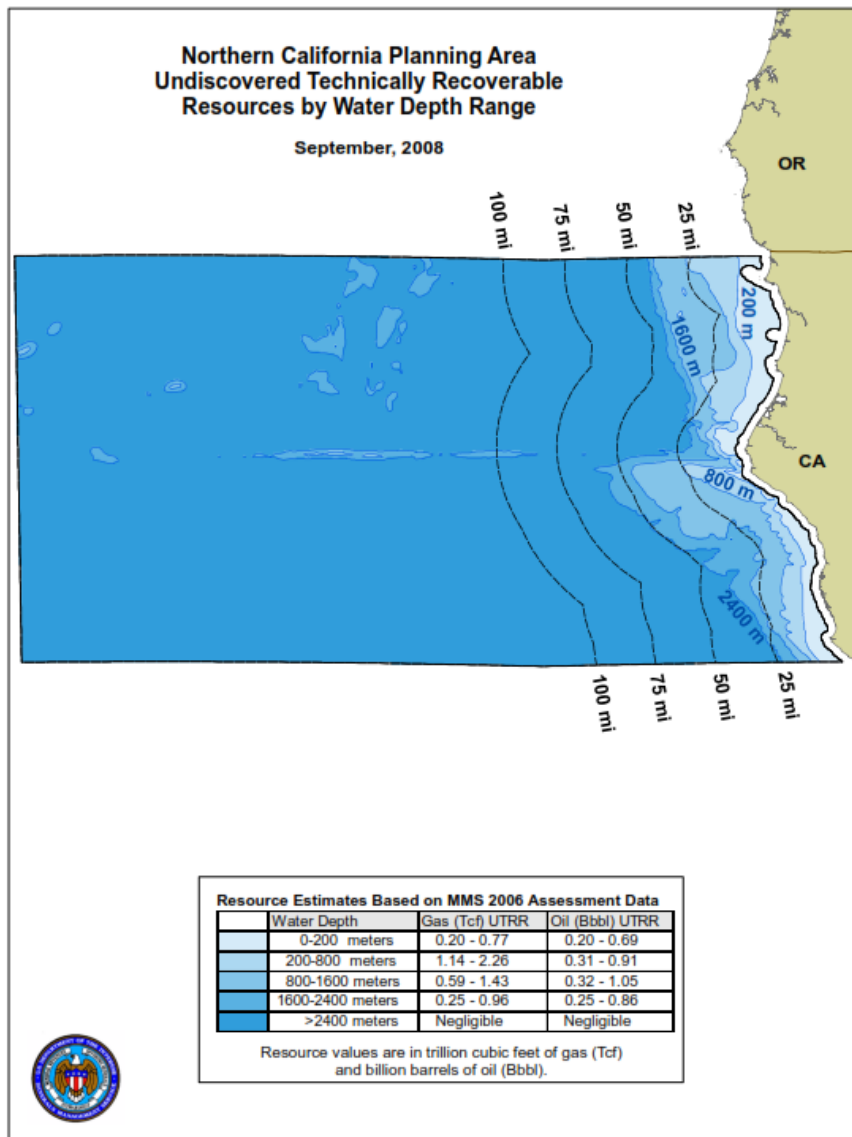
Figure 39: Central California Planning Area



Source: BOEM

\*Resources mentioned in figure above are not representative of resources used for data development.

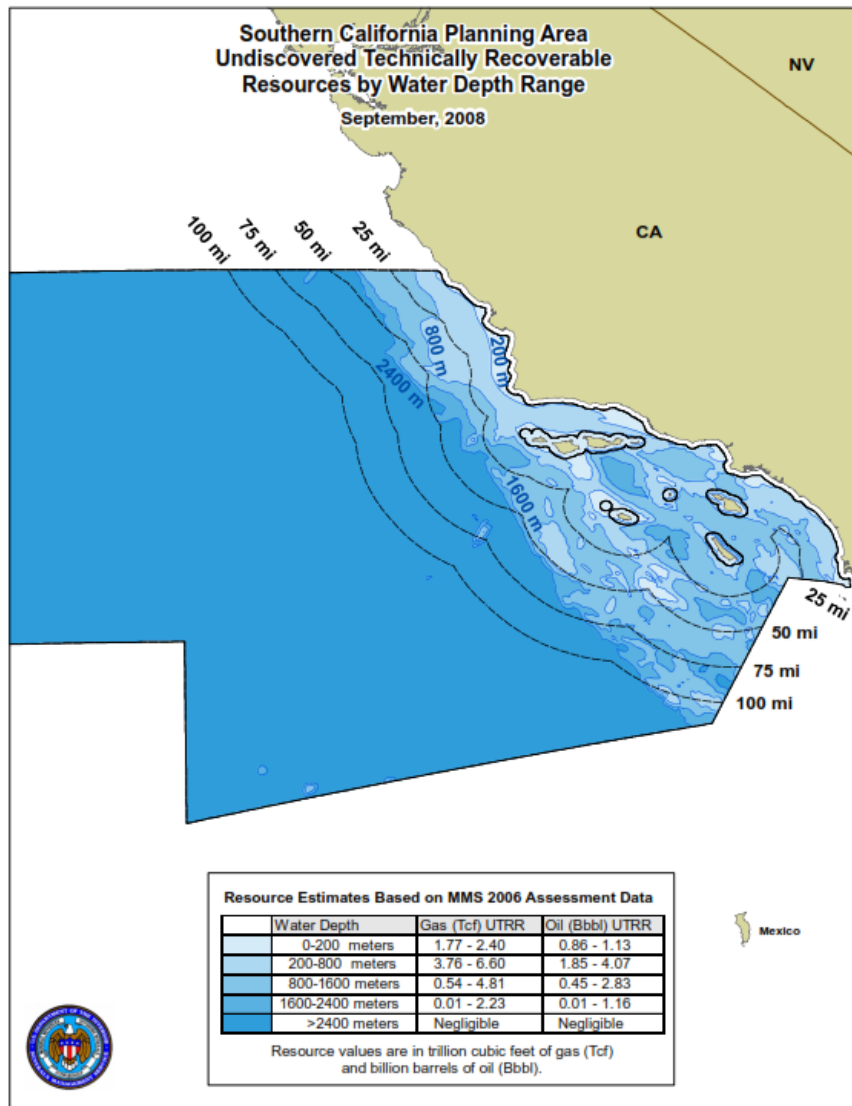
Figure 40: Northern California Planning Area



Source: BOEM

\*Resources mentioned in figure above are not representative of resources used for data development.

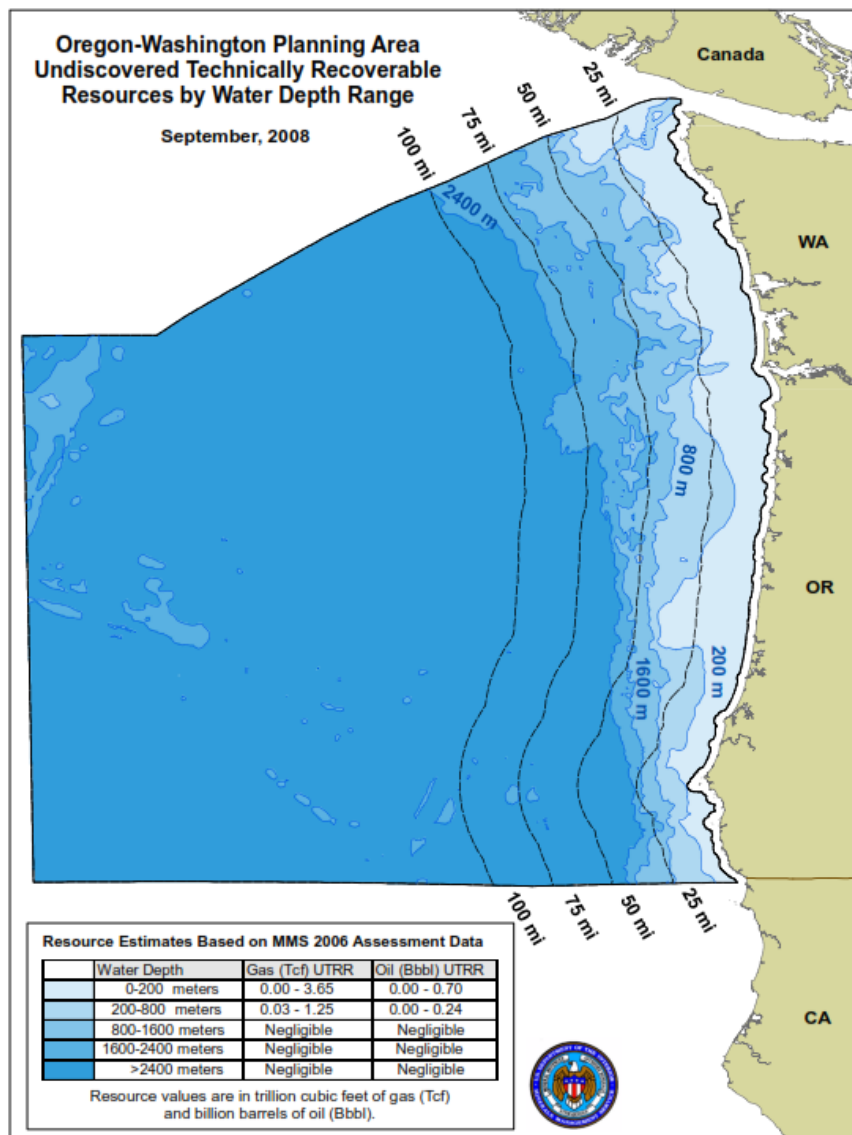
Figure 41: Southern California Planning Area



Source: BOEM

\*Resources mentioned in figure above are not representative of resources used for data development.

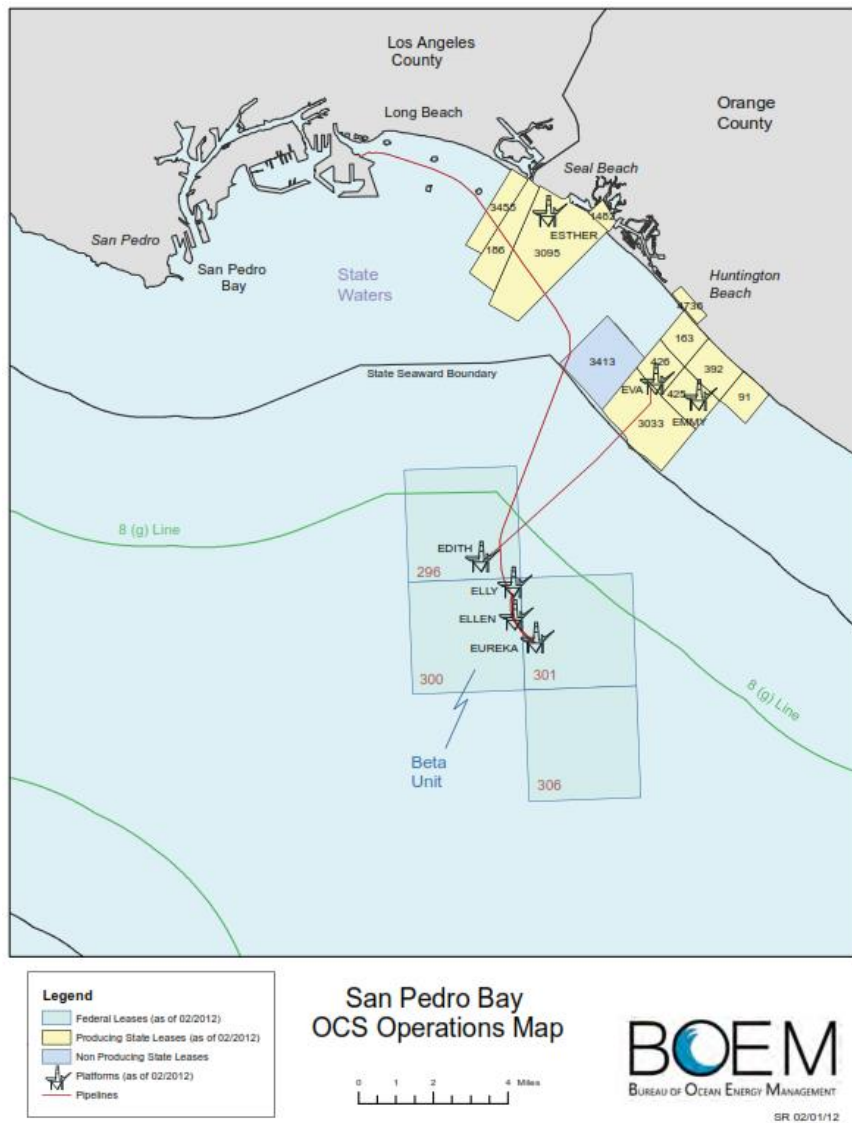
Figure 42: Washington-Oregon Planning Area



Source: BOEM

\*Resources mentioned in figure above are not representative of resources used for data development.

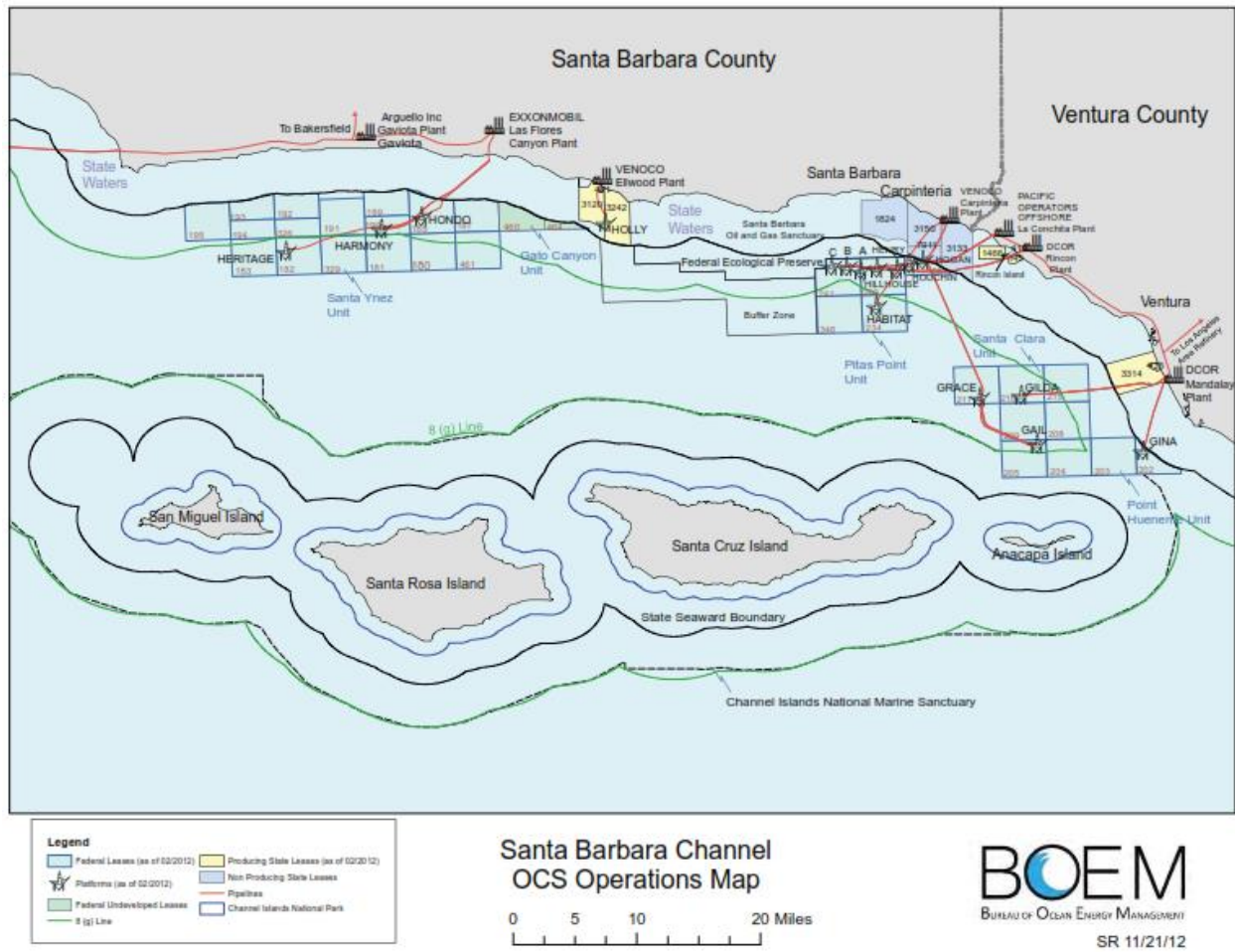
Figure 43: San Pedro Bay OCS Operations Map



Source: BOEM

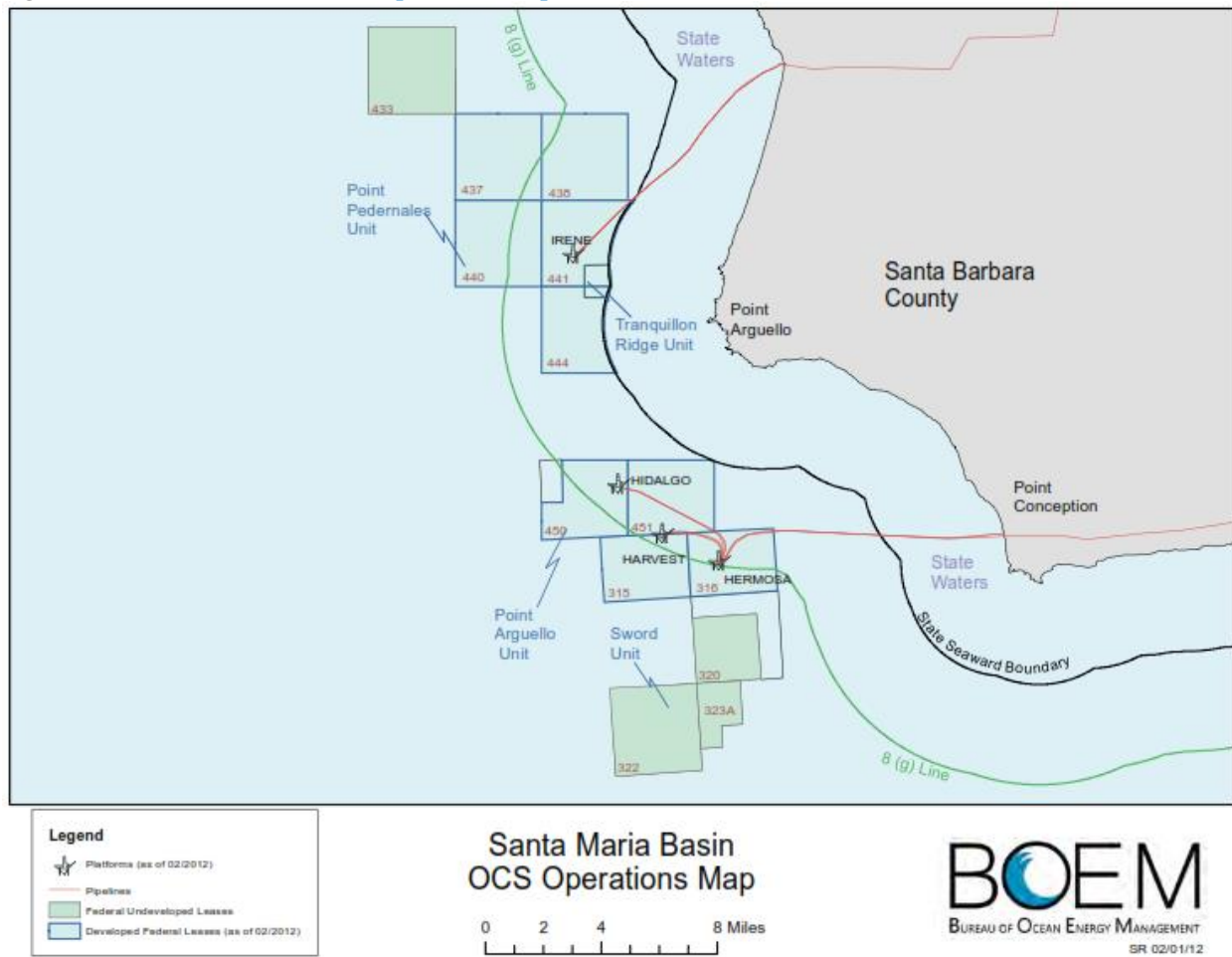


Figure 44: Santa Barbara Channel OCS Operations Map



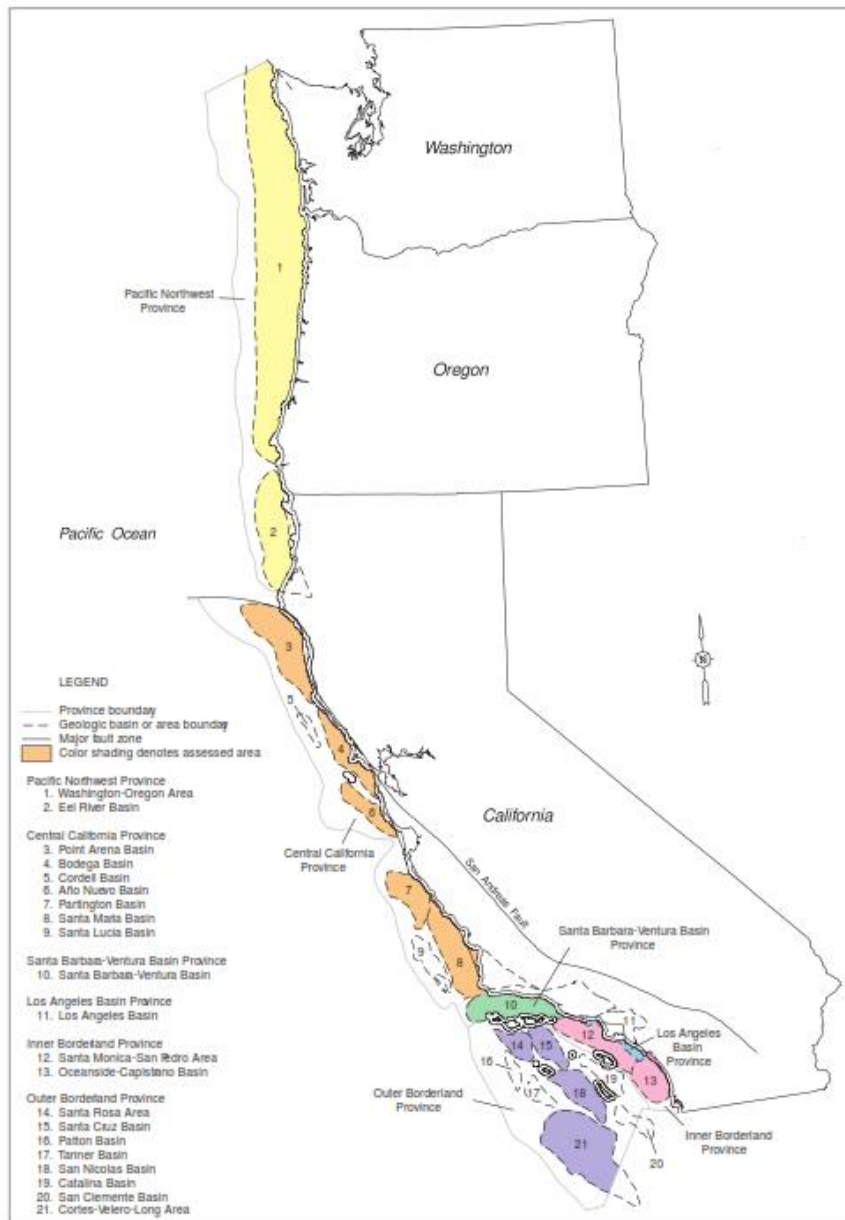
Source: BOEM

Figure 45: Santa Maria Basin OCS Operations Map



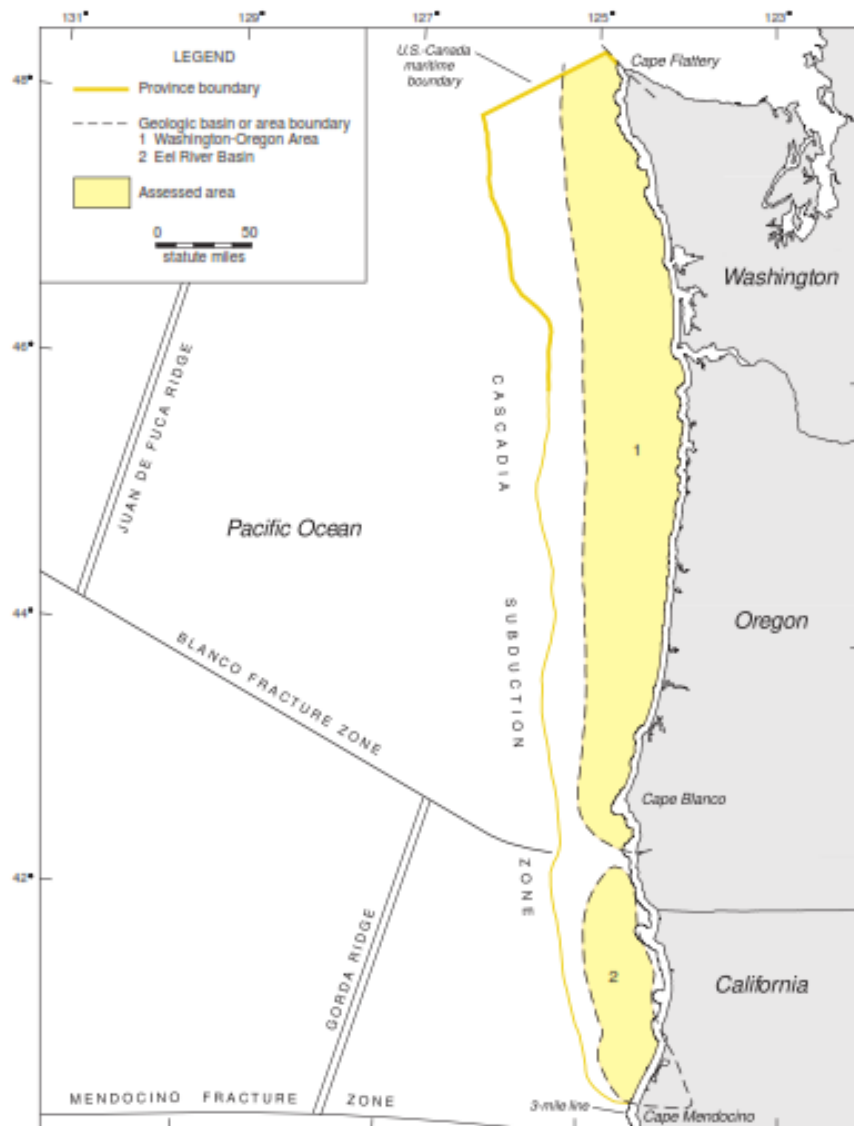
Source: BOEM

Figure 46: Pacific OCS Plays Map



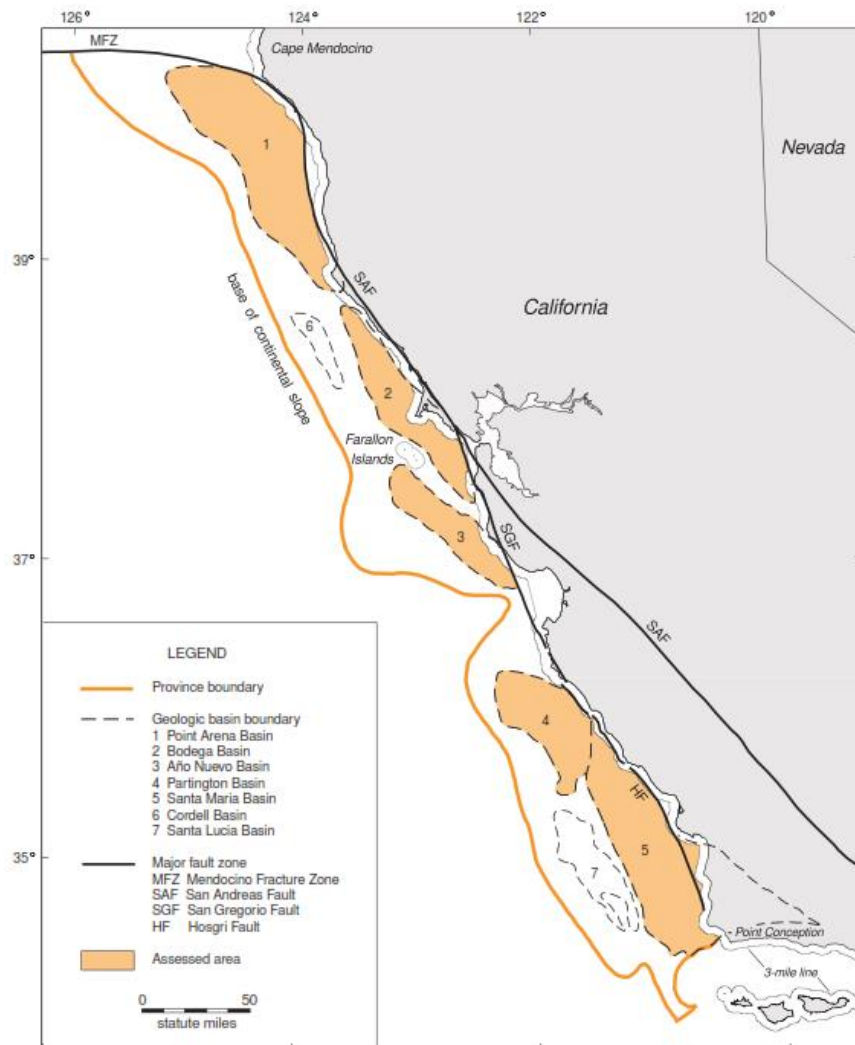
Source: BOEM

Figure 47: Pacific Northwest Province



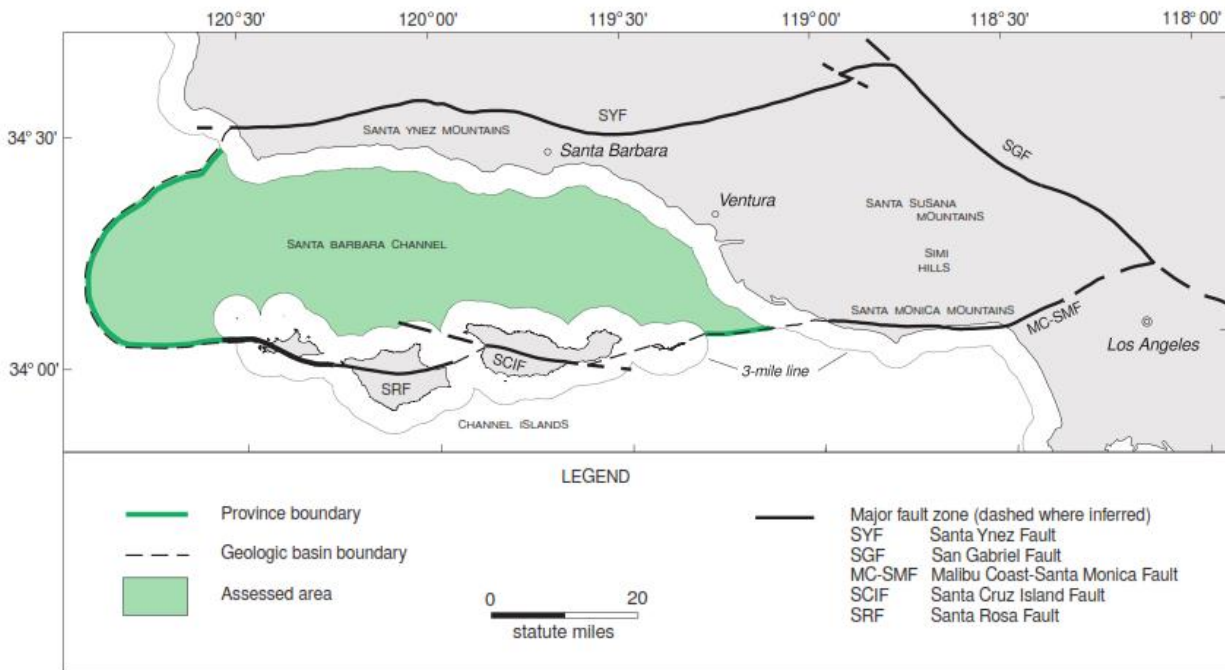
Source: BOEM

Figure 48: Central California Province



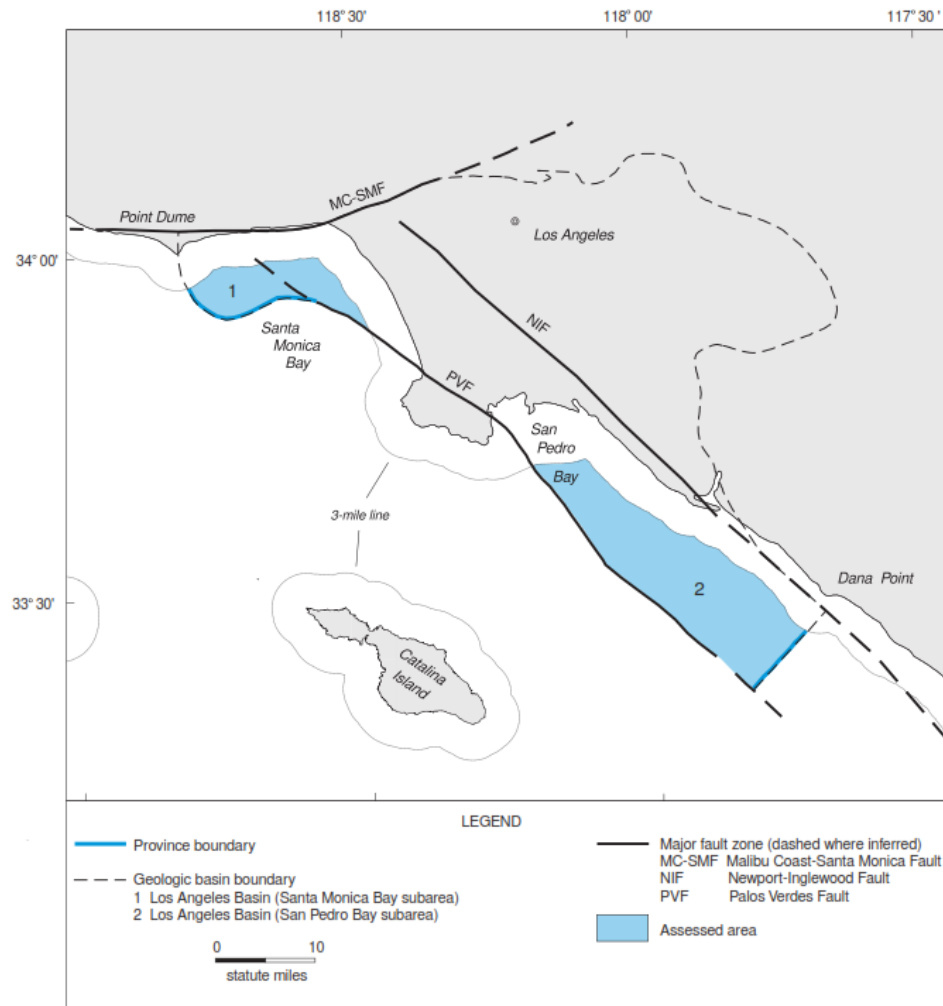
Source: BOEM

Figure 49: Santa Barbara-Ventura Basin Province



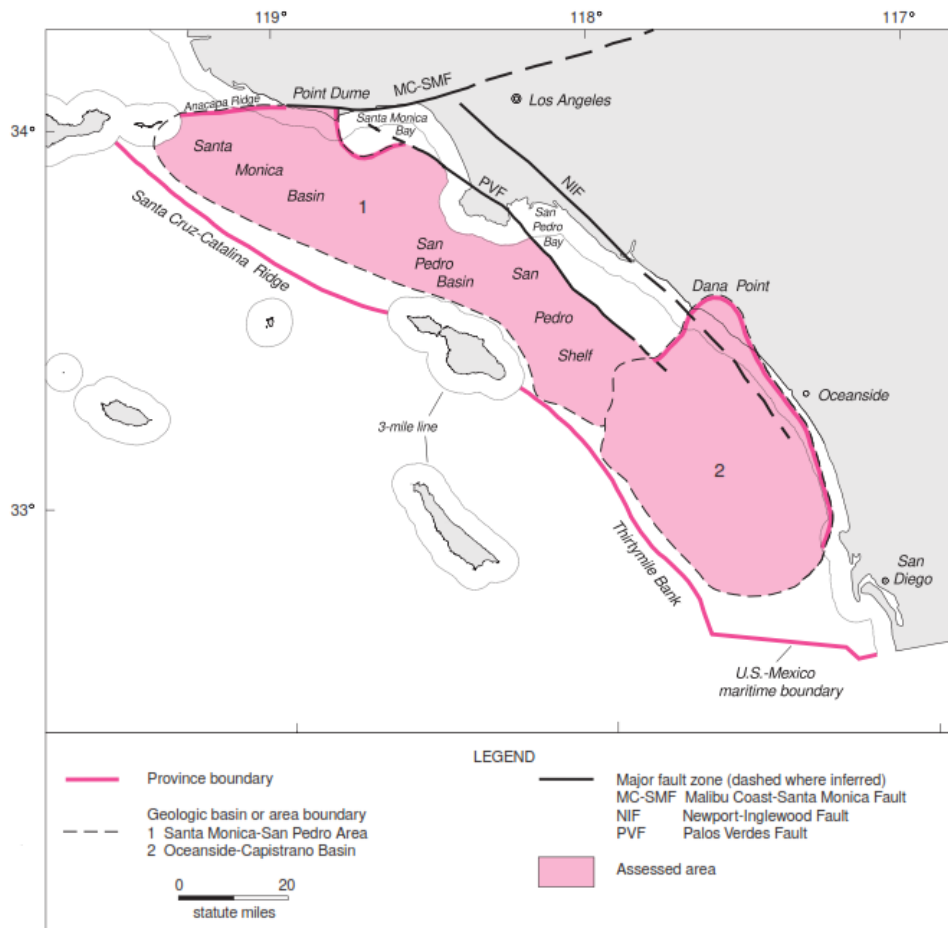
Source: BOEM

Figure 50: Los Angeles Basin Province



Source: BOEM

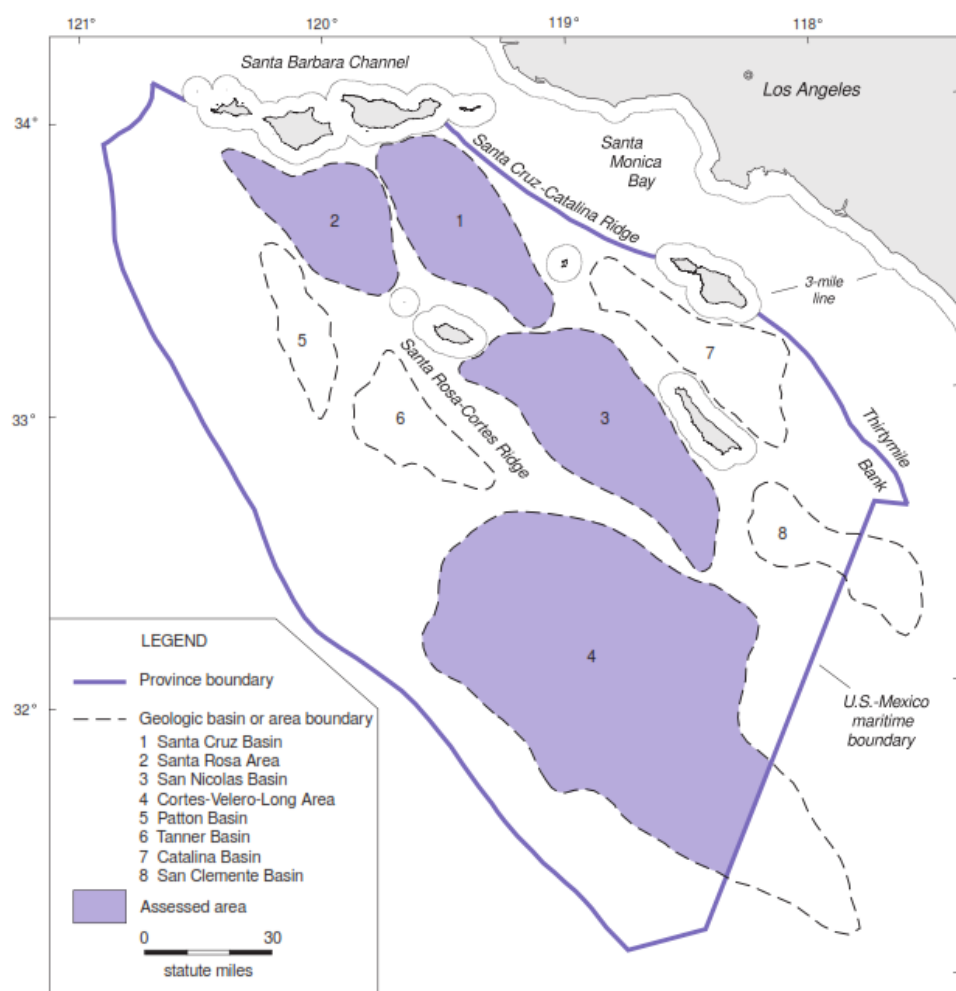
Figure 51: Inner Borderland Province



Source: BOEM



Figure 52: Outer Borderland Province



Source: BOEM

8.3 Data Tables

Table 11: Leasing Activity by Pacific Coast

Region	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Washington / Oregon	0	26	26	28	27	25	25	24	25	26	25	24	24	24	24	23	24	23	24
North California	0	86	82	83	77	77	78	75	81	78	79	75	74	73	75	72	77	68	70
Central California	0	90	92	85	87	86	86	86	80	81	81	83	84	77	77	78	81	77	79
Southern California	0	106	101	105	99	97	94	103	94	101	97	99	91	93	96	88	91	95	88

Source: Quest Offshore Resources, Inc.

Table 12: Production by Oil vs. Natural Gas

Production Type	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Oil boe/day	39,735	37,722	35,810	33,996	32,273	30,638	30,303	39,784	52,017	74,325
Gas boe/day	10,300	9,565	8,883	8,249	7,661	7,114	6,969	9,754	13,034	16,920
Production Type	2027	2028	2029	2030	2031	2032	2033	2034	2035	
Oil boe/day	110,082	203,302	318,834	451,978	574,478	637,850	699,429	778,846	951,875	
Gas boe/day	24,572	44,576	78,315	110,186	144,277	157,964	184,320	201,816	241,788	

Source: Quest Offshore Resources, Inc.

Table 13: Spending by Activity Type (Millions of Dollars)

Activity Type	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Drilling	\$0	\$0	\$46	\$92	\$183	\$229	\$346	\$616	\$995	\$1,419
Engineering	\$0	\$0	\$8	\$16	\$32	\$45	\$95	\$307	\$843	\$1,423
G&G	\$42	\$198	\$233	\$307	\$303	\$299	\$294	\$293	\$291	\$291
Install	\$0	\$0	\$0	\$0	\$0	\$0	\$16	\$32	\$62	\$366
OPEX	\$374	\$374	\$374	\$368	\$363	\$351	\$352	\$353	\$359	\$366
Platforms	\$0	\$0	\$0	\$0	\$0	\$0	\$50	\$383	\$1,133	\$1,517
Processing	\$0	\$0	\$0	\$35	\$33	\$67	\$100	\$100	\$133	\$67
SURF	\$0	\$0	\$0	\$0	\$0	\$25	\$51	\$93	\$357	\$908
<b>Total</b>	<b>\$416</b>	<b>\$572</b>	<b>\$661</b>	<b>\$818</b>	<b>\$914</b>	<b>\$1,016</b>	<b>\$1,303</b>	<b>\$2,177</b>	<b>\$4,173</b>	<b>\$6,356</b>

Activity Type	2027	2028	2029	2030	2031	2032	2033	2034	2035	Total
Drilling	\$2,086	\$2,961	\$3,744	\$4,144	\$4,395	\$4,830	\$5,258	\$5,849	\$6,216	\$43,408
Engineering	\$1,859	\$2,077	\$2,142	\$2,278	\$2,922	\$3,794	\$4,220	\$4,061	\$3,671	\$29,792
G&G	\$288	\$287	\$283	\$280	\$277	\$274	\$275	\$273	\$273	\$5,060
Install	\$1,110	\$1,412	\$1,472	\$1,361	\$1,314	\$1,597	\$1,564	\$3,454	\$3,205	\$16,965
OPEX	\$480	\$821	\$1,287	\$1,783	\$2,238	\$2,663	\$3,189	\$3,731	\$4,769	\$24,615
Platforms	\$1,617	\$1,567	\$1,400	\$1,717	\$2,850	\$3,767	\$3,567	\$2,367	\$2,300	\$24,233
Processing	\$167	\$133	\$133	\$167	\$167	\$200	\$167	\$200	\$167	\$2,035
SURF	\$1,164	\$1,248	\$1,259	\$1,201	\$1,433	\$1,842	\$2,936	\$2,745	\$2,287	\$17,549
<b>Total</b>	<b>\$8,770</b>	<b>\$10,505</b>	<b>\$11,720</b>	<b>\$12,931</b>	<b>\$15,596</b>	<b>\$18,986</b>	<b>\$21,176</b>	<b>\$22,679</b>	<b>\$22,887</b>	<b>\$163,657</b>

Source: Quest Offshore Resources, Inc.

Table 14: Spending by State (Millions of Dollars)

State	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
California	\$227	\$316	\$356	\$434	\$470	\$520	\$617	\$833	\$1,361	\$2,058
Oregon	\$18	\$27	\$31	\$43	\$47	\$53	\$69	\$101	\$179	\$283
Washington	\$17	\$25	\$29	\$41	\$44	\$49	\$70	\$128	\$272	\$474
Other U.S. States	\$146	\$192	\$225	\$270	\$310	\$340	\$465	\$877	\$1,721	\$2,526
<b>Total</b>	<b>\$408</b>	<b>\$560</b>	<b>\$642</b>	<b>\$789</b>	<b>\$871</b>	<b>\$963</b>	<b>\$1,220</b>	<b>\$1,939</b>	<b>\$3,534</b>	<b>\$5,341</b>

State	2027	2028	2029	2030	2031	2032	2033	2034	2035	Total
California	\$2,956	\$3,774	\$4,534	\$5,180	\$6,243	\$7,718	\$9,096	\$9,981	\$10,619	\$67,294
Oregon	\$414	\$514	\$599	\$702	\$854	\$1,037	\$1,292	\$1,377	\$1,440	\$9,080
Washington	\$807	\$1,013	\$1,134	\$1,283	\$1,611	\$2,086	\$2,297	\$3,017	\$3,050	\$17,450
Other U.S. States	\$3,140	\$3,567	\$3,675	\$3,874	\$4,586	\$5,240	\$5,465	\$4,861	\$4,517	\$45,996
<b>Total</b>	<b>\$7,317</b>	<b>\$8,868</b>	<b>\$9,942</b>	<b>\$11,039</b>	<b>\$13,294</b>	<b>\$16,082</b>	<b>\$18,149</b>	<b>\$19,236</b>	<b>\$19,626</b>	<b>\$139,820</b>

Source: Quest Offshore Resources, Inc.

Table 15: Jobs by State

State	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
California	3,931	6,397	6,917	8,120	8,505	9,254	10,614	13,589	20,724	30,315
Oregon	788	1,538	1,596	1,822	1,860	1,963	2,248	2,869	4,119	5,941
Washington	433	834	882	1,056	1,084	1,159	1,445	2,243	4,082	7,078
Region	5,151	8,770	9,394	10,998	11,448	12,376	14,306	18,701	28,925	43,335
Other U.S. States	1,876	2,548	2,934	3,533	3,954	4,351	5,919	11,095	21,968	32,510
<b>Totals</b>	<b>7,026</b>	<b>11,318</b>	<b>12,328</b>	<b>14,531</b>	<b>15,403</b>	<b>16,726</b>	<b>20,226</b>	<b>29,796</b>	<b>50,894</b>	<b>75,845</b>

State	2027	2028	2029	2030	2031	2032	2033	2034	2035
California	43,714	56,586	69,522	82,224	100,794	123,047	143,495	159,732	175,420
Oregon	8,537	11,612	15,027	19,186	24,052	28,370	33,861	37,736	43,412
Washington	12,676	16,525	19,240	22,247	27,498	34,788	38,275	53,183	55,462
Region	64,927	84,724	103,788	123,657	152,343	186,205	215,631	250,651	274,294
Other U.S. States	40,856	45,861	46,628	48,833	57,964	66,540	69,287	62,041	56,990
<b>Totals</b>	<b>105,783</b>	<b>130,585</b>	<b>150,416</b>	<b>172,490</b>	<b>210,307</b>	<b>252,745</b>	<b>284,918</b>	<b>312,692</b>	<b>331,284</b>

Source: Quest Offshore Resources, Inc.

Table 16: Jobs by Industry

Industry	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Agriculture, forestry, fishing, and hunting	46	68	74	86	94	102	123	177	279	403
Mining	1,649	1,659	1,786	1,911	2,135	2,213	2,558	3,305	4,380	5,608
Utilities*	26	36	41	48	52	57	73	119	221	335
Construction	150	324	330	648	642	941	1,355	1,557	2,204	3,645
Manufacturing	298	417	462	556	612	811	1,374	3,325	8,126	13,390
Wholesale trade	172	258	281	327	355	393	490	747	1,310	1,997
Retail trade	567	920	994	1,167	1,236	1,349	1,625	2,321	3,810	5,618
Transportation and warehousing*	175	261	289	341	372	409	506	769	1,333	2,002
Information	112	177	194	227	241	259	310	454	771	1,140
Finance and insurance	362	578	620	702	736	776	903	1,297	2,137	3,093
Real estate and rental and leasing	302	503	555	656	696	743	886	1,333	2,317	3,417
Professional, scientific, and technical services	690	1,751	2,049	2,607	2,729	2,840	3,264	4,880	8,761	13,060
Management of companies and enterprises	146	175	192	216	238	258	315	467	782	1,152
Administrative and waste management services	434	740	823	985	1,040	1,112	1,326	1,985	3,491	5,211
Educational services	101	169	181	206	218	234	276	392	635	928
Health care and social assistance	499	837	899	1,028	1,087	1,164	1,377	1,984	3,247	4,739
Arts, entertainment, and recreation	112	189	203	233	245	262	306	432	704	1,033
Accommodation	66	99	110	133	140	152	183	273	482	723
Food services and drinking places	389	646	701	811	855	914	1,079	1,555	2,587	3,806
Other services*	237	371	400	460	489	530	633	904	1,468	2,154
Households	62	118	125	141	147	156	180	254	409	594
Government	431	1,021	1,019	1,042	1,043	1,052	1,085	1,265	1,439	1,799
<b>Total</b>	<b>7,026</b>	<b>11,318</b>	<b>12,328</b>	<b>14,531</b>	<b>15,403</b>	<b>16,726</b>	<b>20,226</b>	<b>29,796</b>	<b>50,894</b>	<b>75,845</b>

Source: Quest Offshore Resources, Inc.

Table 17: Jobs by Industry (Continued)

Industry	2027	2028	2029	2030	2031	2032	2033	2034	2035
Agriculture, forestry, fishing, and hunting	585	763	920	1,068	1,263	1,478	1,650	1,894	2,063
Mining	7,973	11,939	16,220	19,611	22,428	25,741	29,312	33,539	39,484
Utilities*	451	552	631	728	903	1,092	1,232	1,293	1,352
Construction	9,129	11,091	12,037	12,415	12,991	15,510	15,647	27,245	26,657
Manufacturing	16,580	18,344	18,479	20,360	27,412	34,505	40,511	36,298	34,760
Wholesale trade	2,759	3,433	3,977	4,553	5,530	6,608	7,574	8,174	8,655
Retail trade	8,084	10,140	11,854	13,671	16,490	19,622	22,002	24,936	26,734
Transportation and warehousing*	2,772	3,440	3,966	4,508	5,433	6,480	7,339	7,964	8,388
Information	1,560	1,929	2,231	2,564	3,137	3,774	4,271	4,622	4,918
Finance and insurance	4,162	5,233	6,189	7,291	9,013	10,799	12,173	13,119	14,308
Real estate and rental and leasing	4,616	5,652	6,469	7,433	9,187	11,153	12,516	13,334	14,060
Professional, scientific, and technical services	16,947	19,563	21,152	23,164	28,523	35,349	39,388	40,166	39,413
Management of companies and enterprises	1,557	1,991	2,372	2,739	3,283	3,877	4,495	4,788	5,197
Administrative and waste management services	6,975	8,395	9,451	10,676	13,104	15,889	17,928	18,940	19,653
Educational services	1,294	1,647	1,963	2,311	2,823	3,350	3,783	4,208	4,599
Health care and social assistance	6,532	8,260	9,783	11,479	14,036	16,637	18,733	20,593	22,430
Arts, entertainment, and recreation	1,428	1,809	2,152	2,533	3,116	3,730	4,240	4,680	5,102
Accommodation	974	1,171	1,313	1,475	1,802	2,183	2,497	2,635	2,730
Food services and drinking places	5,198	6,473	7,559	8,770	10,724	12,792	14,475	15,755	16,944
Other services*	3,039	3,855	4,565	5,310	6,413	7,587	8,565	9,569	10,375
Households	804	1,026	1,233	1,478	1,842	2,195	2,475	2,697	2,979
Government	2,366	3,881	5,898	8,353	10,854	12,395	14,111	16,240	20,480
<b>Total</b>	<b>105,783</b>	<b>130,585</b>	<b>150,416</b>	<b>172,490</b>	<b>210,307</b>	<b>252,745</b>	<b>284,918</b>	<b>312,692</b>	<b>331,284</b>

Source: Quest Offshore Resources, Inc.



Table 18: GDP by State (Millions of Dollars)

State	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
California	\$354	\$581	\$632	\$737	\$777	\$838	\$957	\$1,242	\$1,883	\$2,727
Oregon	\$60	\$126	\$130	\$146	\$150	\$157	\$178	\$229	\$328	\$471
Washington	\$38	\$74	\$78	\$93	\$96	\$102	\$125	\$192	\$344	\$576
Region	\$452	\$781	\$840	\$976	\$1,022	\$1,097	\$1,260	\$1,663	\$2,556	\$3,774
Other U.S. States	\$160	\$219	\$255	\$307	\$350	\$381	\$514	\$960	\$1,872	\$2,736
Totals	\$613	\$1,000	\$1,096	\$1,283	\$1,372	\$1,478	\$1,774	\$2,622	\$4,428	\$6,510

State	2027	2028	2029	2030	2031	2032	2033	2034	2035
California	\$3,876	\$5,090	\$6,326	\$7,528	\$9,230	\$11,213	\$13,021	\$14,472	\$16,039
Oregon	\$668	\$915	\$1,193	\$1,534	\$1,931	\$2,274	\$2,701	\$2,996	\$3,456
Washington	\$986	\$1,284	\$1,508	\$1,772	\$2,213	\$2,787	\$3,086	\$4,093	\$4,309
Region	\$5,529	\$7,290	\$9,028	\$10,834	\$13,374	\$16,274	\$18,808	\$21,560	\$23,804
Other U.S. States	\$3,414	\$3,872	\$3,985	\$4,194	\$4,953	\$5,664	\$5,874	\$5,253	\$4,866
Totals	\$8,944	\$11,162	\$13,013	\$15,027	\$18,327	\$21,938	\$24,681	\$26,814	\$28,671

Source: Quest Offshore Resources, Inc.

Table 19: GDP by Industry (Millions of Dollars)

Industry	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Agriculture, forestry, fishing, and hunting	\$2	\$4	\$4	\$5	\$5	\$6	\$7	\$9	\$15	\$21
Mining	\$162	\$163	\$182	\$198	\$233	\$248	\$296	\$409	\$571	\$752
Utilities*	\$8	\$12	\$14	\$16	\$17	\$18	\$23	\$36	\$65	\$98
Construction	\$12	\$26	\$26	\$44	\$44	\$60	\$84	\$97	\$134	\$218
Manufacturing	\$29	\$43	\$47	\$56	\$61	\$77	\$124	\$290	\$673	\$1,061
Wholesale trade	\$23	\$35	\$38	\$44	\$47	\$52	\$64	\$98	\$172	\$262
Retail trade	\$28	\$46	\$50	\$58	\$61	\$67	\$80	\$114	\$187	\$275
Transportation and warehousing*	\$11	\$18	\$19	\$23	\$25	\$27	\$33	\$51	\$88	\$132
Information	\$19	\$32	\$35	\$40	\$42	\$45	\$53	\$75	\$123	\$181
Finance and insurance	\$44	\$68	\$72	\$82	\$86	\$91	\$106	\$148	\$238	\$344
Real estate and rental and leasing	\$73	\$121	\$130	\$148	\$156	\$166	\$194	\$276	\$447	\$650
Professional, scientific, and technical services	\$70	\$189	\$222	\$285	\$298	\$309	\$354	\$528	\$951	\$1,419
Management of companies and enterprises	\$17	\$21	\$23	\$26	\$29	\$31	\$38	\$56	\$93	\$138
Administrative and waste management services	\$16	\$28	\$31	\$36	\$38	\$41	\$48	\$72	\$125	\$186
Educational services	\$4	\$6	\$7	\$8	\$8	\$9	\$10	\$14	\$23	\$34
Health care and social assistance	\$29	\$51	\$55	\$62	\$65	\$70	\$81	\$116	\$189	\$274
Arts, entertainment, and recreation	\$4	\$7	\$8	\$9	\$10	\$10	\$12	\$16	\$26	\$39
Accommodation	\$4	\$6	\$7	\$8	\$8	\$9	\$11	\$16	\$29	\$43
Food services and drinking places	\$11	\$20	\$21	\$25	\$26	\$27	\$32	\$46	\$75	\$110
Other services*	\$12	\$20	\$22	\$25	\$27	\$29	\$34	\$50	\$83	\$123
Households	\$1	\$1	\$1	\$1	\$1	\$2	\$2	\$2	\$4	\$5
Government	\$35	\$83	\$82	\$84	\$84	\$85	\$88	\$102	\$116	\$145
<b>Total</b>	<b>\$613</b>	<b>\$1,000</b>	<b>\$1,096</b>	<b>\$1,283</b>	<b>\$1,372</b>	<b>\$1,478</b>	<b>\$1,774</b>	<b>\$2,622</b>	<b>\$4,428</b>	<b>\$6,510</b>

Source: Quest Offshore Resources, Inc.

Table 20: GDP by Industry (Millions of Dollars) (Continued)

Industry	2027	2028	2029	2030	2031	2032	2033	2034	2035
Agriculture, forestry, fishing, and hunting	\$31	\$41	\$49	\$58	\$69	\$82	\$92	\$107	\$117
Mining	\$1,079	\$1,585	\$2,102	\$2,475	\$2,772	\$3,143	\$3,534	\$4,008	\$4,597
Utilities*	\$132	\$164	\$191	\$224	\$278	\$336	\$380	\$405	\$430
Construction	\$530	\$652	\$722	\$763	\$816	\$972	\$995	\$1,675	\$1,675
Manufacturing	\$1,305	\$1,460	\$1,488	\$1,678	\$2,270	\$2,812	\$3,224	\$2,889	\$2,871
Wholesale trade	\$360	\$449	\$521	\$599	\$731	\$876	\$1,004	\$1,081	\$1,148
Retail trade	\$394	\$494	\$579	\$672	\$815	\$973	\$1,091	\$1,233	\$1,326
Transportation and warehousing*	\$181	\$225	\$260	\$297	\$360	\$430	\$486	\$525	\$554
Information	\$249	\$313	\$371	\$434	\$535	\$643	\$729	\$798	\$866
Finance and insurance	\$472	\$602	\$722	\$853	\$1,046	\$1,250	\$1,417	\$1,558	\$1,711
Real estate and rental and leasing	\$894	\$1,137	\$1,359	\$1,604	\$1,971	\$2,352	\$2,659	\$2,921	\$3,199
Professional, scientific, and technical services	\$1,829	\$2,102	\$2,262	\$2,468	\$3,047	\$3,791	\$4,217	\$4,275	\$4,170
Management of companies and enterprises	\$187	\$240	\$287	\$333	\$401	\$477	\$554	\$593	\$645
Administrative and waste management services	\$248	\$300	\$340	\$388	\$481	\$585	\$660	\$697	\$729
Educational services	\$47	\$59	\$71	\$84	\$104	\$124	\$140	\$154	\$169
Health care and social assistance	\$376	\$478	\$571	\$677	\$834	\$991	\$1,117	\$1,227	\$1,346
Arts, entertainment, and recreation	\$53	\$67	\$81	\$96	\$119	\$142	\$162	\$178	\$195
Accommodation	\$58	\$69	\$78	\$88	\$107	\$131	\$149	\$157	\$163
Food services and drinking places	\$149	\$187	\$220	\$258	\$319	\$382	\$432	\$468	\$508
Other services*	\$171	\$213	\$249	\$290	\$355	\$425	\$479	\$526	\$565
Households	\$7	\$10	\$12	\$14	\$18	\$21	\$24	\$26	\$29
Government	\$191	\$314	\$477	\$675	\$877	\$1,002	\$1,141	\$1,313	\$1,655
<b>Total</b>	<b>\$8,944</b>	<b>\$11,162</b>	<b>\$13,013</b>	<b>\$15,027</b>	<b>\$18,327</b>	<b>\$21,938</b>	<b>\$24,681</b>	<b>\$26,814</b>	<b>\$28,671</b>

Source: Quest Offshore Resources, Inc.

Table 21: Revenue Sharing under GOMESA by State (Millions of Dollars)

State	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
California	\$70	\$167	\$166	\$170	\$170	\$172	\$177	\$206	\$235	\$293
Oregon	\$36	\$86	\$86	\$88	\$88	\$89	\$92	\$107	\$122	\$152
Washington	\$17	\$41	\$41	\$41	\$41	\$42	\$43	\$50	\$57	\$71
<b>Total</b>	<b>\$124</b>	<b>\$294</b>	<b>\$293</b>	<b>\$300</b>	<b>\$300</b>	<b>\$302</b>	<b>\$312</b>	<b>\$364</b>	<b>\$414</b>	<b>\$517</b>

State	2027	2028	2029	2030	2031	2032	2033	2034	2035	Total
California	\$386	\$633	\$963	\$1,363	\$1,771	\$2,023	\$2,303	\$2,650	\$3,342	\$17,261
Oregon	\$200	\$329	\$499	\$707	\$919	\$1,049	\$1,195	\$1,375	\$1,734	\$8,956
Washington	\$94	\$154	\$234	\$332	\$431	\$493	\$561	\$646	\$814	\$4,205
<b>Total</b>	<b>\$680</b>	<b>\$1,116</b>	<b>\$1,696</b>	<b>\$2,402</b>	<b>\$3,122</b>	<b>\$3,565</b>	<b>\$4,058</b>	<b>\$4,671</b>	<b>\$5,890</b>	<b>\$30,421</b>

Source: Quest Offshore Resources, Inc.

