Middlebury Institute *of*
International Studies at Monterey
Center for the Blue Economy

The Economic Effects of Outer Continental Shelf Oil and Gas Exploration and Development in the South Atlantic Region: Issues and Assessment

Prepared for the
Southern Environmental Law Center

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SUMMARY REPORT

In 2013, the American Petroleum Institute and the National Ocean Industries Association, oil and gas industry groups, commissioned Quest Offshore Resources, Inc., to prepare a report (the Quest report) on the economic impacts of offshore drilling in the Atlantic. This report has been widely cited to make the case for opening the Southeast to oil and gas development based on significant local, state, and regional benefits from drilling.

The report, however, was based on an incomplete and misleading economic picture, which resulted in overstating the likely regional economic effects of offshore oil and gas exploration and development.

This summary identifies issues with the Quest report that lead to significant overestimates of the economic impacts of offshore drilling in the Atlantic and provides an overview of the existing ocean economy of the South Atlantic region in order to provide the context of the industries that could be vulnerable to disruptions from oil and gas activity.

For purposes of this assessment, the region of interest consists of Virginia, North Carolina, South Carolina, and Georgia and is designated as the "South Atlantic" region. In Department of the Interior planning, Virginia and North Carolina are included in the "Mid-Atlantic" planning region, while South Carolina and Georgia are in the "South Atlantic." In this assessment, however, all four states will be referred to as falling within the South Atlantic region.

Key Findings

- The existing ocean economy in Virginia, North Carolina, South Carolina, and Georgia accounted for 249,000 jobs in 2012 and is thus larger than the Quest estimates for oil and gas employment in 2035, which as noted appear to be exaggerated.
- Employment in sectors that have been vulnerable to disruption from oil and gas development is significant in the region.
- The Quest report was prepared before the Department of the Interior released its leasing proposal in 2015, and is therefore based on scenarios that assume significantly more leasing in the near term than will actually be undertaken in the Department of Interior's still preliminary plans.
  - The report assumes that lease sales will be held annually beginning in 2018, but the Department of the Interior has proposed only one lease sale, to be held in 2021.
  - The report assumes that production will begin in 2026, but production would likely not begin until at least 2029 under the actual proposal.
  - The report assumes that Atlantic drilling can take place in all federal waters, but the Department of the Interior is proposing to limit oil and gas activity to areas off the coasts of Virginia, North Carolina, South Carolina, and Georgia, and has proposed a 50-mile buffer from the coastline within which drilling would be prohibited.
- Employment estimates in the Quest report are likely exaggerated. It is unclear, for example, how much of the projected employment will be filled by residents outside the South Atlantic region.
- The Quest report fails to disclose key assumptions about the location of support activities such as equipment manufacturing and does not distinguish between oil- and gas-related economic activities taking place in the South Atlantic and those based outside the region.
- The Quest report examines the impacts if Atlantic coast states were to receive revenue sharing

from the federal government, as Gulf of Mexico states do, but it fails to acknowledge the long history of difficulty of establishing revenue sharing in Congress.

A. The South Atlantic Ocean Economy Context of OCS Development

Any analysis that examines the economic impacts of outer continental shelf (OCS) oil and gas activity in the South Atlantic must consider the value of the region's existing ocean economy. The coastal communities in this region are well known for industries such as tourism, recreation, and commercial fishing, and it is important to place potential OCS development in the context of existing ocean-based activities.

The region's existing ocean-related economy is quite substantial. In 2012, there were 249,000 ocean-related jobs in Virginia, North Carolina, South Carolina, and Georgia. This total is larger than the number of oil and gas jobs estimated by Quest for 2035. The region's ocean economy paid $7.515 billion in wages and contributed $14.5 billion to the economies of the South Atlantic region. The largest sector in employment in 2012, with 171,159 jobs, was tourism and recreation. This sector is also the largest contributor to the gross domestic product (GDP) with $6.050 billion. Ship and boat building is the second largest sector, and the living resources sector, which includes commercial fishing, accounts for $978.505 million in GDP.

While drilling may bring new economic activity to the region, it may impact the other significant elements in the region's ocean-based economy. Any predicted employment and economic gains must be weighed against possible losses to existing economies as a result of onshore industrialization, routine contamination, construction activities, and the threat of major oil spills (see Table 1).

B. Estimating Economic Impacts from OCS Oil and Gas Activities

The five questions examined below are key to estimating economic impacts from OCS oil and gas activities:

1. How much OCS activity will there be?
2. What will determine the local economic impacts?
3. Will states receive revenue sharing from the federal government?
4. What are multipliers and how are they estimated?
5. What economic issues are left out of economic impact analyses?

1. How much OCS activity will there be?

Lease sales, the starting point for OCS exploration, must be included in the Five-Year OCS Oil and Gas Leasing Program prepared by the Department of the Interior. The 2017–2022 Outer Continental Shelf Oil and Gas Leasing Draft Proposed Program, released on January 17, 2015, included a proposed lease sale (number 260) off the coasts of Virginia, North Carolina, South Carolina, and Georgia for the year 2021.[1] This is consistent with past practice to hold only one lease sale in the first five-year program of a "frontier" area.

The Quest report, however, was prepared before the Draft Proposed Program was issued, and assumed there would be one lease sale each year from 2018 to 2022. This assumption means that the job estimates were based on a much higher level of activity, at least in the exploration stage, than will actually occur under the Draft Proposed Program. This assumption also results in a projected development timeline in the Quest report

Table 1

2012 Ocean Economy – South Atlantic Region

Sector	Establishments	Employment Number of jobs	Wages $Millions	GDP $Millions
All ocean sectors	11,121	248,831	$7,515.65	$14,580.22
Construction*	322	3,371	$206.57	$382.21
Living resources	498	4,811	$140.31	$978.51
Minerals**	70	670	$69.41	$154.87
Ship & boat building	182	40,258	$2,585.04	$3,806.00
Tourism & recreation	9,275	171,159	$2,858.90	$6,050.10
Transportation	730	28,302	$1,645.11	$3,180.87

* Not disclosed in Georgia
** Not Disclosed in Georgia or North Carolina

[See Appendix for sector definitions and a note on data disclosure]

Figure 1
VA, NC, SC, and GA Ocean Economy: 2012 Employment

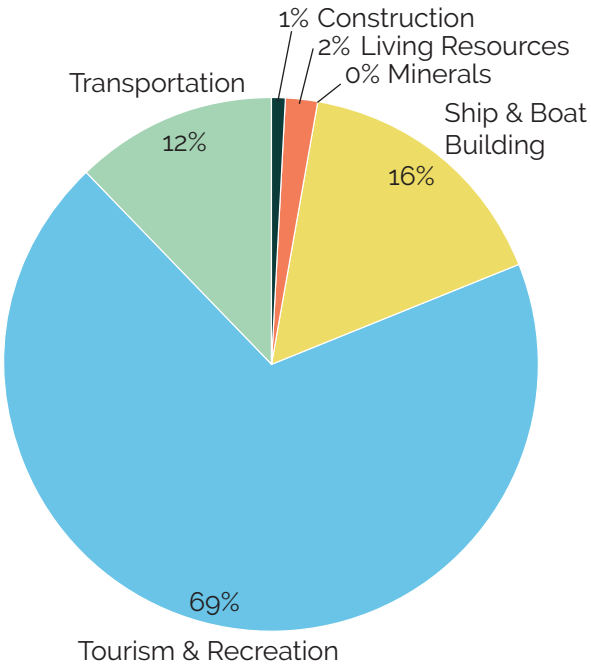
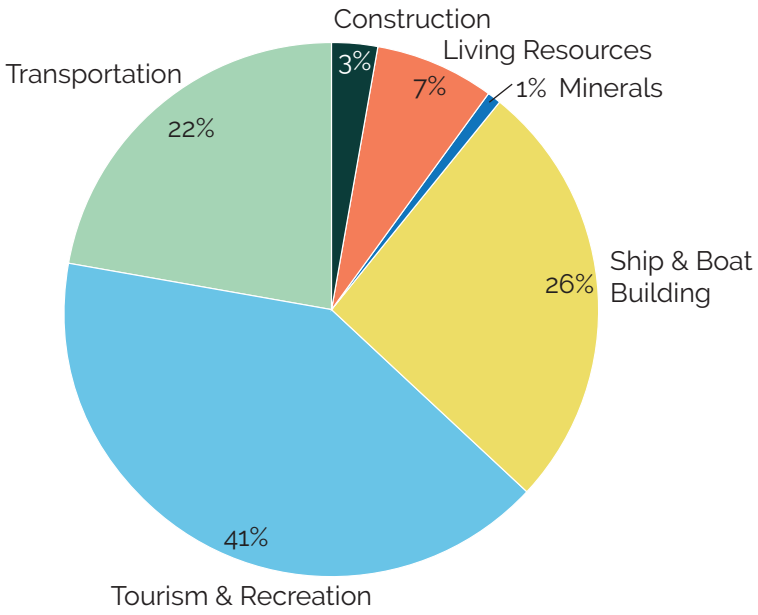


Figure 2
VA, NC, SC, and GA Ocean Economy: 2012 GDP



that is much too early. The report projects that production will begin in 2026, but, based on the actual proposed lease sale schedule, the earliest production would take place is 2029.

Likewise, the Quest report assumed that lease sales would take place throughout the Atlantic OCS, while the lease sale proposed by the Department of the Interior in the Draft Proposed Program would only cover the area off the coasts of Virginia, North Carolina, South Carolina, and Georgia. The Department of the Interior has further proposed a 50-mile buffer from the coast within which drilling would be prohibited, to say nothing of potential conflicts with the Department of Defense, the National Aeronautics and Space Administration, and other federal agencies. The actual proposal would, therefore, make available only a fraction of what the report assumes will be open for leasing.

Lastly, the Quest report notes that its estimates are based on data on potential oil and gas reserves that are several decades old. It is not known what amount of oil and gas may be present; indeed, it is not at all certain that oil and gas resources exist in sufficient quantities to make them commercially viable. But the lack of recent remote sensing data increases the uncertainty in ways that should be more explicitly accounted for through estimates bounded by a range rather than point estimates.

Table 2
Counties/Cities with the Largest Share of Employment in the Ocean Economy

County/City	State	Ocean Economy Percent of Employment
City of Portsmouth	Virginia	30.9%
Horry County	South Carolina	22.3%
Dare County	North Carolina	25.9%
Northumberland County	Virginia	19.4%
Carteret County	North Carolina	17.4%

2. What will determine the local economic impacts?

Offshore oil and gas exploration and production require highly specialized technologies, facilities, and equipment, as well as a highly trained workforce. In a frontier region such as the South Atlantic, most of the specialized equipment and workforce is not present and must be provided from outside the region, particularly in the exploration phase.

The South Atlantic's proximity to the Gulf of Mexico region means that many existing

firms will seek to be suppliers to Atlantic operations. The skilled workforce of the Gulf will certainly be tapped in the early years. Oil and gas workers commonly work for long periods in regions distant from their homes. Many of the workers in the North Sea off Scotland and Norway commuted to the region from Louisiana and Texas, at least in the early years.

The Quest report, however, is silent on the question of how much of the industry's expenditures for goods and services, other than those that must be in the South Atlantic region, would actually be made in the region and how much would be made elsewhere. The report instead implies that businesses in the South Atlantic region will naturally be chosen. Without a much clearer picture of how the South Atlantic will interact with the worldwide oil and gas industry and its suppliers, and particularly with the large concentration of such firms in the neighboring Gulf of Mexico region, it is likely that the report significantly overestimates the impacts to the region in terms of employment, new industry, and economic activity.

3. Will states receive revenue sharing from the federal government?

The Quest report discusses a situation where the Atlantic coast states will receive significant revenues from OCS leasing and production. Under current law, however, Atlantic coast states would not receive any such revenues. The sharing of federal revenues with the states has been a controversial issue for decades, and to establish revenue sharing for the Atlantic region, Congress would have to pass legislation.

The Obama administration has opposed revenue sharing, and Congress has historically been extremely reluctant to share revenues with the states. Moreover, current rules designed to reduce the deficit create a very different fiscal environment for the federal government than when revenue sharing was established for the Gulf States a decade ago. OCS oil and gas bonus and royalty payments are, in some years, second only to income tax as a source of revenue for the federal government. Others, however, view revenue sharing as a necessary predicate to increased drilling, a dichotomy that makes the path forward for any legislation precarious.

The Quest report notes that the question of revenue sharing has been a long-standing issue between the states and the federal government, but suggests, without more explanation, that a recent change affecting the Gulf of Mexico is reason to expect that a similar arrangement could be made with the Atlantic coast states.

4. What are multipliers, and how are they estimated?

New industries in a region have effects on the economy beyond those immediately observable in the industries themselves. The new industries purchase goods and services from within the region, expanding the activity of other firms and industries. The output and employment of the new industries are called the direct effects; the increased sales by other industries to the oil and gas industries are called the indirect effects. The incomes of workers in the new industry and its suppliers create additional economic activity.

To estimate these multiplier effects, the Quest report used the Regional Industrial Multiplier System (RIMS), which is widely used for this type of analysis. RIMS gives an approximate picture of multipliers, but it is a limited picture that requires additional explanation. First, this analysis depends on there already being an established relationship between the new industry and other industries in the region. In the case of an entirely new and large industry such as oil and gas, this relationship does not yet exist; it will take many years to develop. And the extent to which it does develop depends heavily on the question of where support activities and employment will take place, as discussed earlier. The report acknowledges part of this problem, but does not explain how it is addressed.

Second, the employment estimates in economic impact analyses do not distinguish between full- and part-time employment. This is the fault of the underlying government data, and all impact analyses suffer from it. But for some jobs, such as those in construction, it is important to note that these jobs are usually temporary, as construction workers routinely move from one project to another.

Thus the multiplier estimates in the Quest report are only a first approximation. Without more detailed information about how the "regional oil and gas" industry was defined and is projected to evolve, and without use of a model that more completely reflects the dynamic regional economy, the likelihood is that the report's estimates are unreasonably high.

5. What is left out of economic impact analyses?
Economic impact analyses such as the Quest report tend to focus on economic activity based on predicted levels of employment, income, and industrial output. Such analyses, however, provide an incomplete picture of regional impacts by not accounting for the impact of offshore oil and gas development on the welfare of people who use ocean and coastal resources.

The issue is the difference between a day at the beach for the consumer and for the business. A visitor to Myrtle Beach or Virginia Beach spends money on hotels and restaurants and other services, and we count that in the ocean economy. But the visitor's purpose is to go to the beach, not to spend money in a hotel; the value to the visitor is the beach experience, not what it costs while they are there.

These are the values that are most at risk from hazards such as oil spills. Hotels and restaurants can make money serving oil-spill cleanup workers as easily as tourists in the short term. But if the fundamental nature of the beach is changed, hotels and restaurants lose in the long term, as do the visitors who no longer choose to travel to favored places. The visitor who must travel longer distances or to less-favored areas, or who must forgo the beach visit all together, is the real loser.

As oil and gas activity develops over time, support facilities onshore in coastal communities will also expand. This may result in a shift in some communities to a greater emphasis on industrial activities in shoreline use, which can create competition with other traditional waterfront users. Competition for scarce working waterfront space and a shift in land use may confront communities with unacceptable changes in their economic character if the needs of onshore oil and gas activities are not carefully planned for.

C. Conclusion

With such valuable ocean-based economies at stake, it is important to analyze the potential economic impacts of OCS oil and gas activity as accurately as possible. The oil and gas industry has widely cited the Quest report to boast the economic benefits of drilling in the Atlantic, but the report presents too optimistic a view of the gains to the regional economy and fails to place oil and gas activity in the context of the larger ocean economy that may be vulnerable to disruptions from oil and gas. In a region where oil and gas development has never occurred, a more realistic and complete picture of possible economic changes is needed.

Appendix

The data contained in this report describes the "ocean economy" of the South Atlantic states. The ocean economy is defined as 21 industries in six sectors that directly or indirectly use ocean resources or locations. As explained in the Technical Report Appendix, totals for establishments, employment, wages, and GDP include all disclosed and nondisclosed data.

Definitions of Sectors and Industries of the Ocean Economy

Construction—Marine
Marine-related construction

Living Resources—Marine
Fishing
Fish hatcheries and aquaculture
Seafood processing
Seafood markets

Minerals—Offshore
Limestone, sand & gravel
Oil and gas exploration
Oil and gas production

Ship & Boat Building
Boat building and repair
Ship building & repair

Tourism & Recreation—Coastal
Amusement and recreation services NEC*
Boat dealers
Eating & drinking places
Hotels & lodging places
Marinas
Recreational vehicle parks & campgrounds
Scenic water tours
Sporting goods retailers
Zoos & aquaria

Transportation—Marine
Deep-sea freight transportation
Marine passenger transportation
Marine transportation services
Search and navigation equipment
Warehousing

* Not elsewhere classified

TECHNICAL REPORT

Introduction

The Southern Environmental Law Center has asked the Center for the Blue Economy of the Middlebury Institute of International Studies at Monterey to examine the impacts on the regional economy if the U.S. Department of the Interior were to begin selling leases for outer continental shelf (OCS) oil and gas exploration as envisioned in the Department's proposed 2017–2022 Leasing Program.

The decision making process for offering oil and gas leases in the Atlantic OCS is still under way, and it is not at all certain that any oil and gas resources exist in sufficient quantities to make them commercially viable. Further, while oil and gas companies have promised significant benefits from drilling, estimating economic impacts years or even decades in advance is a highly uncertain process. Nevertheless, it is possible to identify the factors that will determine the major dimensions of impacts and to suggest some possible changes in economic activity that could result.

This report first outlines the value of the region's existing ocean-based economy in order to provide the context of industries that could be vulnerable to disruptions from oil and gas activity. The region is well known for strong ocean-based industries such as tourism, recreation, and commercial fishing, and this data is an important reminder of the risks that OCS oil and gas activities pose to a thriving economy.

This report then discusses the principal data and analyses required to project economic impacts. This discussion includes an assessment of an economic report prepared by Quest Offshore Resources, Inc., of Sugar Land Texas, which was funded by two industry groups, the American Petroleum Institute (API) and the National Ocean Industries Association, in 2013. The Quest report and its conclusions have been widely circulated in the region and present a significant overestimation of economic impacts.

Third, this report discusses economic issues that should be addressed in forthcoming environmental reviews of the proposed Five-Year Leasing Program and any environmental impact statements accompanying actual lease sale decisions in the Atlantic. Lastly, this report's appendix provides data on the portions of South Atlantic states that are currently dependent on ocean resources.

For purposes of this assessment, the region of interest consists of Virginia, North Carolina, South Carolina, and Georgia and is designated as the "South Atlantic" region. In Department of the Interior planning, Virginia and North Carolina are included in the "Mid-Atlantic" planning region, while South Carolina and Georgia are in the "South Atlantic." In this assessment, however, all four states will be referred to as falling within the South Atlantic region.

The major conclusions of this report may be summarized as follows:

- Any projected employment and economic gains must be weighed against the risk to existing economies as a result of onshore industrialization, routine contamination, construction activities, and the threat of major oil spills.
- The Quest report overstates the likely extent of economic impacts. Key assumptions in the analysis are not documented, so it is difficult to assess the validity of some results, while other

assumptions are biased toward estimates that are too high and are projected to occur too soon.

- In particular, the Quest report has the following areas of concern:
  - Uses assumptions that are not consistent with actual leasing proposals, as it was prepared before the release of the Draft Proposed Program in January 2015. The Quest report assumes earlier, more frequent lease sales than are actually proposed, and does not take into account a proposed limitation on the area to be offered for leasing in the South Atlantic.
  - Fails to disclose key assumptions about the location of support activities, such as equipment manufacturing, and fails to make clear how such activities located outside the region affect their estimates of employment within the region.
  - Uses an economic model that tends to overstate multipliers over the long term.
  - Suggests that Atlantic coast states will receive revenue sharing from the federal government, but glosses over the long-standing difficulty of establishing revenue sharing in Congress.
- Any future assessment of the regional and national economic impacts of South Atlantic OCS development should implement the following modifications:
  - Use scenario planning to address the large range of uncertainty inherent in assessing development in a frontier OCS area.
  - More explicitly account for the economic geography of the oil and gas and supporting industries and not assume that simply because exploration and production occur offshore of South Atlantic states that economic activity will occur in proportion to the level of exploration and production activity.
  - Clearly distinguish between economic benefits (changes in economic welfare) and economic impacts (changes in economic activity) in order to more completely assess the economic effects of environmental changes that would accompany OCS exploration, development, and production.

I. THE OCEAN ECONOMY CONTEXT OF THE SOUTH ATLANTIC REGION

Any analysis that examines the economic impacts of OCS oil and gas activity in the South Atlantic must consider the value of the region's existing economy. The coastal communities in the South Atlantic region are well known for industries such as tourism, recreation, and commercial fishing, and it is important to place potential OCS development in the context of existing ocean-based economic activities.

As detailed in the data appendix below, the region's ocean-based industries are quite substantial in size. The existing ocean economy accounted for 249,000 jobs in 2012 (the latest available year for this data) and is thus larger than the API estimates for oil and gas employment in 2035, which as noted appear to be too high. In addition, in 2012, the region's ocean-based industries paid $7.515 billion in wages and contributed $14.5 billion to the economies of Virginia, North Carolina, South Carolina, and Georgia.[2]

While drilling may bring new economic activity to the region, it jeopardizes these significant industries. Any predicted employment and economic gains must be weighed against possible losses to existing economies as a result of onshore industrialization, routine contamination, construction activities, and the threat of major oil spills. The Quest report did not discuss the vulnerabilities of other ocean-related industries, as that was not part of the terms of reference from its sponsors. Nor does this report undertake a specific analysis of the risks from oil and gas development on other economic activities in the region. That will be an appropriate discussion in environmental impact statements accompanying both the Five-Year Leasing Program and any lease sales that may be proposed under the final program.

II. ECONOMIC IMPACT ESTIMATES IN THE QUEST REPORT

The Quest report uses the Bureau of Ocean Energy Management's (BOEM) estimates of possible oil and gas reserves to construct a set of scenarios for exploration and development based on the location within the Atlantic OCS planning areas, whether the discoveries are likely to be made in deep water or shallow water, and the size of potential development projects. The economic impacts are derived from estimates of the amount of spending for the various components of oil and gas exploration, development, and production. These spending estimates are based on a proprietary database of industry spending patterns. These spending estimates are adjusted to the

state level and then run through the Bureau of Economic Analysis (BEA) Regional Industrial Multiplier System (RIMS II). The RIMS II model translates the spending on oil and gas projects into estimates of jobs and contributions to gross domestic product (GDP) in each state.

The RIMS II model also calculates the direct and multiplier effects of the estimated oil- and gas-related spending. Direct effects are the employment and GDP resulting from specific purchases by the industry. Multiplier effects are the sum of indirect effects (the employment and GDP resulting from within-region suppliers of goods and services to the oil and gas industry) and the "induced" effects that result from spending by employees in the region. For example, if the oil and gas industry spends money to build a platform for production, it contracts with a construction company. The construction company's employees and output are the direct effects. The steel, electronics, and other such goods that the construction company buys from within the region to include in the platform are the indirect effects. The incomes spent within the region by employees of the directly and indirectly affected firms comprise the "induced" effects. Total impacts are the sum all three.

This approach to analyzing economic impacts is consistent with standard practice for conducting such studies. Quest's database of industry spending data is primary data that is not often available for these kinds of studies. Confidential data from businesses is commonly used in such studies. Quest does have expertise in the industry and access to relevant data. The spending estimates related to possible projects are likely a sound aspect of the Quest report.

At the same time, the quality and usefulness of this type of analysis depends to a great extent on the assumptions that are used to shape the analysis. All such analyses depend on assumptions, because there are so many unknowns that influence the results. The question that should be asked about assumptions is whether they are more likely to overstate or understate the results and whether the assumptions are grounded in the best available information. In the case of the Quest report, the assumptions used to frame the analysis have a significant upward bias. That is, they are more likely to overstate the economic impacts than understate them. Moreover, the most important assumptions in the analysis, those concerning the distribution of oil- and gas-related economic activity to the states, are not documented in their report, making it impossible to assess the state-by-state analysis. There are also a number of elements in the analysis that should be clarified. These aspects of the report are detailed in the following sections.

III. ESTIMATING ECONOMIC IMPACTS FROM OCS OIL AND GAS

A. Upward Bias in the Assumptions

1. How much OCS activity will there be: timing and extent of activity?

The Quest report projects impacts for 2035, which would be the first year of full production, assuming that leasing promptly begins with the new Five-Year Program in 2018 and that there are no delays in the execution of lease sales or permitting, with exploration beginning in 2019 and first production beginning in 2026 (Quest report, p. 5).

These assumptions are not surprising in an industry-sponsored study. But the assumption of speedy leasing and permitting does not reflect the actual proposal that BOEM released in January 2015 after the Quest report was published. BOEM's Draft Proposed Five-Year Leasing Program proposes one lease sale in the South Atlantic for 2021. This is significantly less than the assumptions in the Quest report, which assumes that lease sales will take place on an annual basis beginning in 2018 (Quest report, p. 27, Figure 10).

The Draft Proposed Program also proposes a 50-mile buffer from the coast within which no drilling activities could take place, and limits OCS activities to the areas off the coasts of Virginia, North Carolina, South Carolina, and Georgia, further restricting the OCS oil and gas activities that the Quest report assumes will take place.

It is not clear exactly what the inclusion of only one lease sale in the Five-Year Program means for the estimates prepared by Quest, because the size of the lease sale and the number of leases ultimately bought and explored is not yet known. With only one lease sale proposed, it is likely that the Quest report significantly overestimates the possible volume of OCS investments and associated impacts.

2. How much OCS activity will there be: probability of impacts?

The Quest report acknowledges the uncertainties in estimating impacts from oil and gas activity when it is not possible to know how much oil and gas may be present. The report uses the BOEM conditional mean estimates of possible resources, which is the mean of a probability distribution of finding oil and/or gas given experience in areas with similar geology. But the report also notes that there has been no updated seismic research in the area in recent years, and that the BOEM estimates are based on data that is now 30 or more years old. Quest based its construction of scenarios on BOEM estimates and "geologic analogs" (Quest report, p. 4).

The BOEM estimates are conditional means; that is, they are the mean of a possible distribution of resources if oil and gas are present. On a purely probabilistic basis, the actual amount of oil and gas has an equal chance of being larger or smaller than the BOEM estimates. Using the mean is reasonable, but it gives an illusion of precision to the resulting analysis that is not considered in the report. No one knows the actual numbers, but making point estimates two decades into the future is misleading. The appropriate way to handle this uncertainty is to consider additional scenarios that give a better picture of the range of possible impacts. This is discussed in Section 3 below.

3. What will determine the local economic impacts?

The economic impacts of OCS exploration and development will shift over time. As Quest notes, this is because the scale of operations grows from initial reconnaissance surveys to installation of production platforms. But the pace of activity is not the only factor. The location of activity also shifts over time. Initially, most OCS activity is supported from outside the region, but over time more and more of the activity may be located in the region, increasing the impacts on the regional economy. A major issue in estimating impacts is the pace and extent of this shift in the location of activity.

In the earliest stages of seismic exploration, specialized ships are used. These ships conduct similar data collection all over the world. Other than ship chandlery and repair services, this stage has little local impact. With more advanced exploration following a lease sale, supply bases are established onshore to support the mobile drilling rigs that are brought in to drill exploratory wells. Communities with existing port facilities and with heliports are selected for onshore support. While most of the workforce comes from outside the region, local businesses are tapped to supply a variety of goods and services. The oil companies usually establish their own local offices with small staffs to coordinate operations with contractors, government agencies, and communities.

If oil or gas is found in commercial quantities (that is, in sufficient volume to be profitably extracted at expected prices), the requirements for facilities, technology, and workforce expand significantly. Permanent wells must be drilled and connected using undersea pipelines to production facilities that will bring the oil ashore by tanker or pipeline (only pipelines are used for natural gas). Contemporary technology allows a larger number of wells to be drilled from a relatively small number of platforms, which is particularly important in deeper waters, where the costs are much higher.

The Quest methodology builds its analysis from the state level up. Total spending on exploration, development, and production derived from the assumptions about resources and timing is allocated to the states, and then state-level economic analysis is done. Thus the most important assumption in the Quest analysis is this: "This study projects that the percentage of spending that will take place in the Atlantic coast states will progress from 48 percent in the first five years of activity to 64 percent in the last five years" (Quest report, p. 7).

The basis for this assumption is not discussed in the report and is subject to considerable question. Because this is the key assumption, the lack of documentation on how this assumption was implemented makes it impossible to validate the rest of the analysis. Transparency is essential for the Quest report, which has been used widely in the region to promote the benefits of OCS oil and gas activity. Decision makers and the public rely heavily on the type of information that is presented in the Quest report, and it is important that the underlying assumptions be clearly stated.

The report implies that the projected spending based on their assumptions about the number and types of projects are divided among sectors in the RIMS II model

(Quest report, pp. 30–31) based on the assumed proportion of local spending (somewhere between 48 and 64 percent), the location of a state relative to the expected "plays" or targets for exploration, and then distributed to the states based on the size of the RIMS sectors in the state. The result is then presented as the number of jobs and GDP attributable to the OCS development. But there are four problems with this approach.

First, the analysis appears to assume that significant specialized production would move to the Atlantic states rather than take place somewhere else in the U.S. The construction of offshore production platforms is the most expensive element of OCS production, requiring specialized production facilities and workforce. Developing new greenfield sites to manufacture production platforms in the Atlantic states would require very large finds to offset the costs. Moreover, the proximity to existing facilities in the Gulf of Mexico would likely make major new facilities less likely than other areas, such as the North Atlantic.

The ultimate question of shifting platform production (or other major economic activity) to the South Atlantic can only be answered based on the size of the find and the relative costs of building platforms in existing facilities and moving them around the Straits of Florida to locations in the Atlantic, versus building a new site and training a new workforce. For possible developments offshore of Georgia and South Carolina, and likely for developments offshore Virginia and North Carolina as well, the former option may be the most financially attractive.

Second, the report does not appear to address the mobility of specialized workforces. Particularly in the early stages of exploration, the majority of the workforce will come from outside the region. While local labor and firms will supply some support services (such as chandlery and repair services), the majority of business and personal income in the exploration phase leaves the region very quickly until exploration activity becomes very large or a find is made. This is a reason why the ambitious timing assumptions noted above not only affect the timing but also the size of the impacts. The South Atlantic's proximity to the Gulf of Mexico likely increases the mobility of the workforce and thus reduces the local impacts, at least in the near term. Thus the report's assumption that nearly half of all spending in the first five years (all exploratory activity) will take place in the region is likely a significant overestimate. At a minimum, this assumption should be much more clearly supported.

Third, in the state–by-state discussions in the report's appendix (Quest report, Section 6, State Results Appendix, pp. 59–95), Quest identifies a number of firms in each state that are either known to be suppliers to the offshore oil industry or, based on the type of products produced, could be suppliers. Based on the discussion in the report, the presence of such firms in each state appears to heavily influence the resulting impact estimates. But, there is no inherent reason to believe that such firms will have a competitive advantage simply because OCS activity is taking place in the South Atlantic. Transportation costs are generally negligible (as evidenced by the fact that the report identifies firms in New England, where there are no OCS operations that supply OCS operations elsewhere). There is also no reason to assume that firms that can supply goods and services to the OCS industries will do so simply because the activity is in the region. The use of regional input/output models tends to support this upwardly biased assumption, which is why a careful separation of in-region from out-of-region purchases is essential in the set ups of the analyses.

The Quest report identifies the geographic relationship between onshore activities and the location of offshore exploration and production as a factor in its analysis. Quest notes that Virginia is a possible location for platform construction. While the dense cluster of marine and ship-building activities and a skilled workforce in the lower Chesapeake region does make this a possible location, most of the capacity there is dedicated to the highly specialized needs of naval ship building. Other ports are mentioned, such as Morgan City and Wilmington in North Carolina, but both are depth-constrained estuary ports that would be suitable for support activities such as service boat bases, but would be more difficult to develop for the kind of major industrial facilities needed for OCS support. This is another example of the questionable assumption that because a capacity exists in the South Atlantic, it will be used to support offshore drilling activities

Finally, there is no reason to assume that local firms that do supply the OCS market will add capacity (new

labor or capital) to do so. The report fails to distinguish between existing and new jobs. Thus, to the extent that local firms do supply the OCS market, the job impacts should be described as divided between "supported jobs," that is, existing jobs whose income is supported by OCS contracts, and "new jobs," which are actual additions to employment levels. The RIMS II model cannot distinguish between "supported" and "new" jobs, but the discussion of the results should note the difference.

The foregoing, unsupported assumptions concerning the location of economic activity are central to the report's analysis, likely resulting in an inflated estimate of the amount of activity that will take place in the South Atlantic region.

4. Will states receive revenue sharing from the federal government?

The Quest report includes an analysis of potential state revenues, assuming that the federal government would share bonus and royalty revenues with the Atlantic states in the same way that revenues are shared with states in the Gulf of Mexico. It is important to note that under current law, Atlantic states would not receive any revenues from offshore oil and gas activities. For the Atlantic states to receive such revenues, Congress would have to pass legislation. Sharing of federal revenues with the states has been a controversial issue since the earliest discussions of amending the OCS Lands Act in the 1970s and has been a perennial subject in OCS policy. As recently as March 2015, the OCS Governors Coalition renewed calls for legislation supporting revenue sharing.[3]

Revenue sharing with the Gulf of Mexico states was established in 2006 during the Bush administration,[4] but the Obama administration has opposed revenue sharing,[5] and historically Congress has opposed broad revenue sharing as well. OCS revenues have been a very large source of revenues to the federal government, in some years second only to the income tax. Moreover, a portion of OCS revenues is dedicated to the Land and Water Conservation Fund ("LWCF"), which provides money to state and local governments throughout the country for the purpose of land conservation and the construction of recreational facilities. Congress has seen the LWCF as sufficient transfer of OCS revenues to state and local governments.[6]

Given current federal fiscal policy constraints, which are in effect into the next decade, and reluctance on the part of Congress and the executive branch, the discussion of revenue sharing in the Quest report overstates the likelihood that these revenues will ever appear for Atlantic states.

B. What Are Multipliers and How Are They Estimated?

The choice of regional economic model affects the estimates of jobs and contributions to GDP. As noted, the BEA RIMS II model used in the Quest report is widely used for these types of studies. But all models have limitations, and all analyses should be accompanied by explanations of what those limitations are.

RIMS II is a comparative statics model. Essentially, the direct spending effects are entered into the model, the relationships to other industries and households are calculated based on a regionally adjusted input-output table, and the results obtained. But economies are dynamic. The increases in employment and demand for goods and services from OCS activities raises the wage rates and prices of goods and services, which filters through the economy and decreases somewhat the competitiveness of firms in the regional economy. This reduces the multiplier (indirect and induced) effects over time. Models such as those produced by Regional Economic Models, Inc., (REMI)[7] take into account these dynamic changes in the economy, as well as incorporating both types of multipliers. Such models are generally more suitable for the kind of long-term, multiyear analysis undertaken by Quest than the RIMS II model that was actually used.

It is not possible to determine the balance of under- and overestimation of multipliers in the Quest analysis. But the likelihood that there will be some specialized labor coming into the region and then returning to their homes outside the region will diminish somewhat the induced effect. In other words, overestimation is more likely than underestimation if induced effects are included.

IV. POINTS NEEDING CLARIFICATION IN FURTHER ECONOMIC AND ENVIRONMENTAL STUDIES

A. Scenario Planning to Address Uncertainty

Assessments of potential OCS development usually use the conditional mean estimates of resources as the starting point for measurement of impacts (where the conditional mean is the average of a range of possible oil and gas amounts if oil and gas are in fact present). But the result is misleading. There is great emphasis on the "mean" and little on the "conditional." In fact, the conditional mean is grounded in a highly probabilistic assessment and needs to be understood more as "if there is oil, it is more probable that there will be closer to the mean amount of the range than other amounts." However, there are still probabilities that the amount of oil and gas will be greater or less than the mean.

There are many ways to handle uncertainty and risk in the face of fundamental unknowns such as whether oil and gas are present, and in fact, the BOEM/U.S. Geological Survey methodology is a standard approach. But to readers the result is an illusion of precision in the analysis that is unwarranted by the actual state of knowledge.

In preparing a decision support analysis, which is what the Five-Year Program and accompanying environmental assessments are, it is useful to convey uncertainty in a simple manner. The best way to do this is to discuss scenarios above and below the mean estimate, so that readers can see both that the resources could be smaller or larger than the estimates on which plans are being based. The purpose is not to complicate the analysis unnecessarily but to convey in more than words the actual implications of our lack of knowledge. In addition to the discussion above about unrevealed upward biases, the Quest report is an excellent example of the illusions of false precision. Future assessments should avoid this trap.

B. Methodological Transparency in the Assessment of Regional Impacts

As discussed above, the Quest report projects that between one-third and one-half of the suppliers to OCS operations in the South Atlantic will come from outside the region, without documentation of this assumption. The distribution of impacts among the South Atlantic states is not explained. These are key issues in the assessment of the economic impacts for any future analysis. The analysis should explicitly model the movement of capital (When is it worth opening new facilities rather than using the capacity of existing facilities?) and labor (When does the skilled workforce shift from predominantly outside the region to predominantly inside the region?).

C. Considering the Value of the Existing Coastal Economy

As discussed in Part I, any economic analysis of the impacts of offshore oil and gas activity must take into account the inherent costs and risks associated with the industry. Only with such an analysis will an economic impact analysis place any potential benefits into context and present a complete picture of the impacts the industry could have on coastal, state, and regional economies. The data appendix below provides more complete information on the existing ocean-based economies of Virginia, North Carolina, South Carolina, and Georgia.

D. Assessing the Economics of Environmental Effects: Impacts versus Benefits

Economists make an important distinction between economic impacts and economic benefits, but the terms are often confused (as in the Quest report). Economic impacts, the subject of the Quest analysis, are changes in the levels of economic activity as measured by employment, income, and industrial output. Meanwhile, economic benefits are changes in economic welfare net of costs.

An example illustrates the difference. When we calculate the economic impacts of a beach trip, we count the money spent on transportation, food, perhaps a hotel, and the employment engaged in providing those services. But to the traveler, these expenditures do not represent the benefits of going to the beach, but the costs. One pays the cost of the hotel to go to the beach; one does not go to the beach for the benefit of staying at a hotel. At the same time, if someone rode his or her bike to the beach and made zero expenditures, would we say there was no benefit to the person?

Most analyses of the economic effects of OCS exploration, development, and production focus on impacts. But by analogy, the spending of oil companies that leads

to the benefits as defined by Quest are the costs to the oil companies. If a transaction is both a benefit and a cost simultaneously, it is not possible to decide what or how much of anything should be done.

Changes in economic welfare are measured with a concept known as "social surplus," which is divided between consumers and producers. The surplus is the difference between the prices at which consumers are willing to pay and what they actually pay and between the prices at which producers are willing to sell and the prices at which they actually sell. There are a wide range of methods for estimating social surplus, and unlike the measurement of economic impacts, there are no standardized methods that are consistently used.

Economic impacts, or changes in regional and national economies, are an important part of the story, but they are only a part. The focus on impacts misses the economic values, particularly of environmental resources, that are not routinely measured. The lack of standard methodology means that not all elements of social surplus can be measured, but there are some aspects of the environmental effects of OCS development that should be discussed in environmental impact assessments. Three areas are particularly important, and they are also areas where there is a substantial body of literature estimating the social surplus values.[8]

1. Recreational losses

Discussions of the environmental impacts of offshore oil operations include the possible consequences of oil spills. In a region such as the South Atlantic, where beaches and barrier islands dominate the coast from the mouth of the Chesapeake Bay through Florida, the impacts on tourism and recreation will be examined. As the data appendix below indicates, the ocean tourism and recreation sector is by far the largest sector in the ocean economy of each state.

Possible impacts on beach recreation from industrialization, routine contamination, and major oil spills are likely to be a major source of concern. Such impacts were a key feature of the Deepwater Horizon spill in 2010. But examining the impact of oil spills only on levels of employment and output in the tourism and recreation sector can be misleading. Large losses would be expected in such businesses as lodging and food service if an oil spill hit at peak season. But some of these losses would initially be offset by the large influx of workers in the "oil-spill disaster economy" who would work on shoreline cleanup and other recovery activities. In some circumstances (such as a spill in off-peak season), the amount of business in lodging and food service related to an oil-spill-recovery workforce could exceed the normal levels of activity for a short and intense period of time, leaving the false impression that oil spills were somehow "good" for the economy.[9]

This is why any analysis of economic losses from oil spills should focus not just on the businesses but also on those who do not go to the beach, some for several seasons, and lose the value they place on beach recreation. The same effect occurs with recreational marine fishing participants. To look only at impacts and ignore the lost benefits of recreation is to miss what may be the largest economic consequences of an oil spill.

The measurement of these losses is not simple. Aside from having to estimate the possible size and timing of oil spills, there is a wide range of estimates of the value of a beach visit. Moreover, estimating the total economic value at risk requires good estimates of the number of beach recreationists at different times of the year. Such estimated are often lacking, although National Parks, Seashores, and Wildlife Refuges often have some data.

But the lack of definitive data should not be a deterrent from a discussion of these losses in environmental reviews. Indeed, at this stage, it is very likely that more is known about the number of recreational fishing participants and beachgoers and their economic values than is currently known about the size and value of the oil and gas resources that might be present. The loss to visitors who no longer choose to travel to the coast must be taken into account, as fundamental changes to the nature of the beach will have long-term impacts on their choices.

2. Wetlands

The economic value of what has come to be called the "ecosystem services" of wetlands has been the subject of significant study. As with the social surplus values of recreation, there are no standard methodologies for measurement; indeed, there are a number of methods of valuing wetlands that go beyond those used for recreation, making for an even wider array of estimates.

Again, however, the economic values of coastal wetlands for essential services such as providing nursery habitat and flood protection can be estimated within bounds of reasonable certainty. The same topography of the South Atlantic that makes it so valuable a recreational resource also provides wetland functions that are vital to the region, and the economic value of wetlands should be acknowledged.

3. Working waterfront and land use impacts
As oil and gas activity develops over time, support facilities onshore in coastal communities will also expand. This may result in a shift in some communities to a greater emphasis on industrial activities in shoreline use, which can create competition with other traditional waterfront users. Competition for scarce working waterfront space and a shift in land use may confront communities with unacceptable changes in their economic character if there aren't careful plans for the needs of onshore oil and gas activities.

E. Climate Change

There is one other environmental issue whose economic dimensions require attention: the role of climate change in measuring the economic benefits of OCS exploration and development. When the OCS Lands Act (OCSLA) was enacted in 1954, and certainly when the OCSLA Amendments were enacted in 1978, in the midst of the 1970s' energy crisis, the underlying policy assumption was that increased oil and gas production in U.S. waters was unambiguously beneficial. Although many people mistakenly believed that OCS oil would lower prices (which were actually set in world markets), the concept of energy security was seen as an unalloyed good.

But our understanding of the role of fossil fuels in the economy has fundamentally changed in the 37 years since OCSLA was enacted. The greenhouse gas emissions from oil and gas operations now need to be factored into the environmental assessment, and the question of how quickly overall reductions in fossil fuel use will take place provide a completely different background to OCS leasing decisions.

In the 2012–2017 program, BOEM acknowledged that climate change would alter the operating conditions for OCS activities in the Gulf of Mexico, but the primary concern was how climate change would affect those activities, not how OCS development would affect climate change.

But the economic issues are fairly clear and deserve discussion in determining whether and how much OCS leasing and development should occur. The social costs of the additional fossil fuels to be developed and produced are large and growing. A recent paper by the International Monetary Fund quantified the total social costs of fossil fuels worldwide at $5.2 trillion per year (or about one-third of the entire U.S. GDP) (Coady et al. 2015). Another paper from the Cambridge Judge Business School in the U.K. found that the social costs of fossil fuels exceed the profits of almost all the fossil fuel-producing companies (Hope, Gilding, and Alvarez 2015). The implication of these studies is that the unrecovered social costs (in the absence of some form of pricing for carbon emissions) could exceed any economic benefits from the production of offshore oil and gas.

It is important to emphasize that this is only a possible conclusion; no analysis of the issue has been undertaken of the specific issues related to OCS development or the South Atlantic. But neither has any analysis been undertaken to support the opposite conclusion: that the benefits will exceed the social costs (leaving aside such uncertain questions as to whether and how an oil spill might affect the region). Such an assessment should now be part of considerations about whether and how much to permit OCS leasing and development, and it is time to recognize that different economic issues must be addressed than have been the case in the past.

Appendix

Ocean Economy Data for South Atlantic States – 2012

The data contained in the following tables describes the "ocean economy" of the South Atlantic states. The ocean economy is defined as 21 industries in six sectors that directly or indirectly use ocean resources or locations. The Office for Coastal Management of the National Oceanic and Atmospheric Administration compiled the data as part of its Economics: National Ocean Watch[10] based on a methodology developed by the National Ocean Economics Program, part of the Center for the Blue Economy.[11]

Employment figures are annual averages derived from the Bureau of Labor Statistics Quarterly Census of Employment and Wages, which is also the source for the number of establishments and annual total wages. GDP is the estimated contribution of the industry to the Gross Domestic Product-State, a measure of the total output of goods and services in the state. This is derived from data published by the Bureau of Economic Analysis.

In the tables, a "D" indicates that disclosure of the data is not permitted, to protect confidentiality. This most often occurs when there are three or fewer employment establishments in a particular industry or sector. Totals include disclosed data. Thus, the ocean economy total includes all employment, establishments, wages, and GDP, including all nondisclosed data.

Definitions of Sectors and Industries of the Ocean Economy

Construction—Marine
Marine-related construction

Living Resources—Marine
Fishing
Fish hatcheries and aquaculture
Seafood processing
Seafood markets

Minerals—Offshore
Limestone, sand & gravel
Oil and gas exploration
Oil and gas production

Ship & Boat Building
Boat building and repair
Ship building & repair

Tourism & Recreation—Coastal
Amusement and recreation services NEC*
Boat dealers
Eating & drinking places
Hotels & lodging places
Marinas
Recreational vehicle parks & campgrounds
Scenic water tours
Sporting goods retailers
Zoos & aquaria

Transportation—Marine
Deep-sea freight transportation
Marine passenger transportation
Marine transportation services
Search and navigation equipment
Warehousing

* Not elsewhere classified

Ocean Economy Totals for VA, NC, SC, and GA

Sector	Establishments	Employment Number of jobs	Wages $Millions	GDP $Millions
All ocean sectors	11,121	248,831	$7,515.65	$14,580.22
Construction*	322	3,371	$206.57	$382.21
Living resources	498	4,811	$140.31	$978.51
Minerals**	70	670	$69.41	$154.87
Ship & boat building	182	40,258	$2,585.04	$3,806.00
Tourism & recreation	9,275	171,159	$2,858.90	$6,050.10
Transportation	730	28,302	$1,645.11	$3,180.87

* Not disclosed in Georgia
** Not Disclosed in Georgia or North Carolina

State Data—Georgia

Sector	Industry	Establishments	Employment Number of jobs	Wages $Millions	GDP $Millions
All ocean sectors	All industries	1,114	23,970	$590.80	$1,247.58
Construction	All industries	D	D	D	D
Living resources	All	84	997	$31.29	$130.25
	Fish hatcheries & aquaculture	8	109	$3.01	$39.53
	Fishing	D	D	D	D
	Seafood markets	61	271	$6.70	$14.80
	Seafood processing	D	D	D	D
Minerals	All	D	D	D	D
	Limestone, sand & gravel	D	D	D	D
	Oil & gas exploration and production	D	D	D	D
Ship & boat building	All	18	885	$33.57	$69.73
	Boat building & repair	11	851	$32.33	$67.15
	Ship building & repair	7	33	$1.25	$2.59
Tourism & recreation	All	846	14,847	$246.37	$518.41
	Amusement and recreation services NEC	43	331	$5.79	$13.02
	Boat dealers	15	77	$2.58	$5.70
	Eating & drinking places	623	11,458	$172.37	$333.94
	Hotels & lodging places	135	2,789	$61.81	$157.14
	Marinas	16	119	$2.70	$6.12
	Recreational vehicle parks & campsites	D	D	D	D
	Scenic water tours	D	D	D	D
	Zoos & aquaria	D	D	D	D
Trans-portation	All	142	7,072	$272.97	$515.74
	Deep-sea freight transportation	24	320	$18.63	$54.86
	Marine passenger transportation	9	29	$1.67	$4.90
	Marine transportation services	43	4,365	$154.62	$280.16
	Search and navigation equipment	10	309	$27.35	$62.76
	Warehousing	56	2,047	$70.71	$113.06

County Data—Georgia

County	Sector	Establishments	Employment Number of jobs	Wages	GDP
Brantley	All ocean sectors	D	D	D	D
	Minerals	D	D	D	D
Bryan	All ocean sectors	69	918	$12,116,856	$24,649,165
	Construction	D	D	D	D
	Living resources	D	D	D	D
	Tourism & recreation	65	891	$10,836,476	$21,967,217
	Transportation	D	D	D	D
Camden	All ocean sectors	66	599	$8,313,620	$16,677,726
	Construction	D	D	D	D
	Living resources	D	D	D	D
	Minerals	D	D	D	D
	Ship & boat building	D	D	D	D
	Tourism & recreation	58	542	$6,616,731	$13,177,482
	Transportation	D	D	D	D
Charlton	All ocean sectors	D	D	D	D
Chatham	All ocean sectors	494	12,530	$313,100,715	$586,795,958
	Construction	10	87	$3,185,113	$7,056,848
	Living resources	16	74	$1,334,813	$2,950,787
	Minerals	D	D	D	D
	Ship & boat building	D	D	D	D
	Tourism & recreation	381	6,922	$114,105,302	$228,989,109
	Transportation	75	5,235	$183,694,472	$327,071,208
Glynn	All ocean sectors	304	5,882	$109,251,392	$242,980,734
	Construction	D	D	D	D
	Living resources	D	D	D	D
	Minerals	D	D	D	D
	Ship & boat building	D	D	D	D
	Tourism & recreation	287	5,882	$109,251,392	$242,980,734
	Transportation	D	D	D	D
Liberty	All ocean sectors	22	846	$24,906,314	$40,903,438
	Construction	D	D	D	D
	Living resources	3	8	$143,960	$318,243
	Tourism & recreation	14	200	$2,726,876	$5,348,163
	Transportation	D	D	D	D
McIntosh	All ocean sectors	46	235	$3,074,095	$6,505,609
	Living resources	D	D	D	D
	Minerals	D	D	D	D
	Ship & boat building	D	D	D	D
	Tourism & recreation	37	235	$3,074,095	$6,505,609
Wayne	All ocean sectors	D	D	D	D
	Construction	D	D	D	D
	Transportation	D	D	D	D

State Data—North Carolina

Sector	Industry	Establishments	Employment Number of jobs	Wages $Millions	GDP $Millions
All ocean sectors	All industries	2,896	41,592	$781.84	$1,800.36
Construction	All industries	103	539	$20.11	$42.34
Living resources	All	171	1,337	$28.36	$178.07
	Fish hatcheries & aquaculture	26	212	$5.22	$42.02
	Fishing	15	24	$0.68	$2.45
	Seafood markets	101	428	$8.47	$17.44
	Seafood processing	29	670	$13.99	$116.17
Minerals	All	20	90	$3.72	$14.23
	Limestone, sand & gravel	D	D	D	D
	Oil & gas exploration and production	D	D	D	D
Ship & boat building	All	70	1,506	$67.28	$193.98
	Boat building & repair	59	1,471	$65.60	$189.16
	Ship building & repair	11	35	$1.67	$4.82
Tourism & recreation	All	2,429	36,468	$545.57	$1,076.76
	Amusement and recreation services NEC	155	859	$13.72	$34.93
	Boat dealers	62	297	$8.74	$17.99
	Eating & drinking places	1,757	30,086	$422.64	$774.72
	Hotels & lodging places	285	4,254	$74.27	$188.35
	Marinas	60	350	$9.11	$18.53
	Recreational vehicle parks & campsites	27	231	$4.20	$10.64
	Scenic water tours	60	115	$2.60	$4.95
	Sporting goods retailers	11	66	$1.70	$6.03
	Zoos & aquaria	12	206	$8.60	$20.63
Trans-portation	All	103	1,653	$116.81	$294.98
	Deep-sea freight transportation	D	D	D	D
	Marine passenger transportation	D	D	D	D
	Marine transportation services	32	549	$19.01	$36.20
	Search and navigation equipment	15	199	$11.08	$21.21
	Warehousing	25	383	$13.98	$22.13

County Data—North Carolina

County	Sector	Establishments	Employment Number of jobs	Wages	GDP
Beaufort	All ocean sectors	115	1,349	$16,166,536	$39,826,826
	Construction	D	D	D	D
	Living resources	12	89	$1,475,222	$12,249,877
	Ship & boat building	D	D	D	D
	Tourism & recreation	87	1,260	$14,691,314	$27,576,949
Bertie	All ocean sectors	16	152	$1,808,012	$5,645,590
	Minerals	D	D	D	D
	Tourism & recreation	14	133	$1,433,911	$2,634,705
	Transportation	D	D	D	D
Brunswick	All ocean sectors	276	3,220	$56,161,348	$111,338,361
	Construction	7	49	$1,759,786	$3,705,046
	Living resources	11	85	$1,125,226	$4,796,610
	Minerals	D	D	D	D
	Tourism & recreation	247	2,754	$42,131,536	$82,251,343
	Transportation	7	52	$2,573,020	$4,899,951
Camden	All ocean sectors	D	D	D	D
	Construction	3	7	$140,865	$296,577
	Tourism & recreation	D	D	D	D
	Transportation	D	D	D	D
Carteret	All ocean sectors	348	3,862	$64,037,073	$133,682,264
	Construction	17	56	$1,991,919	$4,193,778
	Living resources	13	32	$851,721	$1,753,895
	Minerals	D	D	D	D
	Ship & boat building	17	184	$6,122,696	$17,653,602
	Tourism & recreation	287	3,579	$54,759,383	$109,488,060
	Transportation	12	11	$311,354	$592,929
Chowan	All ocean sectors	39	579	$12,244,094	$35,825,089
	Construction	D	D	D	D
	Living resources	D	D	D	D
	Ship & boat building	4	115	$4,588,433	$13,229,853
	Tourism & recreation	30	375	$4,628,970	$8,811,218
Craven	All ocean sectors	192	3,897	$75,606,348	$173,367,913
	Construction	4	20	$533,080	$1,122,344
	Living resources	D	D	D	D
	Minerals	D	D	D	D
	Ship & boat building	D	D	D	D
	Tourism & recreation	171	3,140	$41,770,388	$80,320,880
	Transportation	7	154	$6,544,701	$10,355,021
Currituck	All ocean sectors	88	567	$9,925,591	$19,300,161
	Construction	3	22	$721,734	$1,519,536
	Living resources	D	D	D	D
	Minerals	D	D	D	D
	Tourism & recreation	80	545	$9,203,857	$17,780,625
	Transportation	D	D	D	D
Dare	All ocean sectors	449	4,853	$101,040,790	$223,797,062
	Construction	8	37	$1,187,977	$2,501,162
	Living resources	17	64	$1,439,564	$3,185,981
	Ship & boat building	10	256	$9,435,046	$27,204,118
	Tourism & recreation	414	4,496	$88,978,203	$190,905,801

County Data—North Carolina (Continued)

	Sector	Establishments	Employment Number of jobs	Wages	GDP
Gates	All ocean sectors	D	D	D	D
	Minerals	D	D	D	D
	Transportation	D	D	D	D
Hertford	All ocean sectors	D	D	D	D
	Transportation	D	D	D	D
Hyde	All ocean sectors	35	196	$3,533,262	$6,515,414
	Construction	D	D	D	D
	Living resources	D	D	D	D
	Tourism & recreation	32	196	$3,533,262	$6,515,414
New Hanover	All ocean sectors	620	11,379	$182,391,159	$355,619,339
	Construction	17	150	$7,308,624	$15,387,545
	Living resources	4	18	$549,398	$1,131,340
	Minerals	3	25	$1,534,229	$2,591,610
	Ship & boat building	D	D	D	D
	Tourism & recreation	563	10,820	$159,727,446	$310,134,789
	Transportation	25	318	$10,576,950	$19,117,908
Onslow	All ocean sectors	324	5,771	$82,007,016	$154,626,082
	Construction	7	57	$2,004,075	$4,219,371
	Living resources	6	12	$160,936	$331,405
	Minerals	D	D	D	D
	Tourism & recreation	306	5,636	$77,512,208	$146,376,273
	Transportation	D	D	D	D
Pamlico	All ocean sectors	54	378	$5,999,788	$22,921,618
	Construction	3	23	$668,215	$1,406,857
	Living resources	8	101	$1,745,127	$14,491,101
	Minerals	D	D	D	D
	Ship & boat building	3	11	$285,444	$823,022
	Tourism & recreation	39	243	$3,301,002	$6,200,638
Pasquotank	All ocean sectors	90	1,430	$19,591,235	$ 63,028,028
	Construction	6	14	$358,963	$755,759
	Living resources	4	170	$4,168,332	$34,612,793
	Tourism & recreation	78	1,246	$15,063,940	$27,659,476
	Transportation	D	D	D	D
Pender	All ocean sectors	71	765	$10,654,790	$20,884,819
	Construction	4	16	$374,979	$789,479
	Living resources	D	D	D	D
	Minerals	D	D	D	D
	Ship & boat building	D	D	D	D
	Tourism & recreation	59	735	$9,758,079	$18,897,352
Perquimans	All ocean sectors	D	D	D	D
	Construction	D	D	D	D
	Tourism & recreation	D	D	D	D
Tyrrell	All ocean sectors	D	D	D	D
	Living resources	D	D	D	D
	Tourism & recreation	D	D	D	D
Washington	All ocean sectors	21	308	$3,295,803	$6,041,413
	Tourism & recreation	21	308	$3,295,803	$6,041,413

State Data—South Carolina

Sector	Industry	Establishments	Employment Number of jobs	Wages $Millions	GDP $Millions
All ocean sectors	All industries	3,063	68,053	$1,418.68	$3,193.61
Construction	All industries	53	377	$20.57	$44.06
Living resources	All	62	244	$4.37	$11.00
	Fish hatcheries & aquaculture	D	D	D	D
	Fishing	D	D	D	D
	Seafood markets	55	214	$3.63	$8.16
	Seafood processing	D	D	D	D
Minerals	All	19	94	$3.93	$11.16
	Limestone, sand & gravel	D	D	D	D
	Oil & gas exploration and production	D	D	D	D
Ship & boat building	All	33	2,183	$93.21	$199.67
	Boat building & repair	D	D	D	D
	Ship building & repair	D	D	D	D
Tourism & recreation	All	2,760	61,175	$1,146.68	$2,645.40
	Amusement and recreation services NEC	186	1,227	$24.30	$63.76
	Boat dealers	31	506	$14.54	$32.72
	Eating & drinking places	2,034	41,626	$689.94	$1,318.14
	Hotels & lodging places	D	D	D	D
	Marinas	45	361	$8.94	$19.09
	Recreational vehicle parks & campsites	D	D	D	D
	Scenic water tours	D	D	D	D
	Sporting goods retailers	D	D	D	D
	Zoos & aquaria	D	D	D	D
Trans-portation	All	136	3,979	$149.91	$282.33
	Deep-sea freight transportation	24	191	$11.87	$38.65
	Marine passenger transportation	D	D	D	D
	Marine transportation services	46	2,149	$78.22	$150.96
	Search and navigation equipment	D	D	D	D
	Warehousing	49	1,569	$54.95	$80.41

County Data—South Carolina

County	Sector	Establishments	Employment Number of jobs	Wages	GDP
Beaufort	All ocean sectors	520	10,027	$192,342,871	$439,200,670
	Construction	D	D	D	D
	Living resources	6	25	$445,409	$1,002,527
	Minerals	D	D	D	D
	Ship & boat building	D	D	D	D
	Tourism & recreation	497	10,002	$191,897,462	$438,198,142
	Transportation	D	D	D	D
Berkeley	All ocean sectors	25	889	$35,116,305	$63,574,962
	Construction	D	D	D	D
	Living resources	D	D	D	D
	Minerals	D	D	D	D
	Ship & boat building	D	D	D	D
	Transportation	16	598	$21,058,567	$30,815,900
Charleston	All ocean sectors	1,128	26,818	$618,304,011	$1,349,355,295
	Construction	22	252	$16,078,378	$34,432,252
	Living resources	15	65	$1,179,615	$2,655,079
	Minerals	6	23	$837,749	$1,453,794
	Ship & boat building	12	807	$43,508,679	$93,195,788
	Tourism & recreation	1,001	22,779	$447,787,217	$1,008,058,138
	Transportation	67	2,298	$75,873,990	$141,630,881
Colleton	All ocean sectors	12	152	$3,156,219	$9,386,763
	Construction	D	D	D	D
	Minerals	D	D	D	D
	Tourism & recreation	9	137	$2,246,176	$4,714,654
Dorchester	All ocean sectors	15	467	$17,623,868	$37,660,953
	Construction	D	D	D	D
	Living resources	D	D	D	D
	Minerals	D	D	D	D
	Ship & boat building	5	331	$13,056,592	$27,967,279
	Transportation	D	D	D	D
Georgetown	All ocean sectors	194	3,238	$55,946,003	$118,485,418
	Construction	D	D	D	D
	Living resources	6	39	$909,709	$2,047,575
	Minerals	D	D	D	D
	Ship & boat building	D	D	D	D
	Tourism & recreation	180	3,186	$54,522,206	$115,339,160
	Transportation	D	D	D	D
Horry	All ocean sectors	1,025	24,475	$443,681,030	$1,062,991,488
	Construction	8	16	$417,391	$893,853
	Living resources	7	28	$392,042	$882,409
	Minerals	D	D	D	D
	Ship & boat building	D	D	D	D
	Tourism & recreation	1,000	24,265	$439,154,775	$1,055,395,613
	Transportation	5	187	$4,775,513	$6,988,212
Jasper	All ocean sectors	56	648	$8,798,161	$18,621,382
	Construction	D	D	D	D
	Living resources	D	D	D	D
	Minerals	D	D	D	D
	Tourism & recreation	50	619	$7,817,385	$16,778,091

State Data—Virginia

Sector	Industry	Establishments	Employment Number of jobs	Wages $Millions	GDP $Millions
All ocean sectors	All industries	4,048	115,216	$4,724.34	$8,338.68
Construction	All industries	166	2,455	$165.89	$295.81
Living resources	All	181	2,233	$76.29	$659.18
	Fish hatcheries & aquaculture	25	328	$13.04	$84.92
	Fishing	42	111	$3.72	$12.83
	Seafood markets	77	353	$7.42	$15.66
	Seafood processing	37	1,439	$52.11	$545.77
Minerals	All	51	576	$65.48	$143.71
	Limestone, sand & gravel	17	125	$5.15	$34.99
	Oil & gas exploration and production	34	450	$60.33	$108.72
Ship & boat building	All	61	35,684	$2,390.98	$3,342.62
	Boat building & repair	11	75	$2.78	$3.89
	Ship building & repair	50	35,608	$2,388.20	$3,338.73
Tourism & recreation	All	3,240	58,669	$920.28	$1,809.54
	Amusement and recreation services NEC	150	3,175	$52.95	$82.98
	Boat dealers	47	373	$11.55	$24.38
	Eating & drinking places	2,557	44,820	$640.50	$1,186.94
	Hotels & lodging places	359	9,110	$180.98	$451.68
	Marinas	67	512	$12.74	$19.61
	Recreational vehicle parks & campsites	30	312	$6.59	$16.45
	Scenic water tours	18	155	$3.76	$6.52
	Sporting goods retailers	D	D	D	D
	Zoos & aquaria	D	D	D	D
Trans-portation	All	349	15,598	$1,105.42	$2,087.81
	Deep-sea freight transportation	23	1,524	$220.63	$641.06
	Marine passenger transportation	D	D	D	D
	Marine transportation services	D	D	D	D
	Search and navigation equipment	46	2,739	$328.53	$548.96
	Warehousing	200	7,570	$314.63	$478.74

County Data—Virginia

County	Sector	Establishments	Employment Number of jobs	Wages	GDP
Accomack	All ocean sectors	138	1,180	$16,835,744	$34,883,199
	Construction	D	D	D	D
	Living resources	D	D	D	D
	Tourism & recreation	123	1,180	$16,835,744	$34,883,199
	Transportation	D	D	D	D
City of Alexandria	All ocean sectors	9	68	$4,068,908	$7,152,216
	Construction	D	D	D	D
	Living resources	D	D	D	D
	Minerals	D	D	D	D
	Transportation	D	D	D	D
Arlington	All ocean sectors	16	136	$18,987,007	$32,516,090
	Construction	3	19	$1,696,997	$3,026,044
	Living resources	D	D	D	D
	Minerals	D	D	D	D
	Ship & boat building	D	D	D	D
	Transportation	D	D	D	D
Caroline	All ocean sectors	D	D	D	D
	Construction	D	D	D	D
	Minerals	D	D	D	D
	Transportation	3	141	$6,017,938	$9,156,684
Charles City	All ocean sectors	D	D	D	D
	Construction	D	D	D	D
	Minerals	3	16	$842,581	$5,722,642
City of Chesapeake	All ocean sectors	71	2,606	$185,324,363	$298,448,074
	Construction	15	462	$40,912,241	$72,953,725
	Living resources	D	D	D	D
	Minerals	D	D	D	D
	Ship & boat building	D	D	D	D
	Transportation	37	1,216	$84,990,605	$135,877,057
Chesterfield	All ocean sectors	25	786	$29,534,573	$47,313,367
	Construction	4	80	$3,139,728	$5,598,688
	Living resources	D	D	D	D
	Minerals	D	D	D	D
	Transportation	15	623	$23,169,103	$35,253,295
Essex	All ocean sectors	D	D	D	D
	Construction	D	D	D	D
	Tourism & recreation	D	D	D	D
Fairfax	All ocean sectors	76	3,409	$381,481,353	$648,988,122
	Construction	27	790	$59,138,006	$105,453,471
	Living resources	D	D	D	D
	Minerals	D	D	D	D
	Ship & boat building	D	D	D	D
	Transportation	33	270	$13,942,090	$21,213,796

County Data—Virginia (Continued)

County	Sector	Establishments	Employment Number of jobs	Wages	GDP
Gloucester	All ocean sectors	96	1,085	$16,997,596	$31,540,340
	Construction	4	61	$2,733,197	$4,873,771
	Living resources	D	D	D	D
	Minerals	D	D	D	D
	Ship & boat building	D	D	D	D
	Tourism & recreation	80	1,024	$14,264,399	$26,666,569
	Transportation	D	D	D	D
City of Hampton	All ocean sectors	285	5,379	$76,017,086	$148,225,780
	Construction	D	D	D	D
	Living resources	D	D	D	D
	Ship & boat building	D	D	D	D
	Tourism & recreation	265	5,379	$76,017,086	$148,225,780
	Transportation	D	D	D	D
Hanover	All ocean sectors	9	122	$5,110,555	$8,475,596
	Living resources	D	D	D	D
	Minerals	D	D	D	D
	Transportation	7	117	$4,951,087	$7,533,400
Henrico	All ocean sectors	38	527	$28,829,884	$58,672,066
	Construction	D	D	D	D
	Living resources	D	D	D	D
	Minerals	D	D	D	D
	Ship & boat building	D	D	D	D
	Transportation	25	261	$9,789,759	$14,895,754
City of Hopewell	All ocean sectors	D	D	D	D
	Construction	D	D	D	D
Isle of Wight	All ocean sectors	43	652	$11,255,933	$23,170,043
	Construction	3	10	$417,756	$744,932
	Living resources	D	D	D	D
	Minerals	D	D	D	D
	Tourism & recreation	36	563	$7,782,029	$16,058,854
	Transportation	D	D	D	D
James City	All ocean sectors	135	3,453	$79,985,957	$147,548,288
	Construction	D	D	D	D
	Living resources	D	D	D	D
	Minerals	D	D	D	D
	Tourism & recreation	124	2,890	$57,165,573	$112,499,026
	Transportation	D	D	D	D
King and Queen	All ocean sectors	D	D	D	D
	Living resources	D	D	D	D
	Minerals	D	D	D	D
	Ship & boat building	D	D	D	D
King George	All ocean sectors	41	33	$518,322	$1,293,610
	Minerals	D	D	D	D
	Tourism & recreation	39	33	$518,322	$1,293,610
King William	All ocean sectors	D	D	D	D
	Construction	D	D	D	D
	Living resources	D	D	D	D
	Minerals	D	D	D	D

County Data—Virginia (Continued)

County	Sector	Establishments	Employment Number of jobs	Wages	GDP
Lancaster	All ocean sectors	52	1,224	$4,129,301	$8,939,561
	Construction	3	9	$194,512	$346,849
	Living resources	8	18	$874,972	$3,016,508
	Ship & boat building	D	D	D	D
	Tourism & recreation	37	197	$3,059,817	$5,576,204
	Transportation	D	D	D	D
Mathews	All ocean sectors	28	21	$456,126	$813,353
	Construction	4	21	$456,126	$813,353
	Living resources	D	D	D	D
	Tourism & recreation	D	D	D	D
	Transportation	D	D	D	D
Middlesex	All ocean sectors	55	258	$4,443,904	$7,625,158
	Construction	D	D	D	D
	Living resources	D	D	D	D
	Ship & boat building	D	D	D	D
	Tourism & recreation	47	258	$4,443,904	$7,625,158
New Kent	All ocean sectors	D	D	D	D
	Construction	D	D	D	D
City of Newport News	All ocean sectors	395	7,920	$160,776,420	$279,435,164
	Construction	D	D	D	D
	Living resources	8	13	$320,310	$1,104,284
	Ship & boat building	4	392	$34,190,121	$47,798,273
	Tourism & recreation	366	6,503	$94,325,356	$181,932,858
	Transportation	14	1,012	$31,940,633	$48,599,748
City of Norfolk	All ocean sectors	575	16,169	$722,778,499	$1,461,825,799
	Construction	6	141	$9,694,215	$17,286,491
	Living resources	7	25	$631,960	$1,334,132
	Ship & boat building	11	3,694	$240,858,743	$336,723,934
	Tourism & recreation	500	8,893	$140,564,157	$276,948,288
	Transportation	45	863	$43,713,235	$73,861,342
Northampton	All ocean sectors	63	348	$3,851,721	$7,693,031
	Construction	D	D	D	D
	Living resources	D	D	D	D
	Tourism & recreation	42	348	$3,851,721	$7,693,031
	Transportation	D	D	D	D
Northumber-land	All ocean sectors	58	489	$17,535,324	$164,761,024
	Construction	D	D	D	D
	Living resources	17	339	$15,908,325	$161,745,977
	Minerals	D	D	D	D
	Ship & boat building	D	D	D	D
	Tourism & recreation	29	150	$1,626,999	$3,015,047
	Transportation	D	D	D	D
City of Poquoson	All ocean sectors	25	207	$2,276,708	$4,219,045
	Construction	D	D	D	D
	Living resources	D	D	D	D
	Tourism & recreation	20	207	$2,276,708	$4,219,045
	Transportation	D	D	D	D

County Data—Virginia (Continued)

County	Sector	Establishments	Employment Number of jobs	Wages	GDP
City of Portsmouth	All ocean sectors	199	13,580	$789,909,971	$1,152,427,170
	Construction	7	198	$11,017,595	$19,646,311
	Living resources	D	D	D	D
	Ship & boat building	7	9,755	$676,201,873	$945,339,795
	Tourism & recreation	155	2,585	$35,795,739	$66,270,001
	Transportation	22	42	$3,040,039	$6,894,397
Prince George	All ocean sectors	D	D	D	D
	Transportation	7	1,351	$51,100,258	$77,752,362
Prince William	All ocean sectors	14	174	$10,043,763	$17,917,489
	Construction	D	D	D	D
	Living resources	D	D	D	D
	Minerals	D	D	D	D
	Transportation	D	D	D	D
City of Richmond	All ocean sectors	14	117	$1,390,158	$2,576,149
Richmond	All ocean sectors	41	435	$20,693,606	$33,303,701
	Construction	D	D	D	D
	Living resources	D	D	D	D
	Minerals	D	D	D	D
	Tourism & recreation	14	117	$1,390,158	$2,576,149
	Transportation	21	191	$8,847,197	$13,461,585
Spotsylvania	All ocean sectors	11	466	$22,085,696	$35,677,667
	Construction	D	D	D	D
	Living resources	D	D	D	D
	Minerals	D	D	D	D
	Transportation	7	465	$21,679,753	$32,987,152
Stafford	All ocean sectors	7	38	$1,429,996	$2,367,412
	Construction	D	D	D	D
	Living resources	D	D	D	D
	Transportation	3	22	$704,879	$1,072,519
City of Suffolk	All ocean sectors	161	3,694	$69,727,645	$154,060,107
	Construction	D	D	D	D
	Living resources	D	D	D	D
	Minerals	D	D	D	D
	Ship & boat building	D	D	D	D
	Tourism & recreation	130	2,546	$33,948,695	$64,500,429
	Transportation	14	943	$27,960,858	$42,544,262
Surry	All ocean sectors	D	D	D	D
	Tourism & recreation	D	D	D	D
	Transportation	D	D	D	D
City of Virginia Beach	All ocean sectors	1,105	20,924	$356,618,038	$706,149,028
	Construction	10	67	$3,272,186	$5,834,883
	Living resources	12	79	$1,379,147	$2,911,520
	Minerals	D	D	D	D
	Ship & boat building	D	D	D	D
	Tourism & recreation	1,050	20,395	$333,979,007	$666,550,144
	Transportation	21	130	$6,300,966	$10,424,724

County Data—Virginia (Continued)

County	Sector	Establishments	Employment Number of jobs	Wages	GDP
Westmoreland	All ocean sectors	46	443	$9,541,603	$61,292,028
	Construction	D	D	D	D
	Living resources	6	182	$5,072,565	$53,126,092
	Tourism & recreation	38	261	$4,469,038	$8,165,937
	Transportation	D	D	D	D
Williamsburg	All ocean sectors	D	D	D	D
	Construction	D	D	D	D
	Living resources	D	D	D	D
York	All ocean sectors	168	2,408	$36,926,739	$67,934,595
	Construction	D	D	D	D
	Living resources	D	D	D	D
	Tourism & recreation	158	2,408	$36,926,739	$67,934,595
	Transportation	D	D	D	D

Percent of Total Employment in Ocean Economy by County: 2012

State	City/County	Annual Average Employment Number of jobs	Employment Number of jobs	Ocean Economy Percentage
Georgia	Brantley	1,988	D	D
	Bryan	6,178	918	14.9%
	Camden	14,331	599	4.2%
	Charlton	2,133	D	D
	Chatham	132,921	12,530	9.4%
	Glynn	35,194	5,882	16.7%
	Liberty	18,185	846	4.7%
	McIntosh	1,775	235	13.2%
	Wayne	8,180	D	D
North Carolina	Beaufort	16,040	1,349	8.4%
	Bertie	6,185	152	2.5%
	Brunswick	28,027	3,220	11.5%
	Camden	1,934	D	D
	Carteret	22,058	3,862	17.5%
	Chowan	4,652	579	12.4%
	Craven	38,004	3,897	10.3%
	Currituck	5,367	567	10.6%
	Dare	18,712	4,853	25.9%
	Gates	1,450	D	D
	Hertford	8,903	D	D
	Hyde	2,094	196	9.4%
	New Hanover	96,738	11,379	11.8%
	Onslow	47,113	5,771	12.2%
	Pamlico	3,175	378	11.9%
	Pasquotank	15,657	1,430	9.1%
	Pender	9,548	765	8.0%
	Perquimans	1,782	D	D
	Tyrrell	1,226	D	D
	Washington	3,146	308	9.8%
South Carolina	Beaufort	57,581	10,027	17.4%
	Berkeley	38,052	889	2.3%
	Charleston	217,132	26,818	12.4%
	Colleton	9,903	152	1.5%
	Dorchester	29,262	467	1.6%
	Georgetown	21,595	3,238	15.0%
	Horry	109,572	24,475	22.3%
	Jasper	6,969	648	9.3%
Virginia	Accomack	12,654	1,180	9.3%
	City of Alexandria	95,584	68	0.1%
	Arlington	165,776	136	0.1%
	Caroline	5,337	D	D
	Charles City	1,506	D	D
	City of Chesapeake	95,303	2,606	2.7%
	Chesterfield	117,645	786	0.7%

Percent of Total Employment in Ocean Economy by County: 2012 (Continued)

State	City/County	Annual Average Employment Number of jobs	Employment Number of jobs	Ocean Economy Percentage
Virginia	Essex	4,060	D	D
	Fairfax	590,490	3,409	0.6%
	Gloucester	9,478	1,085	11.4%
	City of Hampton	54,960	5,379	9.8%
	Hanover	45,506	122	0.3%
	Henrico	178,088	D	D
	City of Hopewell	7,865	D	D
	Isle of Wight	10,060	652	6.5%
	James City	26,991	3,453	12.8%
	King and Queen	928	D	D
	King George	10,094	33	0.3%
	King William	3,377	D	D
	Lancaster	4,631	224	4.8%
	Mathews	1,468	21	1.4%
	Middlesex	3,210	258	8.0%
	New Kent	3,795	D	D
	City of Newport News	96,261	7,920	8.2%
	City of Norfolk	137,771	16,169	11.7%
	Northampton	5,002	348	7.0%
	Northumberland	2,516	489	19.4%
	City of Poquoson	1,729	207	12.0%
	City of Portsmouth	43,920	13,580	30.9%
	Prince George	14,022	D	D
	Prince William	112,954	174	0.2%
	City of Richmond	148,410	435	0.3%
	Richmond	2,617	117	4.5%
	Spotsylvania	31,017	466	1.5%
	Stafford	38,080	38	0.1%
	City of Suffolk	26,673	3,694	13.8%
	Surry	2,233	D	D
	City of Virginia Beach	164,585	20,924	12.7%
	Westmoreland	3,415	443	13.0%
	City of Williamsburg	13,709	D	D
	York	20,804	2,408	11.6%

Fisheries Harvesting Employment

The employment data in the living resources sector generally excludes jobs in the fisheries harvesting sector because of the provisions of federal law. The majority of employment in fisheries harvesting is "self-employment," and this is estimated using a data series from the Census Bureau that measures "nonemployer" employment. The estimated self-employment in the living resources sector in the four states is as follows:

Georgia	287
North Carolina	2,034
South Carolina	582
Virginia	1,557
Total	4,460

References

Coady, David, Ian Parry, Louis Sears, and Baoping Shang. 2015. "How Large Are Global Energy Subsidies ?" Working paper 15/105, International Monetary Fund, Washington, DC.

Hope, Chris, Paul Gilding, and Jimena Alvarez. 2015. "Quantifying the Implicit Climate Subsidy Received by Leading Fossil Fuel Companies." Working paper 02/2015, Cambridge Judge Business School, Cambridge, UK.

Endnotes

[1] Lease Sale 260 would combine a portion of the DOI Mid-Atlantic Planning Area with the South Atlantic Planning Area. This report refers to this area as the "South Atlantic region."

[2] All data concerning the ocean economy of the region is taken from the data series published by the National Ocean Economics Program of the Center for the Blue Economy. This data is produced in cooperation with the National Oceanic and Atmospheric Administration Office for Coastal Management. See www.oceaneconomics.org.

[3] http://ocsgovernors.org/wp/wp-content/uploads/2015/04/FINAL-OCSGC-Letter-on-DPP-2017-2022-03-30-15.pdf

[4] http://www.boem.gov/Revenue-Sharing/

[5] http://www.ogj.com/articles/2013/07/administration-opposes-bill-to-share-ocs-revenue-with-coastal-states.html

[6] Statutory authorization for the Land and Water Conservation Fund expired at the end of fiscal year 2015 and Congress has not acted to reauthorize the program.

[7] www.remi.com

[8] The National Ocean Economics Program at the Center for the Blue Economy maintains a bibliographic database of such "nonmarket" valuation studies. See www.oceaneconomics.org.

[9] http://www.salon.com/2014/05/02/oil_company_oil_spills_can_be_good_for_the_economy/

[10] http://coast.noaa.gov/dataregistry/search/collection/info/enow

[11] www.oceaneconomics.org

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