



NOAA Technical Memorandum NMFS-SEFSC-669  
doi:10.7289/V5J10135

A REVIEW OF PRINCIPAL COASTAL ECONOMIC SECTORS WITHIN THE SOUTHEAST  
UNITED STATES AND U.S. CARIBBEAN

By

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December 2014

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This report should be cited as follows:

Fleming, C. S., F, Tonioli, and J. J. Agar. 2014. A review of principal coastal economic sectors within the southeast United States and U.S. Caribbean. NOAA Technical Memorandum NMFS-SEFSC-669. 44 p. doi:10.7289/V5J10135

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# **A review of principal coastal economic sectors within the southeast United States**

## **Abstract**

This report provides an overview of the key coastal economic sectors found within the southeast United States, including the Gulf of Mexico, southeast U.S. Atlantic coast and U.S. Caribbean. These regions share key coastal economic areas of interest, including oil and gas production, maritime transportation, tourism, and fisheries and aquaculture. The study found that the southeast region holds over 30% of the nation's population and employment opportunities, as well as generating roughly 30% of the nation's GDP and personal income. Oil production is the most valuable natural resource-based activity in the southeast generating \$9.1 billion. Waterborne commerce and tourism are other major economic sectors. In 2012, over 52.2% of the nation's trade tonnage passed through southeast ports, and these ports were responsible for shipping over \$3.8 trillion in exports and imports. Tourism generated \$206.7 billion in tourism and travel related expenditures (23.3% of the nation's total), \$31.5 billion in taxes and supported 3 million jobs. Fisheries and aquaculture were found to play a significant role in providing food, income, employment and recreational opportunities. Local commercial fleets produced 18.4% of the nation's landings and dockside revenues. Additionally, the southeast region was responsible for 45% of the nation's aquaculture production sales and held 52% of the nation's aquaculture farms. The report concludes by highlighting the importance and heterogeneity of these sectors within the southeast region and the importance of considering tradeoffs when developing ecosystem based management plans.

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## 1. Introduction

The oceans and coastlines of the United States provide many benefits to the communities bordering those waters and to the U.S. economy at large. The socio-economic significance of coastal activities in the U.S. Gulf of Mexico (GOM), southeast U.S. Atlantic coast (SA) and U.S. Caribbean (USC) are of particular interest to the National Marine Fisheries Service’s (NMFS) Southeast Fisheries Science Center (SEFSC) of the National Oceanic and Atmospheric Administration (NOAA). The SEFSC is responsible for supporting “science-based management in all jurisdictions...to achieve healthy marine ecosystems with sustainable and productive populations that provide long-term economic and social benefits involving fishing, recreation, tourism and other activities” (NOAA, 2013a) for its three management regions shown in Figure 1.



Figure 1. Management regions supported by SEFSC.

Moreover, the SEFSC Science Plan emphasizes the need to conduct research to “monitor and assess fisheries and marine ecosystems...[to] understand and forecast the effects of natural and anthropogenic processes and threats...on living marine resources and habitats...[and to] describe and assess the role of habitat in supporting healthy marine ecosystems and populations of exploited and protected species” (NOAA, 2013a).

The objective of this study is to provide an overview of the economic importance of key sectors that draw from marine and coastal resources within the southeast region. This review describes trends

and the economic importance of four key sectors: energy, marine transportation, tourism and fisheries. The intent of this rapid assessment is to aid in the implementation of the SEFSC Science Plan by providing an understanding of the magnitude of these sectors and providing context when considering socio-economic tradeoffs of regulatory actions. We also offer demographic information to contextualize the review. For the intent of this report, the GOM includes the states of Alabama, Mississippi, Louisiana, Texas and western Florida. The SA encompasses the states of Georgia, North Carolina, South Carolina and eastern Florida. The USC includes the Commonwealth of Puerto Rico and the territory of the U.S. Virgin Islands, which contains the islands of St. Thomas, St. John and St. Croix. The data compiled and synthesized were derived from a variety of secondary sources, including government databases and reports, academic studies, personal communications, and grey literature from industry, environmental and non-governmental organizations. All values discussed are nominal.

This study is structured as follows. Section 2 briefly describes the three large marine ecosystems (LME) of the southeast region. Section 3 provides an overview of southeast demographics, including population, employment, gross domestic product and personal income discussions. This section also describes the energy sector (including hydrocarbons production and reserves, electricity generation and deep sea minerals), maritime transportation sector (including transport tonnage, revenue, port calls, container traffic, port specialties and number of passengers), tourism sector (including expenditures, employment, payroll, and visitors), and commercial and recreational fisheries and aquaculture sector (including participation and production). The study concludes by highlighting the significance and heterogeneity of these sectors and the importance of considering socio-economic tradeoffs when developing ecosystem based management plans.

## **2. Background**

The southeast region is composed of three LMEs, but U.S. jurisdiction occurs only within the nation's Exclusive Economic Zone (EEZ) and these ecosystems support various economic activities including oil and gas production, maritime transportation, tourism and fisheries.<sup>1</sup> The GOM LME is bordered by the U.S., Mexico and Cuba, and covers more than 1.5 million square kilometers (The PEW Charitable Trusts, 2014a). The GOM LME accounts for 0.6% of the world's coral reefs and less than 0.1% of the world's sea mounts (The PEW Charitable Trusts, 2014b). Although this body of water represents the entire GOM ecosystem, U.S. jurisdiction narrows the water body to the GOM EEZ, which

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<sup>1</sup> LMEs are defined as regions of ocean space that encompass coastal habitats, including river basins and estuaries, and extend seaward to the boundaries of continental shelves and coastal current systems (FAO, 2014). The U.S. EEZ defines the up to 200 nautical mile seaward extension of U.S. jurisdiction (UNCLOS, 1982).

covers an area of over 700,000 square kilometers. The GOM EEZ has 0.2 percent of the world's coral reefs (The PEW Charitable Trusts, 2014a).

The SA region discussed in this paper overlaps closely with the Southeast U.S. Continental Shelf LME, which extends from mid North Carolina through the tip of Florida, excluding the Florida Keys, and is an area of more than 300,000 square kilometers. The Southeast U.S. Continental Shelf LME holds 0.2% of the world's coral reefs, comparable to the GOM EEZ, and less than 0.1% of the world's sea mounts (The PEW Charitable Trusts, 2014b). These LME figures are altered slightly when considering U.S. jurisdiction within the area, since the West Central Atlantic East Coast U.S. EEZ includes the entire North Carolina coast, and extends through the Florida Keys. The West Central Atlantic East Coast EEZ is larger than the Southeast U.S. Continental Shelf LME, covering an area of less than 430,000 square kilometers. This EEZ holds 0.4% of the world's coral reefs, more than the LME, and still holds less than 0.1% of the world's sea mounts (The PEW Charitable Trusts, 2014a).

The Caribbean Sea LME is much larger than our study area, and borders the southwestern tip of Mexico, Central America and south through Venezuela. Westward, it includes Turks and Caicos, Puerto Rico, the U.S. Virgin Islands (USVI) and the Lesser Antilles. The area equals more than 3.3 million square kilometers, which is larger than both the GOM and U.S. Southeast LMEs. The area holds 9.5% of the world's coral reefs and 2.0% of the world's sea mounts (The PEW Charitable Trusts, 2014b). To focus on U.S. jurisdiction within the Caribbean Sea, the EEZs of Puerto Rico and the USVI can be combined to reveal an area of more than 211,000 square kilometers, still smaller than the other regions. These two EEZs account for 0.3% of the world's coral reefs and 0.1% of the world's sea mounts (The PEW Charitable Trusts, 2014a).

There are many vital coastal ecosystems found across the globe, and the southeast holds a large or complete share of these ecosystems found within the U.S. The only extensive shallow water coral reefs of the U.S. are found adjacent to Florida, within the Flower Garden Banks in the GOM off the coast of Texas, among the main Hawaiian Islands and the Northwestern Hawaiian Islands, and around many of the U.S.'s territories including Puerto Rico, USVI, American Samoa, Guam, Federated States of Micronesia, among others (CoRIS, 2012). Mangrove swamps are found from the southeastern tip of Florida along the GOM coast to Texas, with Florida's southwestern coast supporting one of the largest mangrove swamps in the world (EPA, 2012). Mangroves are also found in U.S. territories, including Puerto Rico and the USVI (NCCOS, 2011). Similar to coral reefs and mangrove swamps, the southeast is the only portion of the continental U.S. that is home to sea turtle nesting sites, ranging from North Carolina to Texas. Sea turtle nesting sites are also found in Puerto Rico and the USVI (Sea Turtle Conservancy, 2014). In addition to coral reefs, mangroves, and turtle nesting areas, estuaries are also

coastal ecosystems of importance. The U.S. National Estuary Program (NEP) exists to protect and restore estuaries of national significance. Currently 10 of the 28 NEP study areas are within the U.S. southeast (EPA, 2014). These southeastern coastal ecosystems are of pronounced significance to the greater coastal ecosystem and the organisms that live near and within coastal waters.

### **3. Demographics and Key Economic Sectors**

#### **A. Demographics**

U.S. coastal populations have grown dramatically in recent decades. Along the Atlantic, Pacific and Gulf coasts, population increased from 47 million people in 1960 to approximately 80 million in 2008 (FEMA, 2011). While coastal growth rates are not necessarily higher than inland ones, the limited space of the coastal region has resulted in greater population densities. Coastal population densities will likely continue to increase because of the projected sustained economic and population growth along southeast seaboard (FEMA, 2011). In 2012, coastal states contributed to 81% of U.S. employment and 84% of U.S. gross domestic product (Kildow et al, 2014).<sup>2</sup>

##### **i. Population and employment**

A substantial portion of the nation's population and employment come from the southeastern U.S. The 2010 Census reported that the southeast region was home to about one fourth of the 312.6 million people who live in the US, including Puerto Rico and the USVI (Table 1). Regionally, the five GOM states accounted for 17.9% of the U.S. population.<sup>3</sup> In comparison, the U.S. population share of the four SA states and the two USC territories were 13.7% and 1.2%, respectively (Table 1). Drawing on NOAA's coastal county designations, Table 1 shows that the GOM coastal region was home to 20.7 million residents (36.8% of its population) followed by the SA and USC coastal regions which housed 15.9 (37.5%) and 2.4 (63.2%) million residents, respectively.<sup>4</sup>

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<sup>2</sup> These figures refer to all employment and GDP within coastal states and are not necessarily directly associated with coastal resources.

<sup>3</sup> Due to Florida's two coasts contributing to both the GOM and SA regions, Florida data in this study is often totaled for both regions. This doubles the state's actual contribution and results in higher figures for each region. This is true for most of the analyses with the exception of data that was collected by coast. These exceptions include coastal population, personal income, commercial landings, recreational landings, spending from coastal tourism and tourism related coastal employment.

<sup>4</sup> NOAA defines coastal counties as counties that meet one of two criteria. The first stipulates that at least 15% of a county's total land area exist within the U.S.'s watershed, and the second requirement specifies that a portion of a county must account for at least fifteen 15% of a coastal cataloging unit, or a drainage basin that falls within

Table 2 shows that total non-farm employment in the southeast region stood at 41.4 million in 2012. The trade, transportation and utilities sector was the largest employer in the GOM (20%) and SA (20%) regions, and was the second largest employer in the USC (19%). In contrast, government was the major employer in the USC (28%) and second largest employer in the GOM (17%) and SA (16%) regions.

Table 1. Population size by state and coastal region (2010).

Total and Coastal Populations (2010)					
Region	State/Territory	Total Population	Share of U.S. Population (%)	Coastal Population	Share of coastal population (%)
GOM	Alabama	4,779,736	1.5	764,643	16.0
	Florida	18,801,310 <sup>(1)</sup>	6.0 <sup>(1)</sup>	7,434,861	39.5
	Louisiana	4,533,372	1.5	3,548,090	78.3
	Mississippi	2,967,297	0.9	628,502	21.2
	Texas	25,145,561	8.0	8,287,623	33.0
	Subtotal	56,227,276	17.9	20,663,719	36.8
SA	Florida	18,801,310 <sup>(1)</sup>	6.0 <sup>(1)</sup>	10,863,942	57.8
	Georgia	9,687,653	3.1	945,436	9.8
	North Carolina	9,535,483	3.1	2,232,810	23.4
	South Carolina	4,625,364	1.5	1,932,246	41.8
	Subtotal	42,649,810	13.7	15,974,434	37.5
USC	Puerto Rico	3,725,789	1.2	2,317,189	60.47
	USVI	106,405	>0.1	106,405	100.00
	Subtotal	3,832,194	1.2	2,423,594	63.2
U.S.		312,579,910	-	-	-
(1) Florida's total population and share of U.S. population is reported twice in the GOM and SA regions because they could not be disaggregated by water body.					

Sources: BEA, 2013a; USC, 2011; USCB, 2011; USCB, 2014

GOM states employed 23.2 million non-farm employees, more than the SA and the USC regions combined. Texas held the highest number of employees (10.0 million) while Mississippi had the least (1.1 million). Florida, Louisiana and Texas had their highest number of employees in trade,

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estuarine drainage areas or coastal drainage areas (USCB, 2003). This definition of coastal counties was used for population demographics analysis for the GOM and SA. Puerto Rico's landward coastal zone generally extends one thousand meters inland, although this boundary reaches further inland in certain areas to protect important coastal resources (Coastal Management, 2012). By overlaying a map of Puerto Rico's inland coastal zone with a map of Puerto Rico's municipalities, any shaded municipality was considered a coastal municipality. The USVI's coastal zone includes the entire territory (Coastal Management, 2012).

transportation and utilities, and Alabama and Mississippi had their highest employment levels from the government sector.

SA states had the second highest non-farm employment numbers of the three regions, totaling 17.2 million. Although Florida contributed largely to this sum at 7.4 million, somewhere between 30 and 50% of it (considered due to differences in population between both coasts) most likely can be attributed to the western coast.<sup>5</sup> Due to this, North Carolina and Georgia also had comparable employment numbers at 4.0 million each. Florida aside, Georgia and the Carolinas had their highest employment in trade, transportation and utilities. The USC had the lowest non-farm employment at 1.0 million with the majority of this total contributed by the Commonwealth of Puerto Rico. Government was the largest employer in both Puerto Rico and the USVI.

Table 2. Non-farm employment and payroll by industry and region (2012).

2012 Employment by Industry (thousands)							
Region	Area	Total Employed	Mining and Logging	Construction	Manufacturing	Trade, Transportation and Utilities	Information
GOM	Alabama	1,882.6	12.6	79.1	243.0	365.3	22.5
	Florida	7,400.1 <sup>(1)</sup>	5.6 <sup>(1)</sup>	341.5 <sup>(1)</sup>	316.8 <sup>(1)</sup>	1,537.1 <sup>(1)</sup>	133.4 <sup>(1)</sup>
	Louisiana	1,925.6	54.6	126.5	142.1	378.1	24.9
	Mississippi	1,103.4	9.2	48.3	137.0	215.9	12.5
	Texas	10,879.8	270.3	585.2	863.1	2,174.2	197.0
	Subtotal	23,191.5	352.3	1,180.6	1,702.0	4,670.6	390.3
SA	Florida	7,400.1 <sup>(1)</sup>	5.6 <sup>(1)</sup>	341.5 <sup>(1)</sup>	316.8 <sup>(1)</sup>	1,537.1 <sup>(1)</sup>	133.4 <sup>(1)</sup>
	Georgia	3,952.8	8.6	141.0	354.6	833.2	100.5
	North Carolina	3,988.1	5.5	171.9	439.8	744.2	69.3
	South Carolina	1,858.2	3.9	77.8	219.8	354.3	25.7
	Subtotal	17,199.2	23.6	732.2	1,331.0	3,468.8	328.9
USC	Puerto Rico	935.2	– <sup>(2)</sup>	35.7 <sup>(2)</sup>	81.5	174.3	19.0
	USVI	40.2	– <sup>(2)</sup>	1.8 <sup>(2)</sup>	1.3	8.3	0.8
	Subtotal	975.4	– <sup>(2)</sup>	37.5 <sup>(2)</sup>	82.8	182.6	19.8
(1) Florida's employment numbers are reported twice in the GOM and SA regions because they could not be disaggregated by water body.							
(2) Mining and logging is combined with construction.							

Source: BLS, 2013a

<sup>5</sup> Total Florida population was 18,801,310. Thirty-nine point five percent (7,434,861) was associated with the western coast. In contrast, 57.8% (10,863,942) was associated with the eastern coast. Given these figures, employment is likely split by similar percentages.

Table 3 reports disaggregated unemployment rates by region. The USC had the highest and the GOM the lowest unemployment rates of the Southeast region. GOM unemployment rates ranged from 6.4% in Louisiana to 9.2% in Mississippi. Louisiana, Texas and Alabama were the only GOM states that had unemployment rates below the 8.1% national unemployment rate. Florida had the lowest annual average unemployment rate of the SA states and North Carolina held the highest SA rate at 9.5%. Puerto Rico had a rate of 14.5%, which was almost double that of the U.S. national average. The USVI's rate was slightly lower at 11.7%.

Table 2 (Con't). Non-farm employment and payroll by industry and region (2012).

2012 Employment by Industry (thousands)							
Region	Area	Financial Activities	Professional and Business Services	Education and Health Services	Leisure and Hospitality	Government	Other Services
GOM	Alabama	92.5	218.4	218.5	173.7	376.5	80.5
	Florida	497.5 <sup>(1)</sup>	1,067.5 <sup>(1)</sup>	1,109.9 <sup>(1)</sup>	997.7 <sup>(1)</sup>	1,078.6 <sup>(1)</sup>	314.4 <sup>(1)</sup>
	Louisiana	94.0	202.5	282.0	207.5	350.1	63.3
	Mississippi	44.2	96.9	133.3	121.9	246.2	37.9
	Texas	659.5	1,405.8	1,461.5	1,087.3	1,794.9	381.2
	Subtotal	1,387.7	2,991.1	3,205.2	2,588.1	3,846.3	877.3
SA	Florida	497.5 <sup>(1)</sup>	1,067.5 <sup>(1)</sup>	1,109.9 <sup>(1)</sup>	997.7 <sup>(1)</sup>	1,078.6 <sup>(1)</sup>	314.4 <sup>(1)</sup>
	Georgia	227.2	562.4	495.8	394.8	681.8	153.1
	North Carolina	203.1	533.3	549.0	416.3	713.9	141.9
	South Carolina	98.8	234.3	210.4	217.6	346.6	69.2
	Subtotal	1,026.6	2,397.5	2,365.1	2,026.4	2,820.9	678.6
USC	Puerto Rico	44.8	110.4	118.5	74.1	259.3	17.7
	USVI	2.3	3.4	2.4	7.2	11.5	1.4
	Subtotal	47.1	113.8	120.9	81.3	270.8	19.1
(1) Florida's employment numbers are reported twice in the GOM and SA regions because they could not be disaggregated by water body.							
(2) Mining and logging is combined with construction.							

Source: BLS, 2013a

Table 3. State annual average unemployment rates for all regions (2012).

Region	Area	Unemployment Rate (%)
GOM	Alabama	7.3
	Florida	8.6 <sup>(1)</sup>
	Louisiana	6.4
	Mississippi	9.2
	Texas	6.8
SA	Florida	8.6 <sup>(1)</sup>
	Georgia	9.0
	North Carolina	9.5
	South Carolina	9.1
USC	Puerto Rico	14.5
	USVI	11.7
U.S.		8.1
(1) Florida's unemployment rate is reported twice in the GOM and SA regions because it could not be disaggregated by water body.		

Sources: BLS, 2013a; Bureau of Economic Research, 2013

## ii. Gross domestic product and personal income

Over one fourth of the nation's \$15.7 trillion gross domestic product (GDP) was generated in the southeastern U.S. Table 4 shows that the GOM produced 17.3% of the national GDP in 2012.<sup>6</sup> Texas and Florida were the largest contributors to the national GDP at 8.9% and 5.0%, respectively, while Mississippi contributed the least at 0.7%. The SA region contributed 11.8% to the national GDP, with Florida adding the most at 5.0% and South Carolina the least at 1.1%.<sup>7</sup> The USC produced 0.7% of the national GDP, with Puerto Rico contributing 0.65% and the USVI contributing 0.03%.

<sup>6</sup> GDP figures at the county level were unavailable.

<sup>7</sup> Florida is double counted for the GOM and SA regions with the exception of coastal population, personal income, commercial landings, recreational landings, spending from coastal tourism and tourism related coastal employment.



Table 4. Gross domestic product by region (2012).

Region	Area	Total GDP (in billions) (2012)	Percent of U.S. (%)
GOM	Alabama	183,547	1.2
	Florida	777,164 <sup>(1)</sup>	5.0 <sup>(1)</sup>
	Louisiana	243,264	1.6
	Mississippi	101,490	0.7
	Texas	1,397,369	8.9
	Subtotal	2,702,834	17.3
SA	Florida	777,164 <sup>(1)</sup>	5.0 <sup>(1)</sup>
	Georgia	433,569	2.8
	North Carolina	455,973	2.9
	South Carolina	176,217	1.1
	Subtotal	1,842,923	11.8
USC	Puerto Rico	101,500	0.7
	USVI	4,233	<0.1
	Subtotal	105,733	0.7
U.S.		15,671,810	100.0
(1) Florida's GDP statistics are reported twice in the GOM and SA regions because they could not be disaggregated by water body.			

Sources: BEA, 2013c; BEA, 2013d; The World Bank, 2014

Table 5 shows that the GOM had a greater share of the nation's personal income (16.8%) than the SA (12.4%) or USC (>0.1%) regions.<sup>8</sup> Of the five GOM states, Texas and Florida had greater shares of U.S. personal income at 7.7% and 5.8%, respectively. Excluding Florida, Georgia and North Carolina had greater personal income levels for the SA region with U.S. shares of 2.7% each. Disaggregating personal income by coastal counties shows that GOM coastal counties had a higher aggregate personal income than SA counties, but the coastal share of state personal income was greater for the SA region (33.2%) than for the GOM region (26.1%). Eastern Florida and South Carolina had the highest coastal personal income shares of any SA or GOM state at 58.6% and 42.0%, respectively. Texas had the largest coastal share of the GOM states at 35.7%. Eastern and western Florida coastal counties had a combined coastal share of 75.1%.

<sup>8</sup> The Bureau of Economic Analysis defines personal income as "the income received by persons from participation in production, plus transfer receipts from government and businesses, plus government interest...It is calculated as the sum of wage and salary disbursements, supplements to wages and salaries, proprietors' income with inventory valuation and capital consumption adjustments, rental income, of persons with capital consumption, personal dividend income, personal interest income, and personal current transfer receipts, less contributions for government social insurance plus an adjustment for residence" (BEA, 2006).

Table 5. Personal income by region, state and coastal region (2012).

Total and Coastal Personal Income (2012)					
Region	State/Territory	Total Personal Income (billions)	Share of U.S. Personal Income (%)	Coastal Personal Income (billions)	Coastal Share of State Personal Income (%)
GOM	Alabama	173.2	1.3	26.0	15.0
	Florida	792.3 <sup>(1)</sup>	5.8 <sup>(1)</sup>	130.7	16.5
	Louisiana	184.3	1.3	47.3	25.7
	Mississippi	100.5	0.7	21.3	21.2
	Texas	1,053.6	7.7	376.0	35.7
	Subtotal	2,303.9	16.8	601.3	26.1
SA	Florida	792.3 <sup>(1)</sup>	5.8 <sup>(1)</sup>	464.6	58.6
	Georgia	371.5	2.7	7.7	2.1
	North Carolina	369.7	2.7	21.7	5.9
	South Carolina	165.6	1.2	69.5	42.0
	Subtotal	1,699.1	12.4	563.5	33.2
USC	Puerto Rico	10.0	>0.1	-	-
	USVI	2.6	>0.1	-	-
	Subtotal	12.6	>0.1	-	-
U.S.		13,729.1	-	-	-

(1) Florida's total personal income and share of U.S. personal income is reported twice in the GOM and SA regions because they could not be disaggregated by water body.

Sources: BEA, 2013c; GDP, 2013; USC, 2011; USCB, 2011; USVI BER, 2013

## B. Energy

Primary energy sources in the U.S. include petroleum (oil), natural gas, coal, renewable energy and nuclear electric power. When converted into British thermal units (Btus), the common energy unit used to compare across fuels measured in barrels, cubic feet, tons, etc., petroleum was the most commonly used energy source in 2013 (36% of national usage). Natural gas and coal were the second (27%) and third (19%) most used, respectively, and renewable energy and nuclear electric power represented 10% and 8%, respectively (EIA, 2014b).<sup>9</sup> In 2013, total U.S. energy production was able to satisfy 84% of total U.S. energy demand at 81.7 quadrillion Btus (quads). The share of U.S. energy consumption supplied by domestic production has been increasing since 2005 when U.S. production was historically lowest (69%). This increase is the result of advances in technology to facilitate the extraction

<sup>9</sup> This includes all fuel usage.

of hard to reach energy sources (i.e., fracking), reduced road travel, and improved vehicle efficiency (EIA, 2014f).

### **i. Hydrocarbons production and reserves**

The southeast region produces roughly 40% of the nation's oil and gas. In 2013, the region produced 94.2 million barrels of crude oil worth about \$9.1 billion (Table 6; EIA, 2014d). Energy production varies greatly among the three regions. The GOM region produced the largest share of the nation's crude oil (39.3% in 2013) and natural gas (42.5% in 2012) (Table 6). It is also responsible for the higher share of the nation's coal production (6.9% in 2012) of the three regions. The GOM produced the highest amount of shale gas, providing over half of the national total in 2011 (EIA, 2013b), and was one of the highest producing regions of biodiesel in 2013 (EIA, 2014a).

Of the U.S.'s natural resource reserves, the GOM region holds a significant portion of them. In 2011 the GOM region held 29.2% of the nation's crude oil reserves, 39.5% of the nation's dry natural gas reserves and 44.4% of the nation's gas plant liquids (Table 6).

The GOM held 5.4% of recoverable coal reserves in 2012 (Table 6). There are 2 coal regions, 1 coal field and 1 coal basin across the 5 states that are capable of producing methane gas (EIA, 2009a), 8 shale basins, 5 current shale plays, 5 prospective shale plays capable of producing shale gas (EIA, 2011b), 5 tight gas basins and 9 tight gas plays capable of producing tight gas (EIA, 2010).<sup>10</sup> The SA region had fewer natural resource reserves in comparison to the GOM, holding about 0.1% of the nation's oil reserves (Table 6). There is 1 coal region and 1 coal field across the 4 states that are capable of producing methane gas (EIA, 2009a), 1 shale basin, 1 current shale play (EIA, 2011b), and 1 tight gas basin within the region (EIA, 2010). To aid in production, the GOM has 5 major coal mines and 52 petroleum refineries, the majority of which are in Texas and Louisiana, and has the largest share of U.S. crude oil refinery capacity (49.9%; see Table 7). There are 2 outer continental shelf areas and 7 conventional gas basins in the GOM region currently producing oil and gas (EIA, 2009b,c).

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<sup>10</sup> A shale play is defined as a set of known or postulated gas accumulations within shale rock (EIA, 2014c). A tight gas basin is a low-permeability reservoir that can produce dry natural gas of which the expected value of permeability to gas flow is less than 0.1 md (Holditch, 2006).

Table 6. Number of reserves and production levels by region (2011-2013).

Region State/Territory		Reserves								Production					
		Crude Oil		Dry Natural Gas		Natural Gas Plant Liquids		Recoverable Coal at Producing Mines		Crude Oil		Natural Gas		Coal	
		Barrels (million)	Share (%)	Cu Ft (billion)	Share (%)	Barrels (million)	Share (%)	Short Tons (million)	Share (%)	Barrels (million)	Share (%)	Cu Ft (billion)	Share (%)	Short Tons (million)	Share (%)
GOM	Alabama	46	0.2	2,475	0.7	68	0.6	265	1.4	0.8	0.4	216	0.9	19.3	1.9
	Florida	22 <sup>(1)</sup>	0.1 <sup>(1)</sup>	6 <sup>(1)</sup>	*	0 <sup>(1)</sup>	0.0 <sup>(1)</sup>	*	*	0.2 <sup>(1)</sup>	0.1 <sup>(1)</sup>	19 <sup>(1)</sup>	0.1 <sup>(1)</sup>	*	*
	Louisiana	417	1.6	30,358	9.1	192	1.8	w	w	5.9	2.5	2,955	11.7	4.0	0.4
	Mississippi	238	0.9	860	0.3	6	0.1	w	w	2.0	0.8	64	0.3	3.0	0.3
	Texas	7,014	26.4	98,165	29.4	4,541	41.9	751	4.0	85.3	35.5	7,475	29.5	44.2	4.3
	Subtotal	7,737	29.2	131,864	39.5	4,807	44.4	1,016	5.4	94.2	39.3	10,729	42.5	70.5	6.9
SA	Florida	22 <sup>(1)</sup>	0.1 <sup>(1)</sup>	6 <sup>(1)</sup>	*	0 <sup>(1)</sup>	0.0 <sup>(1)</sup>	*	*	0.2 <sup>(1)</sup>	0.1 <sup>(1)</sup>	19 <sup>(1)</sup>	0.1 <sup>(1)</sup>	*	*
	Georgia	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	North Carolina	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	South Carolina	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Subtotal	22	0.1	6	*	0	0.0	*	*	0.2	0.1	19	0.1	*	*
USC	Puerto Rico	0	0.0	0	0.0	0	0.0	*	*	*	0.0	0	0.0	0	0.0
	USVI	0	0.0	0	0.0	0	0.0	*	*	0.0	0.0	0	0.0	0	0.0
	Subtotal	0	0.0	0	0.0	0	0.0	*	*	0	0.0	0	0.0	0	0.0

(1) Florida's energy units and shares are reported twice in the GOM and SA regions because they could not be disaggregated by water body.  
 \* No data available.  
 - Data withheld.

Source: EIA, 2012

Table 7. Capacity and number of production facilities by region (2013).

Region	State/Territory	U.S. Share Crude Oil Refinery Capacity (%)	U.S. Share Electricity Net Generation (%)	Number of Production Facilities			
				Major Coal Mines	Petroleum Refineries	Major Non- Nuclear Electricity Generating Plants	Nuclear Power Plants
GOM	Alabama	0.7	3.8	0	3	5	2
	Florida	0.0 <sup>(1)</sup>	6.1 <sup>(1)</sup>	0 <sup>(1)</sup>	0 <sup>(1)</sup>	5 <sup>(1)</sup>	1 <sup>(1)</sup>
	Louisiana	18.4	2.5	0	19	5	2
	Mississippi	2.0	1.2	0	3	5	1
	Texas	28.8	10.8	5	27	5	2
	Subtotal	49.9	24.4	5	52	25	8
SA	Florida	0.0 <sup>(1)</sup>	6.1 <sup>(1)</sup>	0 <sup>(1)</sup>	0 <sup>(1)</sup>	5 <sup>(1)</sup>	1 <sup>(1)</sup>
	Georgia	0.2	3.0	0	0	5	2
	North Carolina	0.0	3.2	0	0	5	3
	South Carolina	*	2.0	0	0	5	4
	Subtotal	0.2	14.3	0	0	20	10
USC	Puerto Rico	0.0		0	1	15	0
	Virgin Islands	0.0		0	1	2	0
	Subtotal	0.0		0	2	17	0
(1) Florida's U.S. shares and production facilities are reported twice in the GOM and SA regions because they could not be disaggregated by water body.							

Source: EIA, 2012

In contrast to the GOM, energy production in the SA region is very minor. Crude oil in 2013 and natural gas production in 2012 represented only 0.1% each of the nation's total. Florida was the only SA energy producer (Table 6). The SA region oil refinery capacity was of 0.2% of the nation's total, and the entirety of this capacity was found in Georgia (Table 7). As of 2011, the SA had no shale gas production (EIA, 2013b,c,d) and no coal production (EIA, 2011a), but in 2010 this region did have a biodiesel production capacity of 66 million gallons per year (EIA, 2014a).

Of the three regions, the USC contributes the least to the nation's oil and gas production. There is minimal oil production (less than 0.01%) in Puerto Rico (EIA, 2014e) and the USVI (EIA, 2014g), and these territories have no natural gas, coal or shale gas production (EIA, 2012). Although St. Croix had one of the ten largest crude oil refineries in the world, the Hovensa refinery closed production in February 2012 and now serves as a storage terminal. Due to limited energy production, both the USVI and Puerto Rico rely heavily on petroleum imports. The USC region is currently exploring undersea cable links with the British Virgin Islands to increase grid reliability (EIA, 2012).

It is important to note that the future holds a changing landscape for energy production with the innovation of fracking technologies, and energy production may be moving inland. Unfortunately, the lag in data and information prevents this study from discussing these changes further.

## **ii. Electricity generation**

Together, the three study regions produce over one third of the nation's electricity. While electricity production is not a coastal activity, it supports local communities since it is mainly consumed locally and not exported to other parts of the U.S. The GOM produces 24.4% of the national total, and has 25 major non-nuclear electricity generating plants and 8 nuclear power plants (Table 7). Table 8 shows that the majority of the GOM's electricity generation is from natural gas (54%), coal (27%) and nuclear energy (12%), but contributions from renewable sources and wind energy are also highlighted. In 2010 Texas led the nation in generation of wind power and was the first state to reach 10,000 megawatts of wind capacity (EIA, 2012). While generation from petroleum coke is not a large contributor in comparison to other sources, the GOM produces over half (51%) of the nation's electricity generation from this source (Table 8).

Table 8. Electricity generation by source and region (2012).

		Net Electricity Generation (thousand megawatt hours)							
Region	State/ Territory	Total	From Coal	From Petroleum Liquids	From Petroleum Coke	From Natural Gas	From Other Gases	From Nuclear Energy	From Hydroelectric (conventional) Power
GOM	Alabama	152,897	45,607	110	0	55,705	178	40,841	7,435
	Florida	221,096 <sup>(1)</sup>	44,286 <sup>(1)</sup>	720 <sup>(1)</sup>	646 <sup>(1)</sup>	149,700 <sup>(1)</sup>	6 <sup>(1)</sup>	17,870 <sup>(1)</sup>	151 <sup>(1)</sup>
	Louisiana	103,408	21,422	38	2,992	58,564	1,247	15,659	680
	Mississippi	54,584	7,212	17	0	38,550	0	7,296	0
	Texas	429,813	138,088	91	1,393	213,901	2,999	38,441	584
	Subtotal	961,798	256,615	976	5,031	516,420	4,430	120,107	8,850
SA	Florida	221,096 <sup>(1)</sup>	44,286 <sup>(1)</sup>	720 <sup>(1)</sup>	646 <sup>(1)</sup>	149,700 <sup>(1)</sup>	6 <sup>(1)</sup>	17,870 <sup>(1)</sup>	151 <sup>(1)</sup>
	Georgia	122,306	40,715	73	305	42,539	0	33,942	2,236
	North Carolina	116,682	50,932	178	0	19,302	0	39,386	3,728
	South Carolina	96,756	28,396	108	0	14,332	0	51,145	1,420
	Subtotal	556,840	164,329	1,079	951	225,873	6	142,343	7,535
U.S.		4,047,765	1,514,043	13,403	9,787	1,225,894	11,898	769,331	276,240
(1) Florida's net generation sources are reported twice in the GOM and SA regions because they could not be disaggregated by water body.									

Source: EIA, 2013a

Table 8 (Con't). Electricity generation by source and region (2012).

Net Electricity Generation (thousand megawatt hours)								
Region	State/ Territory	From Renewable Sources (excluding hydroelectric)	From Hydroelectric (pumped storage) Power	From Other Energy Sources	From Wind	From Biomass	From Geothermal	From Solar
GOM	Alabama	2,777	0	227	0	2,777	0	0
	Florida	4,524 <sup>(1)</sup>	0 <sup>(1)</sup>	3,194 <sup>(1)</sup>	0 <sup>(1)</sup>	4,330 <sup>(1)</sup>	0 <sup>(1)</sup>	197 <sup>(1)</sup>
	Louisiana	2,430	0	376	0	2,430	0	0
	Mississippi	1,509	0	0	0	1,509	0	0
	Texas	34,017	0	298	32,214	1,684	0	118
	Subtotal	45,257	0	4,095	32,214	12,730	0	315
SA	Florida	4,524 <sup>(1)</sup>	0 <sup>(1)</sup>	3,194 <sup>(1)</sup>	0 <sup>(1)</sup>	4,330 <sup>(1)</sup>	0 <sup>(1)</sup>	197 <sup>(1)</sup>
	Georgia	3,279	-839	56	0	3,276	0	3
	North Carolina	2,704	0	452	0	2,564	0	139
	South Carolina	2,143	-896	106	0	2,143	0	0
	Subtotal	12,650	-1,735	614	0	7,983	0	142
U.S.		218,333	-4,950	13,787	140,822	57,622	15,562	4,327
(1) Florida's net generation sources are reported twice in the GOM and SA regions because they could not be disaggregated by water body.								

Source: EIA, 2013a

Although oil and gas production is very low in the SA, these four states generate 14.3% of the nation's electricity, and have 20 major non-nuclear electricity generating plants and 10 nuclear power plants (Table 7). Its number of nuclear power plants and its electricity generated from nuclear energy are two of the few areas in which the SA region generates more energy than the GOM. The other areas are in net electricity generation from petroleum liquids and from pumped storage of hydroelectric power, the second of which does not exist at all in the GOM region. Similar to the GOM, the SA region generates the majority of its electricity from natural gas, coal and nuclear energy, followed by renewable sources (Table 8).

In furtherance of renewable energy production, the USVI requires solar water heaters for all future construction on the islands and in 2011, a large solar project was completed on St. Thomas that provides 15% of the airport's electricity. Similarly, in 2010 Puerto Rico ranked 5<sup>th</sup> in the nation in installation of solar thermal hot water heaters and two wind energy facilities also began in 2012 to help provide power to the island (EIA, 2012).



### iii. Deep sea minerals

There are important marine mineral deposits in each of the three study regions. The GOM has a history of sulfur mining from salt dome cap rocks and from Permian evaporites offshore Louisiana and Texas principally for the production of sulfuric acid; however, production was halted in late 2000 due to changes in economic conditions.<sup>11</sup> The discovery of “involuntary” sulfur recovery as a by-product of refining metal sulfide ores, natural gas and oil combined with the depletion of existing sulfur deposits also encouraged the halt in production (Kyle, 2002). There are reports of clastic phosphorite deposits in the SA off the coasts of Florida and North Carolina, and the Blake Plateau off the northeastern coast of Florida also has reported phosphatic nodules (United Nations Division for Ocean Affairs, 2004).<sup>12</sup> Polymetallic manganese nodules and cobalt-rich ferromanganese crusts also exist within the GOM and SA, bordering both coasts of Florida through North Carolina, and the Caribbean as well (National Oceanography Centre, 2014). While exploratory measures took place in the 1970s in an attempt to exploit these deposits and nodules, commercial exploitation is yet to begin due to a combination of technological, economic, environmental and legal obstacles (Marvasti, 2013). Currently there is no commercial exploitation of marine minerals in any of the three study regions because it remains economically unfeasible.

## C. Maritime Transportation

The maritime transportation industry is an important source of jobs and income to many coastal communities. Figure 2 shows the increase in coastal waterborne trade over the past 40 years. In 1970, total foreign and domestic trade was 1,531.7 million short tons. By 2000, total trade had increased to 2,424.6 million short tons (AAPA, 2008), and in 2012 was 2,306.8 million short tons (WCSC, 2014a). The U.S. cruise industry has been one of the fastest growing industries, having achieved more than 2,100% growth since 1970 when only about 500,000 people embarked on a cruise. It is estimated that 13.5 million people took a cruise in 2009 (CLIA, 2010). This strong and fast growth has encouraged the advancement and evolution of the cruise experience with more ports having cruise terminals and increased amenities on board (CLIA, 2010).

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<sup>11</sup> Evaporites are defined as sedimentary rock, such as gypsum, that originates by the evaporation of seawater in an enclosed basin (Merriam-Webster, 2014).

<sup>12</sup> Clastic is defined in geology as made of fragments of preexisting rocks (Merriam-Webster, 2014).

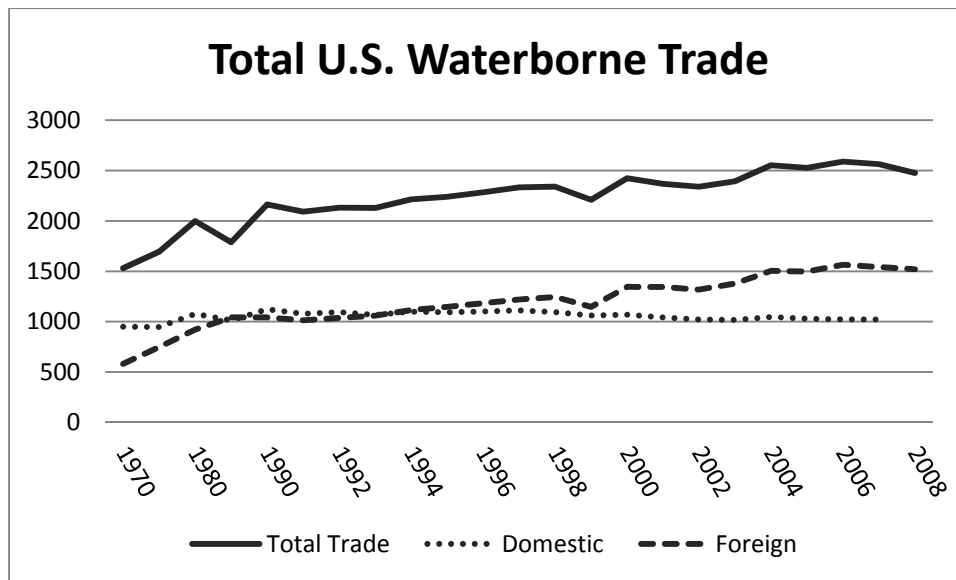


Figure 2. U.S. waterborne trade over time.

#### i. Shipping industry: tonnage, revenue, port calls, container traffic and port specialties

Total tonnage traveling in and out of American ports was 2.3 billion in 2012, and the majority of this total (48.3%) occurred within GOM ports, whereas the SA and USC regions contributed only 2.9% and 1.0%, respectively (WCSC, 2014a).<sup>13</sup> Table 9 shows that the Port of South Louisiana, SA was ranked first in the nation in 2012 by cargo volume, with Houston, TX in 2<sup>nd</sup>, New Orleans, LA in 4<sup>th</sup> and Beaumont, TX in 5<sup>th</sup>. Ten of the 15 top ranked tonnage American ports were in the GOM, with all but one in Louisiana or Texas. Savannah, GA was the top ranked cargo port for the SA and was ranked 20<sup>th</sup>, with Port Everglades, FL and Charleston, SC following in 31<sup>st</sup> and 32<sup>nd</sup>. San Juan, Puerto Rico was ranked 57<sup>th</sup> based on tonnage and is the highest ranked port for the USC with Ponce, Puerto Rico next in 102<sup>nd</sup> place (AAPA, 2013a).

Although the GOM out-produces the SA and USC regions in terms of cargo volume, regional contribution changes when considering port container traffic (Table 9)<sup>14</sup>. In 2012, U.S. ports loaded 32.2 million twenty foot equivalent units (TEUs) of container cargo. Eighteen percent of this container total flowed through SA ports, with 6.7% through GOM ports and 2.2% through USC ports (WCSC, 2014b). Of the top 15 ranked American containership ports in 2010, 5 were located in the SA, with Savannah,

<sup>13</sup> Florida's contribution to regional tonnage could not be separated by individual port; however, when specific Florida port contributions were identifiable, as in container traffic and port calls, Florida has significantly higher numbers on the east coast, so it is possible that its total tonnage and revenue are similarly distributed.

<sup>14</sup> Cargo includes all trade moving in or out of a port, and is measured by tonnage. This includes containerized cargo, but also loose break bulk materials, such as grain, coal, sand and steel. Container traffic refers only to number of TEUs (shipping containers).

GA taking the lead in 4<sup>th</sup> place nationally, Charleston, SC in 9<sup>th</sup>, and Miami, FL, Port Everglades, FL and Jacksonville, FL in 11<sup>th</sup>, 12<sup>th</sup> and 14<sup>th</sup>, respectively (Table 9). Houston, TX was the highest ranked GOM port in 8<sup>th</sup> place, with New Orleans, LA in 14<sup>th</sup>. San Juan, Puerto Rico was ranked 16<sup>th</sup> as a U.S. containership port (BTS, 2012), which marks a significant increase in ranking compared with its status of cargo volume.

In 2011, there were 68,036 port calls within American ports. 33.9% of these were in GOM ports, 15.8% were in SA ports, and 1.9% of calls occurred in USC ports (Maritime Administration, 2013b). Of the top 15 ranked ports by port calls in 2010, there were 4 ports each from the GOM and SA regions. Houston, TX and New Orleans, LA were ranked 1<sup>st</sup> and 2<sup>nd</sup>, and Port Arthur, TX and Texas City, TX followed in 14<sup>th</sup> and 15<sup>th</sup> place (Table 9). Savannah, GA was highest ranked for the SA in 8<sup>th</sup> place, and Charleston, SC, Jacksonville, FL and Port Everglades, FL followed in 11<sup>th</sup>, 12<sup>th</sup> and 13<sup>th</sup>, respectively. San Juan, Puerto Rico was ranked 20<sup>th</sup> (BTS, 2012).

In terms of trade revenue, American ports were responsible for shipping \$3.8 trillion worth of imports and exports in 2013. Fifty-nine percent of this revenue came from imports and 41% from exports. GOM and USC ports gained more export revenue than import revenue, at 27.5% and 1.3% of the national export revenue to 21.6% and 1.1% of the national import total, and the SA saw more import revenue at 10.1% to 9.7% of the national totals (USCB, 2014).

In comparing U.S. customs districts rather than ports and considering the top 20 ranked ports based on cargo volume in 2011, Table 9 shows that 5 were in the GOM, 3 were in the SA and 2 were in the USC. Houston-Galveston, TX and New Orleans, LA were the highest ranked GOM customs districts in 1<sup>st</sup> and 2<sup>nd</sup> place nationally, and Port Arthur, TX, Mobile, AL and Tampa, FL followed in 5<sup>th</sup>, 8<sup>th</sup> and 14<sup>th</sup>. Savannah, GA was the highest ranked customs district within the SA region in 13<sup>th</sup> place, and was followed by Miami, FL and Charleston, SC, ranked 16<sup>th</sup> and 17<sup>th</sup>. The USVI and San Juan, Puerto Rico were both in the U.S. top 20 ranked customs districts in 15<sup>th</sup> and 20<sup>th</sup> place (AAPA, 2013c). Ratings differed slightly when considering revenue. Of the top 20 ranked American customs districts by the cargo value in 2011, 5 were in the GOM, 4 were in the SA and 2 were in the USC. Houston-Galveston, TX and New Orleans, LA were ranked 2<sup>nd</sup> and 4<sup>th</sup> in the nation, and Port Arthur, TX, Tampa, FL and Mobile, AL followed as top ranked GOM customs districts, in 13<sup>th</sup>, 14<sup>th</sup> and 15<sup>th</sup>. The highest ranked SA customs district was Savannah, GA, ranked 6<sup>th</sup> and followed by Charleston, SC in 8<sup>th</sup>, Miami, FL in 12<sup>th</sup> and Wilmington, NC in 20<sup>th</sup>. In the USC, the USVI was ranked 17<sup>th</sup> in the nation, followed by San Juan, Puerto Rico in 19<sup>th</sup> (AAPA, 2013b).

Table 9. Number of port and customs districts rankings by region (2010-2012).

Rank	Ports				Customs Districts	
	By Cargo Volume (2012)	By Port Call (2010)	Containership Ports (2010)	Cruise Ports (2011)	By Cargo Volume (2011)	By Cargo Value (2011)
1	South Louisiana, LA	Houston, TX	Los Angeles, CA	Miami, FL	Houston-Galveston, TX	Los Angeles, CA
2	Houston, TX	New Orleans, LA	Long Beach, CA	Fort Lauderdale, FL	New Orleans, LA	Houston-Galveston, TX
3	New York/New Jersey	New York/New Jersey	New York, NY	Port Canaveral, FL	Los Angeles, CA	New York City, NY
4	New Orleans, LA	Los Angeles/Long Beach, CA	Savannah, GA	New York, NY	New York City, NY	New Orleans, LA
5	Beaumont, TX	Virginia Ports, VA	Oakland, CA	San Juan, PR	Port Arthur, TX	Seattle, WA
6	Long Beach, CA	San Francisco, CA	Norfolk, VA	Galveston, TX	Norfolk, VA	Savannah, GA
7	Hampton Roads, VA	Columbia River, OR	Seattle, WA	Tampa, FL	Philadelphia, PA	San Francisco, CA
8	Corpus Christi, TX	Savannah, GA	Houston, TX	Seattle, WA	Mobile, AL	Charleston, SC
9	Los Angeles, CA	Philadelphia, PA	Charleston, SC	Long Beach, CA	Seattle, WA	Norfolk, VA
10	Baton Rouge, LA	Baltimore, MD	Tacoma, WA	New Orleans, LA	San Francisco, CA	Philadelphia, PA
11	Port of Plaquemines, LA	Charleston, SC	Miami, FL	Los Angeles, CA	Columbia-Snake	Baltimore, MD
12	Texas City, TX	Jacksonville, FL	Port Everglades, FL	Baltimore, MD	Baltimore, MD	Miami, FL
13	Mobile, AL	Port Everglades, FL	Baltimore, MD	Cape Liberty, NJ	Savannah, GA	Port Arthur, TX
14	Lake Charles, LA	Port Arthur, TX	New Orleans, LA	Jacksonville, FL	Tampa, FL	Tampa, FL
15	Huntington-Tristate	Texas City, TX	Jacksonville, FL	Charleston, SC	USVI	Mobile, AL
16	Baltimore, MD	Seattle, WA	San Juan, PR		Miami, FL	Columbia-Snake
17	Pittsburg, PA	Corpus Christi, TX	Wilmington, NC		Charleston, SC	USVI
18	St. Louis, MO/IL	Tacoma, WA	Philadelphia, PA		Boston, MA	Boston, MA
19	Duluth-Superior, MN/WI	Miami, FL	Gulfport, MS		Detroit, MI	San Juan, PR
20	Savannah, GA	San Juan, PR	Wilmington, DE		San Juan, PR	Wilmington, NC
21	Pascagoula, MS	Mobile, AL	Portland, OR		Cleveland, OH	Providence, RI
22	Tampa, FL	Tampa, FL	Boston, MA		Portland, ME	Honolulu, HI
23	Port Arthur, TX	Freeport, TX	West Palm Beach, FL		Honolulu, HI	San Diego, CA
24	Philadelphia, PA	Galveston, TX	Chester, PA		Wilmington, NC	Anchorage, AK
25	Valdez, AK	Lake Charles, LA	Mobile, AL		Buffalo, NY	Detroit, MI
26	Portland, OR	Honolulu, HI	Freeport, TX		Anchorage, AK	Portland, ME
27	Tacoma, WA	Galveston, TX	San Diego, CA		Providence, RI	Cleveland, OH
28	Seattle, WA	Wilmington, NC	Tampa, FL		Chicago, IL	Chicago, IL
29	Richmond, CA	Nederland Terminal, TX	Honolulu, HI		Mineapolis, MN	Laredo, TX
30	Freeport, TX	Port Angeles, WA	Panama City, FL		Ogdensburg, NY	Ogdensburg, NY
57	San Juan, PR					
102	Ponce, PR					

Light grey represents USC ports and customs districts; medium grey represents GOM ports and customs districts; dark grey represents SA ports and customs districts.

Sources: AAPA, 2013a; AAPA, 2013b; AAPA, 2013c; BTS, 2012

Just as ports are ranked based on different ratings metrics, customs districts and individual ports also specialize in what they trade. GOM ports transport a variety of items. Houston, TX has a bulk material handling plant capable of holding various kinds of dry bulk materials, a liquid bulk facility, container cargo terminals and a terminal capable of packaging corn, oats and other food items on-site (Port of Houston Authority, 2012). Houston's main imports are oil, refined petroleum and iron tubing and piping, and its main exports are refined petroleum, parts for heavy machinery and cyclic hydrocarbons (World City 2012). Port of New Orleans, LA has facilities to handle various types of cargo including cold storage, break bulk, containers, heavy cargo and grains (Port of New Orleans, 2014). New Orleans principally imports oil, refined petroleum and phone equipment, and its main exports are refined petroleum, soybeans and corn (World City, 2012). Port Arthur, TX is equipped to handle all types of break bulk cargo (Port Arthur, 2014), and its principal imports are wood pulp and lumber, steel slabs and military equipment and the port exports mainly plywood, linerboard and steel pipe (Texas Ports Association, 2014). Mobile, AL has a bulk material handling plant and a marine liquid bulk terminal, and its main imports and exports are similar to other GOM ports, including heavy and oversized cargo, coal and wood pulp. Mobile also exports poultry and soybeans (Alabama State Port Authority, 2014).

SA ports differ from GOM ports in what they specialize in. Savannah, GA is the largest single container terminal in North America and is capable of handling container, refrigerated, heavy lift, break bulk and roll-on/roll-off cargoes (Georgia Ports Authority, 2013). Savannah's main imports are motor vehicles and motor vehicle parts, computers and medicine, and its exports include civilian aircraft parts, motor vehicles, wood pulp and cotton (World City, 2012). Port of Miami, FL specializes in container cargo, but is also capable of handling break bulk, vehicles and industrial equipment (PortMiami, 2012a). Miami's top imports are gold, refined petroleum and electronic integrated circuits, and its top exports are precious scrap metal, civilian aircraft parts and phone equipment (World City, 2012). Miami also transports fruits and vegetables, apparel and vehicles (PortMiami, 2012a). Charleston, SC was voted the nation's most productive container terminal, and in addition to transporting containers, the port also transports refrigerated cargo, vehicles, break bulk, oversized cargo and non-containerized cargo (South Carolina Ports, 2014). Charleston's top imports are motor vehicle parts, medicine, internal combustion engines and refined petroleum, and its top exports are motor vehicles, military aircraft parts and engines and rubber tires (World City, 2012).

San Juan, Puerto Rico is arguably the most productive USC port. It can transfer container cargo and roll-on/roll-off cargo, and has the capacity to handle fuel, grains, flour, food, construction materials and loose cargo, such as wood and paper for printing. Smaller ports on Puerto Rico specialize in the

transport of oil and oil products, propane and fertilizers (Autoridad de los Puertos, 2014). The three islands comprising the USVI have numerous terminals and docking areas, many of which are used for cruise lines, sea planes and private vessels. Other terminals regularly handle container cargo such as the Wilfred “Bomba” Allick Port and Transshipment Center on St. Croix, The Theovald Eric Moorehead Dock and Terminal on St. John and The Crown Bay Cargo Port on St. Thomas. The Gordon A. Finch Molasses Pier on St. Croix is used primarily for the importation of molasses by tanker vessels to the Virgin Islands Rum Industries Limited distillery, but also imports liquid asphalt and bulk cargo (Virgin Islands Port Authority, 2014).

## **ii. Cruise industry: passengers, benefits and rankings**

The American cruise industry has been steadily growing from 1990 to 2010 at an average rate of 7.6% (CLIA, 2011), and has continued to grow through 2012 (BREA, 2013). In 2011 there were 4,222 cruises embarking from North American ports (Maritime Administration, 2013a) with 10.1 million passengers in 2012 (BREA, 2013). More cruise passengers (39.3%) were sourced from the GOM states in 2010 than the SA (31.5%) or USC (0.7%). Of the national total, however, Florida provided the highest number of cruise passengers at 26.7% of the national total (CLIA, 2011). Since the top three ranked cruise ports of 2011 were Miami, FL, Port Everglades, FL and Port Canaveral, FL, it is reasonable to assume that more cruise passengers were sourced from the eastern coast of Florida, as opposed to the western coast. Shown in Table 9, following the top three cruise ports, the SA region also included Jacksonville, FL and Charleston, SC in 14<sup>th</sup> and 15<sup>th</sup> place. The USC port of San Juan, Puerto Rico was ranked before any from the GOM in 5<sup>th</sup> place, but GOM ports Galveston, TX and Tampa, FL followed closely in 6<sup>th</sup> and 7<sup>th</sup> place (BTS, 2012).

Cruise lines and their passengers and crew generate income, employment and other economic benefits to the nation. These benefits are derived from different sources, including direct spending by cruise passengers and crew for travel and vacation spending before and after their cruise, costs generated by cruise line headquarters, marketing and tour operations, expenditures by the cruise lines for goods and services necessary for cruise operations, spending by cruise lines for port services and expenditures by cruise lines for maintenance and repair. If wages and salaries of cruise line employees are included, the total economic spending of the cruise industry to North America equaled \$42.3 billion in 2012. This economic impact was seen across every state, but impacted some states more than others. For example, Florida was the center of cruising in 2012, accounting for approximately 60% of U.S. cruise embarkations, and direct purchases from the cruise industry represented 35.7% of the U.S. total

economic impact in 2012. Texas's direct purchases represented 6.3% of the total impact. Georgia followed with 3.1% (BREA, 2013).

PortMiami, FL is known as “the Cruise Capital of the World”, and remains the world's busiest cruise port with over 4 million passengers in fiscal year 2012. PortMiami is the global headquarters of 5 cruise lines, offers cruises aboard 13 different companies with 30 ships from which to choose, and provides 7 cruise terminals to facilitate access (PortMiami, 2012b). Port Everglades, FL hosts 10 cruise lines with 44 ships, and holds the world record for the most passengers embarking and debarking on a single day. Nearly 3.7 million people debarked from Port Everglades in fiscal year 2012 (Port Everglades, 2014). As the third busiest port, Port Canaveral, FL provides 7 terminals to access its 4 cruise lines offering 10 ships for travel (Port Canaveral, 2014).

## **D. Tourism.**

Tourism is one of the nation's largest industries and employers in the U.S. In 2013 tourism generated \$2.1 trillion in economic output and \$134 billion in tax revenue. One out of every nine jobs in the U.S. was directly associated with travel or tourism. The hospitality industry was ranked the 6<sup>th</sup> highest employer compared to other major private industry sectors (U.S. Travel Association, 2014). The tourism industry in the U.S. has been growing and continued growth is projected for future years. The number of international tourists has increased from 55 million in 2009 to 70 million in 2013, and through the National Travel and Tourism Strategy, issued in 2012, the President's administration set a goal of further increasing America's visitors to 100 million by year 2021 (The Executive Office of the President, 2014).

### **i. Spending**

Travel related spending is an important contributor to national, regional and local economies. In 2011, domestic and international travelers spent \$206.7 billion in the southeast region, 23.3% of total U.S. travel expenditures (\$887.9 billion). These expenditures generated 23.5% (\$31.5 billion) of the nation's travel related tax revenue (Table 10).

Domestic and international travelers to the GOM states spent a total of \$150.4 billion in 2011. The GOM state with the highest spending total was Florida (\$71.5 billion), followed by Texas (\$55.0 billion).<sup>15</sup> Federal, state and local taxes generated by these expenditures totaled an additional \$22.5 billion. In comparison, travelers to the SA states spent \$124.6 billion in 2011. Second to Florida, the next largest contributor was Georgia, adding \$22.7 billion. SA traveler spending generated \$19.6 billion

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<sup>15</sup> As stated previously, Florida figures were unable to be separated by coast for this comparison.

in taxes. Total spending in the USC was \$3.24 billion in 2012 (Table 10). Roughly two thirds (\$2.23 billion) of this was the direct GDP contribution from travel and tourism in Puerto Rico (World Travel and Tourism Council, 2013). The remainder (\$1.01 billion) was spent in the USVI (USVI BER, 2013).

Spending from coastal tourism and travel can be approximated by considering only spending within congressional districts that are adjacent to the coast. The southeastern U.S. generated \$108.6 billion in coastal travel expenditures. Coastal GOM congressional districts held 25.1% (\$37.69 billion) of total tourism and travel spending in the GOM region. Western Florida contributed most (57.3%) to coastal tourism and travel spending, with Louisiana (19.6%) and Texas (13.2%) following. In comparison to the GOM region, SA coastal tourism and travel spending was higher (\$40.0 billion) and equaled a higher percentage (32.1%) of the region's total travel related spending. Eastern Florida contributed the most (67.3%) to this value, followed by South Carolina (16.8%; Table 10).

## **ii. Employment and payroll**

The U.S. employed 7.5 million people directly in the travel industry in 2013. Twenty-nine point three percent (2.2 million people) of this employment occurred within the southeastern U.S. and 10.7% (0.8 million people) of this employment occurred within the coastal region of the southeastern U.S. (Table 11).

Tourism and travel related employment accounted for about 1.6 million jobs in the GOM region in 2011 (Table 11)<sup>16</sup>. Employment in coastal congressional districts was 25.6% of the regional total. Florida was the largest coastal tourism-based employer (58.4%) in the GOM, followed by Louisiana (19.1%) and Texas (12.2%). Payroll generated from these jobs was \$40.1 billion for the entire region and \$9.2 billion for coastal congressional districts. This coastal contribution equaled 23.0% of the regional amount with western Florida again providing for the majority (61.9%) and Louisiana and Texas following (Table 11).

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<sup>16</sup> Again, Florida figures were unable to be separated by coast for this comparison.



Table 10. Travel and tourism expenditures and taxes collected by region (2012).

Region	State/Territory	Expenditures				Taxes generated (billions)
		Regional Expenditures (billions)	Coastal District Expenditures (billions)	Share of Regional Expenditures (%)	Share of Coastal Expenditures (%)	
GOM	Alabama	8.2	1.9	-	5.0	0.9
	Florida	71.5 <sup>(1)</sup>	21.6	-	57.3	10.6 <sup>(1)</sup>
	Louisiana	9.9	7.4	-	19.6	1.2
	Mississippi	5.8	1.8	-	4.8	0.9
	Texas	55	5.0	-	13.2	8.8
	Subtotal		150.4	37.7	25.1	-
SA	Florida	71.5 <sup>(1)</sup>	26.9	-	67.3	10.6 <sup>(1)</sup>
	Georgia	22.7	2.5	-	6.3	4.5
	North Carolina	19	3.9	-	9.8	2.9
	South Carolina	11.4	6.7	-	16.8	1.6
	Subtotal		124.6	40.0	32.1	-
USC	Puerto Rico	2.2	-	-	-	-
	USVI	1.0	1.0	-	-	-
	Subtotal		3.2	1.0	-	-
U.S.		887.9	-	-	-	133.9
(1) Florida's regional expenditures and taxes are reported twice in the GOM and SA regions because they could not be disaggregated by water body.						

Sources: Travel Effect, 2014; World Travel and Tourism Council, 2013; USVI BER, 2013

Tourism and travel related employment for the SA region was lower (1.3 million vs 1.6 million) than in the GOM region, but was more prevalent in coastal districts (31.7% vs 25.6%). Florida again provided the majority (68.6%) of the region's coastal tourism employment, followed by South Carolina (16.5%). The payroll generated from tourism and travel related jobs amounted to \$33.2 billion for the entire SA region and \$10.0 billion for coastal districts. The SA payroll coastal contribution (30.2% vs 23%) is higher than in the GOM, and eastern Florida contributed most (73.2%), followed by South Carolina (12.7%; Table 11).

USC jobs created from tourism and travel related activities totaled 26.8 thousand in 2012 (Table 11), with the majority (18.5 thousand) of these jobs occurring within Puerto Rico (World Travel and Tourism Council, 2013) and the remainder (8.3 thousand) from the USVI (USVI BER, 2013).<sup>17</sup>

<sup>17</sup> The USC could not be broken into congressional districts, so no coastal contribution could be calculated; however, given the fact that both areas of interest are islands, it could be argued that the large majority of travel and tourism happens within their respective coastal zones.

### iii. Visitors

Number of visitors is another way to measure tourism and travel benefits, but this can be a difficult number to obtain. Overseas incoming destination of travel is indicated on the Survey of International Air Travelers, and in 2012, Florida was ranked the second most internationally traveled with 6.58 million self-indicated travelers. Texas was ranked 8<sup>th</sup> with 1.34 million travelers, Georgia was ranked 13<sup>th</sup> (0.74 million), North Carolina was ranked 17<sup>th</sup> (0.39 million) and Louisiana was ranked 20<sup>th</sup> (0.30 million travelers; Office of Travel and Tourism Industries, 2013). This indicates that three of five GOM states and three of four SA states were among the top twenty ranked internationally traveled.

In trying to understand the role travel and tourism has on individual states and their economies, most states conduct studies that are published within their respective departments dealing with tourism and travel.<sup>18</sup> Due to differing assumptions and metrics that each state tourism agency uses for these studies, it is difficult to make cross-state comparisons. The state visitor data discussed below is used to give a general impression of tourist travel for the southeast U.S., but cross-state comparisons should not be made.

For GOM states, Texas was reported as having the largest number of visitors (228.2 million domestic and international travelers ) by the state's Office of the Governor, Economic Development and Tourism in 2012 (Texas: It's Like a Whole Other Country, 2013). Visit Florida, Florida's official and private tourism marketing corporation, estimated a total of 87.3 million visitors in 2011 (Visit Florida, 2012). In comparison to these higher numbers, the Mississippi Tourism Department claimed only 21.6 million visitors in 2013 (Visit Mississippi, 2013) and the Alabama Tourism Department indicated 23 million visitors to the state in their 2012 economic impact study (Sweet Home Alabama, 2013). Similar to Mississippi and Alabama, the Louisiana Department of Culture, Recreation and Tourism indicated a total of 26.3 million visitors in 2012 (Louisiana: Pick Your Passion, 2014). If these visitors are totaled, an estimated 393.9 million people visited the GOM states in a given year.

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<sup>18</sup> State published tourism studies do not use a uniform method of recording or defining visitors. Some states, such as Georgia, use person-trips as their unit of measurement, whereas other states, such as Florida, use visitors. This discrepancy may cause inaccuracies in comparing states.

Table 11. Travel and tourism produced payroll and employment by region (2012).

Region	State/Territory	Payroll				Employment			
		Regional (billions)	Coastal District (billions)	Regional Share (%)	Coastal Share (%)	Regional (thousands)	Coastal District (thousands)	Regional Share (%)	Coastal Share (%)
GOM	Alabama	1.4	0.3	-	3.0	76.7	15.8	-	3.9
	Florida	19.4 <sup>(1)</sup>	5.7	-	61.9	758.7 <sup>(1)</sup>	236.1	-	58.4
	Louisiana	2.0	1.5	-	16.4	102.8	77.2	-	19.1
	Mississippi	1.8	0.6	-	6.4	83.2	26.1	-	6.5
	Texas	15.5	1.1	-	12.3	555.9	49.3	-	12.2
	Subtotal	40.1	9.2	23.0	-	1,577.3	404.4	25.6	-
SA	Florida	19.4 <sup>(1)</sup>	7.3	-	73.2	758.7 <sup>(1)</sup>	285.0	-	68.6
	Georgia	7.3	0.7	-	6.6	238.4	23.2	-	5.6
	North Carolina	4.4	0.8	-	7.6	196.1	38.5	-	9.3
	South Carolina	2.1	1.3	-	12.7	117.3	68.5	-	16.5
	Subtotal	33.2	10.0	30.2	-	1,310.5	415.2	31.7	-
USC	Puerto Rico	-	-	-	-	18.5	-	-	-
	USVI	-	-	-	-	8.3	8.3	-	-
	Subtotal	-	-	-	-	26.8	8.3	-	-
U.S.	(2013)	209.5	-	-	-	7,500.0	-	-	-
(1) Florida's regional payroll and regional employment are reported twice in the GOM and SA regions because they could not be disaggregated by water body.									

Sources: Travel Effect, 2014; World Travel and Tourism Council, 2013; USVI BER, 2013

Within the SA region, the Georgia Department of Economic Development estimated a total of 122.5 million combined day and over-night person-trips in 2011 (Georgia USA, 2012), which would rank Georgia above Florida’s 87.3 million visitors. The North Carolina Department of Commerce’s Division of Tourism, Film and Sports Development estimated 45.4 million person-trips took place in their state in 2012 (North Carolina Department of Commerce, 2013). Claiming the least amount of visitors, South Carolina’s Department of Parks, Recreation and Tourism indicated there were 15.3 million visitors in 2012 (South Carolina: Just Right, 2013a;b). If the SA visitors and person-trips are totaled, there was an estimated 270.52 million people that visited the region in a given year.

Lastly, the number of arrivals to Puerto Rico in 2010 was reported to be 3.68 million (Trading Economics, 2013), and the USVI Bureau of Economic Research indicated 2.64 million visitors in 2012 (USVI BER, 2013). This created a total of 6.32 million visitors to the USC in a given year.

### E. Fisheries and Aquaculture

The U.S. fishing industry has almost doubled in the past 40 years. Figure 3 shows that in 1970, U.S. commercial fishermen landed 2.2 million metric tons of finfish and shellfish valued at \$594.9 million. By 2012, this value increased to 4.2 million metric tons valued at \$5.2 billion (NMFS, 2012). The recreational sector has not grown in the same capacity as the commercial sector. Figure 4 shows that in 1981, there were a documented 54.2 million angler trips responsible for harvesting 226.2 million fish and releasing 103.7 million fish. In 2012, there were 70.8 million angler trips recorded having harvested 141.3 million fish and released 240.3 million fish (NOAA, 2013b).

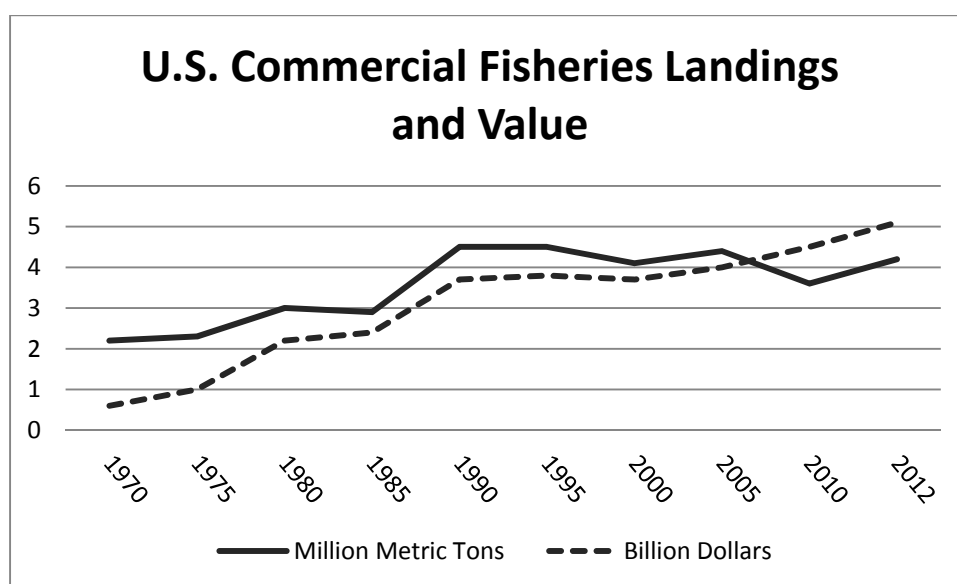


Figure 3. U.S. commercial fisheries landings and values over time.

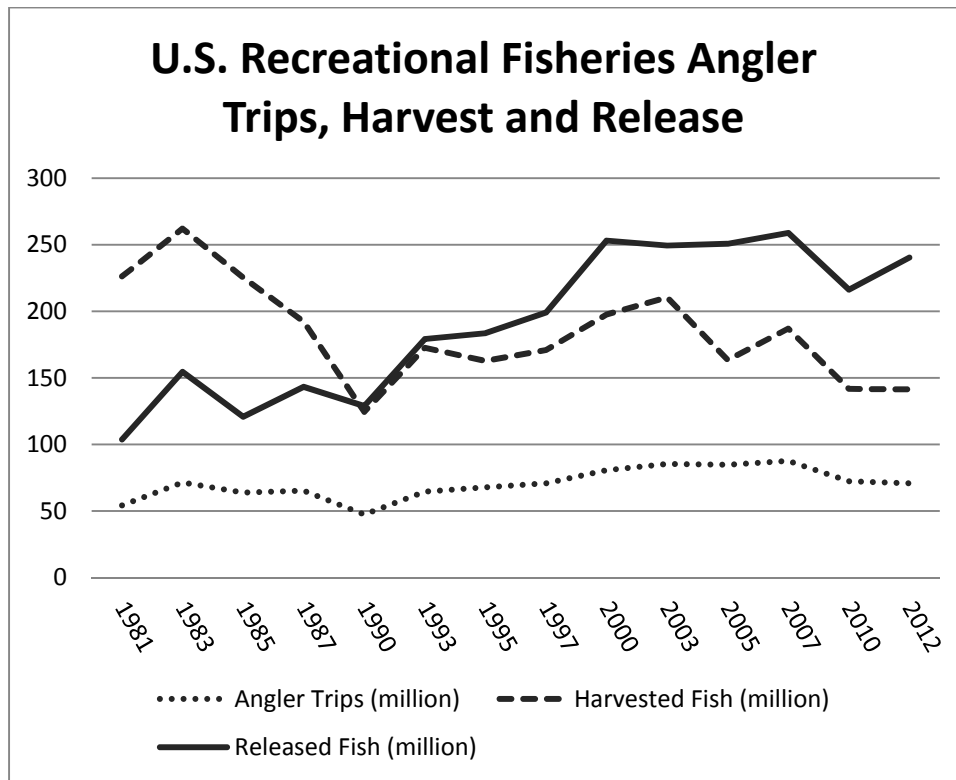


Figure 4. U.S. recreational fisheries angler trips, harvest and release over time.

#### i. Commercial fisheries: landings, revenue and top categories

The GOM generates the most landings and dockside revenues of the three southeast regions. In 2012, the GOM region produced 745,478 metric tons of finfish and shellfish worth about \$754.2 million dollars, which accounted for 17.3% of U.S. total landings and 15.0% of U.S. total dockside revenues. The most valuable species landed were shrimp (mostly brown and white), menhaden, oysters and blue crabs. Louisiana was the most productive fishing state, accounting for 73.0% of the GOM’s commercial landings and 43.5% of its dockside revenues (NMFS, 2012). The top three most economically valued species landed in Louisiana were Gulf menhaden, white shrimp and blue crab (NOEP, 2014). Mississippi landed 15.9% of the region’s commercial catch (NMFS, 2012), and its top three harvested species were Gulf menhaden and white and brown shrimp (NOEP, 2014). These high catch quantities left only 11.1% of total landings to be dispersed between the other three states. In value terms, Texas and western Florida followed Louisiana with 25.7% and 18.6%, respectively, leaving 12.2% between Mississippi and Alabama (NMFS, 2012). Top valued commercial species in Texas were white and

brown shrimp and the eastern oyster. Top valued species for western Florida were Florida stone crab (claws), spiny lobster and red grouper (NOEP, 2014).

The SA region generated 48,994 metric tons worth \$171.6 million dollars in 2012, which was about 1.1% of the U.S. total landings and 3.4% of U.S. dockside value. The most valuable species landed were blue crab, shrimp (mostly brown and white), swordfish and southern flounder. North Carolina had the highest percentage of catch and value at 52.5% of the region's total catch and 42.5% of the region's total dockside revenue (NMFS, 2012). The top three most valued species harvested in North Carolina were blue crab, brown shrimp and southern flounder (NOEP, 2014). Eastern Florida was the second largest contributor with 26.6% of the region's total landings and 33.7% of the region's total value (NMFS, 2012). Its top three species were white shrimp, swordfish and king and cero mackerel (NOEP, 2014). South Carolina's commercial fishery contribution proved to be third highest at 11.5% of regional catch and 14.3% of regional value (NMFS, 2012). The state's top three valued species were white shrimp, blue crab and eastern oyster (NOEP, 2014). Georgia had the smallest contribution to the commercial sector at only 9.4% of total landings and 9.5% of total value (NMFS, 2012), and its top three valued species were white shrimp, blue crab and brown shrimp (NOEP, 2014).

The USC has the smallest commercial fishery of the southeast region, with 1,458 metric tons landed, valued at \$13.5 million dollars in 2012. Puerto Rico contributed 71.9% (1,048 metric tons) of the landings and 60.6% (\$8 million) of the dockside revenues. The USVI provided the remainder of the seafood production. St. Croix produced 15.9% of total regional landings and 22.6% of total regional value, followed by St. Thomas, producing 12.1% of regional landings and 16.8% of regional value. St. John contributed the least. It produced less than 1% of landings and dockside revenue (Bennett, 2014). Between 1983 and 2011, top landed categories in Puerto Rican waters included snapper, spiny lobsters and queen conch (Caribbean Fishery Management Council, 2014).

## **ii. Recreational fisheries: landings, anglers and trips, fishing mode and top categories**

In the GOM region, 5.8 million anglers, 3.1 million of which were residents, harvested 75.8 million pounds (mp) of fish in 2012 (NMFS, 2014; NMFS, 2013)<sup>19</sup>. Of this, western Florida caught 41.7% of the regional total and 61.4% of western Florida's contribution was through private or rental boats. About 23% of catch was derived from chartered vessels and 15.8% was caught from shore. Top categories for western Florida were drum, tuna, mackerel, snapper, and seabass (NOAA, 2013b). Florida also had the highest number of anglers (66.5% of GOM anglers) and angler trips (60.7% of GOM angler

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<sup>19</sup> Texas collects little recreational catch data, and is therefore absent from much of the analysis.

trips) in 2012. Of these anglers, 44.5% were from Florida coastal counties and 55.5% were from out-of-state (NMFS, 2014). Louisiana caught the next highest quantity of fish (38.0%), and 83.2% of the state's contribution was through private or rental boats. 11.5% came from chartered vessels and only 5.2% of fish were caught from shore. Drum was the number one category at almost twenty times more than the next top category (porgies; NOAA, 2013b). Louisiana also had the second highest number of anglers (15.4%) and angler trips (17.0%). The majority of these anglers (72.9%) were from Louisiana coastal counties, 18.5% were from out-of-state and 8.6% were from non-coastal counties (NMFS, 2014).

Alabama caught the third highest quantity of fish at 12.6% of the regional amount, with 55.8% from private or rental boats, 34.9% from shore and 9.4% from chartered vessels. Top categories were drum, tuna, mackerel and snapper (NOAA, 2013b). Alabama had 12.5% of the region's anglers and 9.5% of the region's angler trips. 46.8% were out-of-state anglers, 35.1% were from coastal counties, and 18.1% were from non-coastal counties (NMFS, 2014). Following Alabama, Mississippi contributed 7.7% to the regional landed catch, with 67.6% from private or rental boats, 28.9% from shore and only 3.6% from chartered vessels. Top categories were drum and herring (NOAA, 2013b). Mississippi had only 5.7% of the region's anglers and 8.0% of the region's angler trips. The majority of these anglers (54.2%) were from coastal counties, and the remaining anglers were split between out-of-state (27.6%) and non-coastal counties (18.2%; NMFS, 2014). Lastly, Texas held only 4.8% of the GOM's angler trips (NMFS, 2014)<sup>20</sup>. Louisiana and the western coast of Florida had higher chartered vessel activity than shore based fishing activity, and the reverse was true for Alabama and Mississippi (NOAA, 2013b).

Over 4.3 million SA recreational anglers (NMFS, 2014) landed 33.82 mp of fish in 2012, a little under half of what the GOM landed (NOAA, 2013b). The eastern coast of Florida landed the most fish at 48.5% of the regional total. 72.0% of Florida's catch was from private or rental boats, 20.8% was caught from shore and only 7.2% was from chartered vessels. Top categories were drum, dolphin, jacks, tuna and mackerel (NOAA, 2013b). Florida had the highest number of anglers (38.6%) and angler trips (52.8%) for the SA region as well (NMFS, 2014). North Carolina followed Florida closely with 35.7% of the regional total. North Carolina uses slightly different classifications, but 42.3% of the state's catch came from chartered vessels, and this percentage is higher than any other GOM or SA state. 41.3% of catch was landed through private or rental boats, 10.1% from man-made sources and only 6.3% from a beach or bank (shore). Top categories were tuna, mackerel, dolphin and drum (NOAA, 2013b). North Carolina held 37.8% of the region's anglers and 29.9% of the region's angler trips. 46.0% of the state's anglers were from out-of-state, followed by coastal counties (37.0%) and non-coastal counties (17.0%; NMFS, 2014). Third for the SA was South Carolina, contributing 11.7% to the regional total, with

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<sup>20</sup> Texas collects only effort data (angler trips).

71.9% from private or rental boats, 19.3% from shore and only 3.8% from chartered vessels. Top caught categories were drum, dolphin, tuna and mackerel (NOAA, 2013b). South Carolina had 16.7% of the SA's anglers and 12.4% of angler trips. The majority of South Carolina's anglers (55.2%) were from out-of-state, followed by 28.1% from coastal counties and 16.7% from non-coastal counties (NMFS, 2014). Lastly, Georgia caught only 4.1% of the region's recreational catch, with 88.8% from private or rental boats, and only 7.1% and 4.1% from shore and chartered vessels. Top categories were drum, porgies and mullet (NOAA, 2013b). Georgian anglers equaled only 6.9% and 5.0% of the region's total anglers and angler trips, respectively. 44.1% of these anglers were from coastal counties, 31.6% were from non-coastal counties, and 24.3% were from out-of-state (NMFS, 2014).

Puerto Rico's 93.8 thousand anglers (NMFS, 2014) caught 1.25 mp of fish, with the overwhelming majority of 96.9% of its catch being landed from private or rental boats. About 3% of the island's recreational catch came from shore based fishing and only 0.2% came from chartered vessels. Top categories were dolphinfish, tuna, mackerel and snapper (NOAA, 2013b). The majority (89.3%) of Puerto Rico's anglers were from within the commonwealth, with the remaining 10.7% from outside the territory (NMFS, 2014). Currently, the USVI does not routinely collect recreational catch data; however, NOAA's Marine Recreational Information Program (MRIP) is expected to start collecting recreational landings and effort data in the coming years.

### **iii. Aquaculture: production, value and farms**

Aquaculture production lags wild-caught seafood production partly due to current regulatory restrictions. Today it accounts for 5.8% of the combined seafood produced in the U.S. (NMFS, 2012). The 2013 Census of Aquaculture reports that the GOM and SA regions combined were responsible for 44.9% of U.S. aquaculture sales and 52.1% of U.S. aquaculture farms (USDA, 2014).

The GOM states alone housed 44.3% of the nation's aquaculture facilities, which generated \$553.2 million.<sup>21</sup> Of the 1,371 farms in the GOM states, 500 (36.5%) were located within Louisiana and 393 (28.7%) within Florida. Most common in Louisiana were crustacean farms, as these were 81.4% (500) of the state's farms. Second to crustaceans were mollusks, comprising 7.8% (39) of Louisiana's farms. 48 of Louisiana's farms were saltwater fed, indicating that at least 9.6% of the state's farms were

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<sup>21</sup> Florida aquaculture facilities and sales could not be separated by coast, and therefore are counted for both the GOM and SA.



coastal (USDA, 2014).<sup>22</sup> In 2013 crawfish were the most farmed crop in terms of both total production and gross farm value at 101.8 mp farmed and a total value of \$137.5 million. Second in total production were turtles at 4.0 million individuals, followed by catfish at 1.8 million lbs. Second in gross farm value were farmed alligators at \$79.1 million, followed by oysters at \$40.7 million (LSU AgCenter, 2013).

Florida held the second highest number (28.7%) of aquaculture farming facilities in the GOM with 393. 33.6% (132) of those farms were dedicated to producing mollusks, 32.3% (127) produced ornamental fish, and 14.8% (58) produced fish for human consumption. Florida had the largest percentage of saltwater sourced farms of any region at 43%. Following Florida, Mississippi held 16.3% (224) of the nation's aquaculture facilities. The large majority (96.4%) of Mississippi's farms produced fish for human consumption, and the state had no saltwater sourced farms (USDA, 2014). After ornamental fish at \$27.3 million, the next highest valued species in 2012 were mollusks totaling \$11.9 million, followed by farmed alligators at \$8.0 million (USDA, 2013). Alabama had 156 farms, with 94.2% of them producing fish for human consumption. Only 3.8% (6) of these facilities had saltwater sources. Texas had the fewest farms (98) of the GOM. 73.5% of these farms were used to produce fish for human consumption, and 23.5% produced crustaceans. Texas was second to Florida in saltwater fed farms with 14.3% (19) of its farms (USDA, 2014). In 2011 catfish was Texas' biggest aquaculture crop, with production levels at 14.4 mp valued at \$14.4 million. Second to catfish were hybrid striped bass at 3.5 mp and \$9.4 million, followed by red drum at 3.3 mp and \$9.0 million (Treece, 2012).

The SA region held 20.5% of the nation's aquaculture facilities, generating \$141.2 million in aquaculture sales. Second to Florida, North Carolina was the leading aquaculture producer with 23.1% (146) of the region's farms. About 64% of North Carolina's facilities produced fish for human consumption, and 15.1% produced mollusks. 17.8% (26) of the state's farms are saltwater fed. Georgia was third in aquaculture production with 62 farms. 72.6% of its farms produced fish for human consumption and 9.7% (6) of the state's farms were saltwater fed. Lastly, South Carolina held 32 farms with 40.6% producing fish for human consumption and 31.3% producing crustaceans. 31.3% (10) of South Carolina's farms were saltwater fed (USDA, 2014). Aquaculture production in the USC is very minor.

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<sup>22</sup> The Census of Aquaculture defines saltwater as water from a sea or ocean, including brackish water. Freshwater converted to saltwater by adding chemicals was sourced as freshwater.

## 4. Summary and Conclusions

The purpose of this review was to offer an overview of the economic importance of key sectors that draw from marine and coastal resources within the southeast region. The southeast region contributes over one-third of the nation's GDP and employment opportunities. Oil and gas production, maritime transportation, tourism and fisheries were identified as important sources of economic growth and employment. Oil production was the most economically important natural resource-based activity in the southeast. In 2012, 94.2 million barrels of oil were produced valued at \$9.1 billion. Tourism generated \$206.7 billion in tourism and travel related expenditures (23.3% of the nation's total), \$31.5 billion in taxes and supported 3 million jobs. Locally caught and grown seafood was found to play a significant role in providing food security. Local commercial fleets harvested 1,766 mp (2.5 million metric tons) of finfish and shellfish worth \$925.8 million which is about 18.4% of the nation's seafood supply and dockside revenues. The southeast region held 52% of the nation's aquaculture farms, and aquaculture sales generated an additional \$616.4 million. Southeast ports moved 52.2% of the nation's cargo, 27% of the nation's container traffic, and were responsible for shipping \$3.8 trillion worth of exports and imports.

We also found that these diverse sectors tended to vary across space partly reflecting the states' pursuit of economic growth opportunities. For example, while Louisiana became more invested in oil and gas production to boost its economy, Florida emphasized coastal tourism and fishing industry. For a number of decades, Florida has banned the exploration for oil and natural gas and the sale of drilling leases on the state's ocean floor; however, environmentally-friendly, economic growth policies may help hedge against rare external shocks but cannot necessarily prevent them. For instance, following the Deep Water Horizon (DWH) spill of 2010, about 40% of the GOM's fishing grounds were temporarily closed to commercial and recreational fishermen. Kroh and Conathan (2012) estimated that the GOM region lost \$8.7 billion in economic impacts and 20,000 jobs over a 7-year period because of the spill. Additionally, areas of the GOM that experienced little to no physical effects from the DWH spill, such as Fort Myers, FL, experienced a severe drop in tourism because of contamination concerns (Reuters, 2012). Oil spills can also hurt the region's coastal amenity value, hurting coastal real estate and property values, as well as environmental quality and other aesthetic and non-use values.

We found that even within economic sectors, regions selected diverse growth policies. For example, within the maritime transportation sector, the GOM favored more cargo shipping with industrial port activity (e.g., loading and offloading of loose break-bulk materials) whereas the SA and USC favored the cruise industry and ports that cater more to tourists. These different choices are

significant because they create dissimilar environmental footprints. For instance, the shipping industry is known to be plagued by invasive species transported by vessels' ballast water. Invasive species problems tend to impact the cargo shipping industry more than the cruise industry because as vessels unload their cargo, they must take on the lost weight in ballast water. Water and any occurring biological species from one region are then transported to another region (Buck, 2012). Due to the magnitude of international cargo that passes through GOM ports relative to the SA and USC, the GOM region is at a greater risk for invasive species outbreaks.

In addition to tradeoffs between sectors and regions, the southeast U.S. must also consider tradeoffs in relation to coastal hazards, including sea level rise, soil erosion and storm surge from hurricanes and tropical storms. Coastal areas need to build and maintain more resilient infrastructure, including coastal buildings, ports and vessels. Increased coastal populations increase the potential economic cost of coastal hazards, including costs to prevent damage, costs to rebuild from damage, and insurance and disaster claims.

Finally, we conclude by stressing the need for additional work and coordination in developing comprehensive ecosystem based coastal and marine resource management plans. As human populations continue to grow and societal needs evolve, increased demands will be placed over ecosystems which will require revisiting past choices. For instance, advancing waterborne commerce will require expanding cargo shipping and port facilities, and increasing seafood production will require the development of offshore aquaculture facilities. It is likely that these new demands will come in conflict with other established users because of siting and environmental degradation concerns. Hence, decision-makers will be pressed to foster policies that reconcile ecosystem protection with the need for sustained economic growth. While these dual goals are not necessarily competing in the long-run, short-term tradeoffs may be required to achieve them (e.g., losses in habitats, including wetlands, corals and sea grass beds vs. employment opportunities and tax revenues). Also, because management plans are highly fragmented and administered by a variety of federal, state and local government agencies, decision-makers will have to better coordinate across these government bodies. This report makes a small contribution to address these challenges by identifying the economic contributions of key economic sectors in the southeast.

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## Acknowledgments

We would like to express our gratitude to our reviewers, with special regard to the critical review of Scott Crosson, Alexander Chester, Maria Estevanez, David Letson and Joshua Grubman. We would like to thank Joshua Bennett for providing commercial fisheries data for the Caribbean region. We would also like to acknowledge the assistance of Robert Jones, who helped provide aquaculture data and resources. We would additionally like to thank Geoffrey Shideler for sharing state tourism data, and Akbar Marvasti for providing resources on deep sea minerals. The views and opinions expressed or implied in this article are those of the authors and do not necessarily reflect the position of the National Marine Fisheries Service, NOAA.