The Economic Importance of the U.S. Private Shipbuilding and Repairing Industry

Maritime Administration (MARAD)

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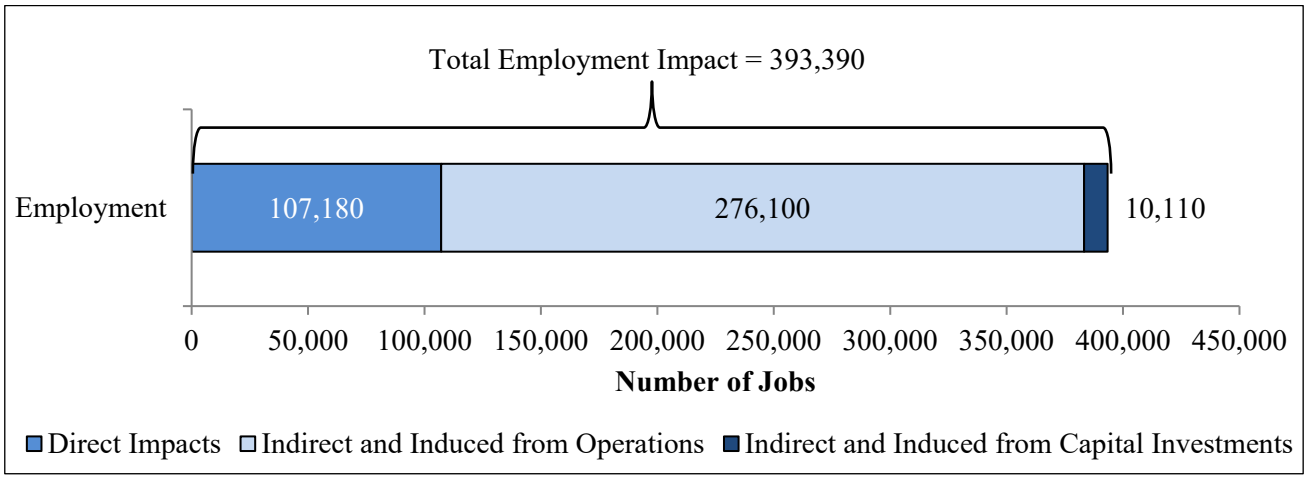
Executive Summary

The U.S. private shipbuilding and repairing industry is comprised of establishments that are primarily engaged in operating shipyards, which are fixed facilities with drydocks and fabrication equipment. Shipyard activities include ship construction, repair, conversion and alteration, as well as the production of prefabricated ship and barge sections and other specialized services. The industry also includes manufacturing and other facilities outside of the shipyard, which provide parts or services for shipbuilding activities within a shipyard.

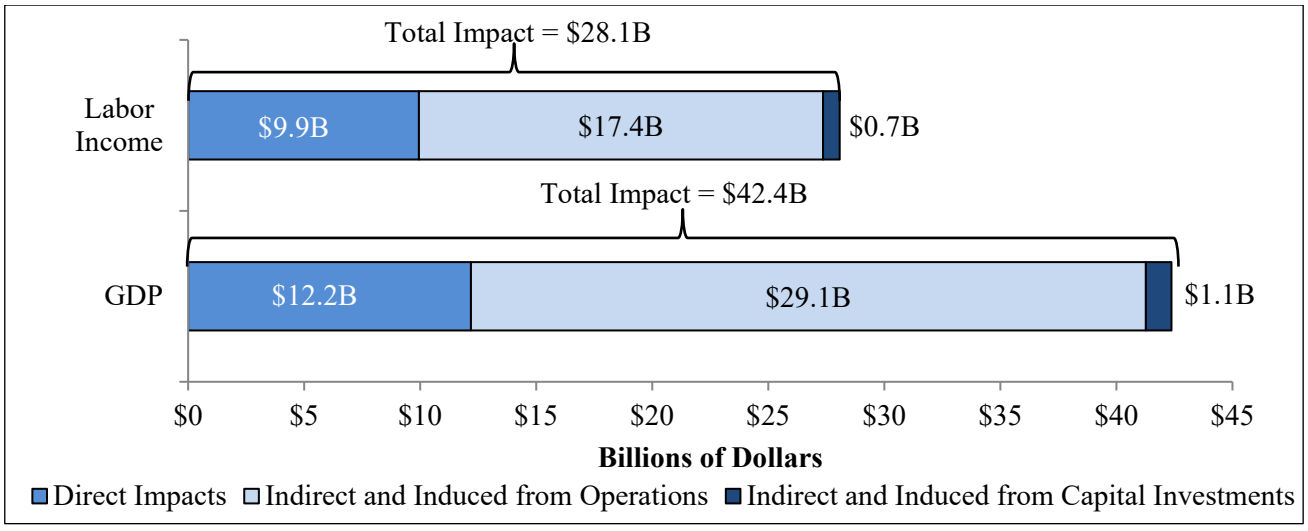
In 2019, the U.S. private shipbuilding and repairing industry directly provided 107,180 jobs (see **Figure E1**, below), $9.9 billion in labor income, and $12.2 billion in gross domestic product, or GDP, to the national economy (see **Figure E2**, below). Including direct, indirect, and induced impacts, on a nationwide basis, total economic activity associated with the industry reached 393,390 jobs, $28.1 billion of labor income, and $42.4 billion in GDP in 2019.

Figure E1: Total Employment Impact Attributable to the U.S. Private Shipbuilding and Repairing Industry, 2019



Source: Calculations using the IMPLAN modeling system (2019 database).

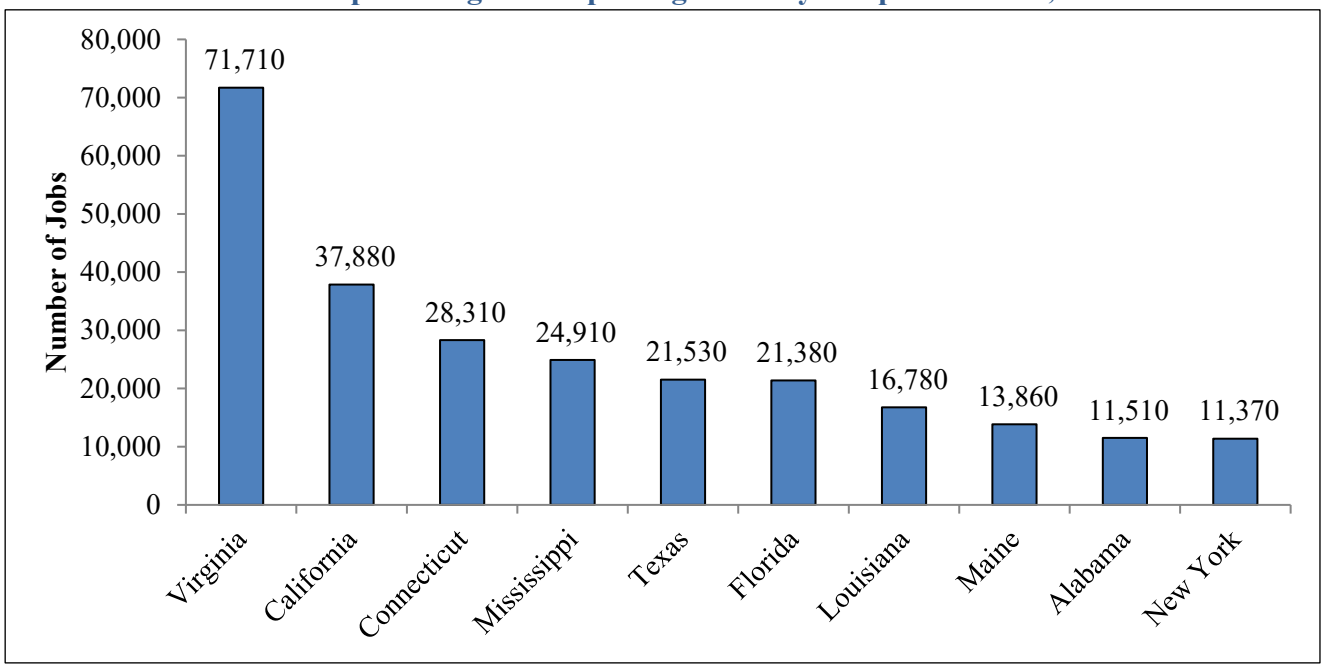
Figure E2: Total Labor Income and GDP Impacts Attributable to the U.S. Private Shipbuilding and Repairing Industry, 2019



Source: Calculations using the IMPLAN modeling system (2019 database).

The industry impact by state varies based on the level of direct activity and the share of the supply chain included in the state. The states with the highest levels of overall direct, indirect, and induced employment associated with the industry are Virginia, California, Connecticut, Mississippi, and Texas (see **Figure E3**).

Figure E3: Total (Direct, Indirect, and Induced) Employment Impact Attributable to the U.S. Private Shipbuilding and Repairing Industry: Top Ten States, 2019



Source: Calculations using the IMPLAN modeling system (2019 database).

Considering the indirect and induced impacts, each direct job in the U.S. private shipbuilding and repairing industry is associated with another 2.67 jobs in other parts of the U.S. economy; each dollar of direct labor income and GDP in the U.S. private shipbuilding and repairing industry is associated with another $1.82 in labor income and $2.48 in GDP, respectively, in other parts of the U.S. economy.

Currently there are 154 private shipyards in the United States, spread across 29 states and the U.S. Virgin Islands, that are classified as active shipbuilders. In addition, there are more than 300 shipyards engaged in ship repairs or capable of building ships but not actively engaged in shipbuilding.[1] The majority of shipyards are located in the coastal states, but there also are active shipyards on major inland waterways such as the Great Lakes, the Mississippi River, and the Ohio River. Employment in shipbuilding and repairing is concentrated in a relatively small number of coastal states, with the top five states accounting for 64 percent of all private employment in the shipbuilding and repairing industry.

The Federal government, including the U.S. Navy, U.S. Army, and U.S. Coast Guard, is an important source of demand for U.S. shipbuilders. While less than three percent of the vessels delivered in 2020 (16 of 608) were delivered to U.S. government agencies, 14 of the 15 deliveries of large deep-draft vessels were to the U.S. government: seven to the U.S. Navy and seven to the U.S. Coast Guard.

[1] See www.shipbuildinghistory.com for details. www.shipbuildinghistory.com is maintained by Tim Colton, a professional with more than 60 years of experience in the shipbuilding industry. His resume is accessible at http://shipbuildinghistory.com/resume.htm.

The purpose of this report is to measure the economic importance of the U.S. private shipbuilding and repairing industry at the national and state levels for calendar year 2019. The importance of the industry is not limited to the direct output and employment it generates (i.e., "direct impact"). Companies in the shipbuilding and repairing industry purchase inputs from other domestic industries, contributing to economic activity in those sectors (i.e., "indirect" impact). Employees spend their incomes, helping to support the local and national economies (i.e., "induced" impact). Thus, the economic importance of the U.S. private shipbuilding and repairing industry includes direct, indirect, and induced effects. Put differently, the report seeks to document what happens in the U.S. private shipbuilding and repairing industry and its relationships to the broader economy. It is important to note that the term "economic impacts" as used in this report reflects the association of employment, labor income, and gross domestic product (GDP) with the U.S. private shipbuilding and repairing industry (including the economic effects of services performed for the government), but does not imply that some of this economic activity would not otherwise exist without the industry.

The IMPLAN model, an input-output (I-O) model based on Federal government data, was used to estimate the industry's overall economic impact. I-O modeling is typically employed to analyze how a change in economic activity in one sector of the economy affects activities in other sectors of the economy. In a so-called "marginal" impact analysis, I-O model results can be viewed as showing the impact of small changes in activity in one sector (e.g., shipbuilding) on the rest of the economy before any price adjustments and any adjustments away from other sectors of the economy. The ultimate economic impact of a change in activity can be less pronounced than shown in initial I-O results, particularly if induced price changes are large.

I-O models can also be used in an economic contribution analysis, as done in this study. By simulating a "complete shutdown" of an existing industry, an economic contribution study attempts to quantify the portion of a region's economy that can be attributed to such an existing industry. It uses the I-O model to identify all backward (i.e., upstream) linkages in the study area. An economic contribution analysis, when compared with the entire study area economy, offers insights into the relative extent and magnitude of the industry in the study area. However, this is not to say that a complete shutdown of the shipbuilding and repairing industry would result in the permanent loss of the jobs and output attributable to the industry through this exercise. In this unlikely event, the resources currently allocated to the shipyards may find employment in other industries, which would compensate in part for the loss of the jobs and output from the shipyard sector.

The study disaggregates the industry's economic activity into two components: operational and capital investment impacts. The operational impact is from purchases of intermediate goods and services, and the capital investment impact is from investment in new structures and equipment.[2] These economic impacts represent all of the backward linkages of the U.S. shipbuilding and repairing industry to its suppliers. They do not capture any forward linkages (i.e., the economic impact on production in sectors that use ships or other shipyard products as an input).

[2] The IMPLAN model results were adjusted to include the economic activity attributable to capital spending by the shipbuilding and repairing sector.

I. Introduction

The purpose of this report is to quantify the economic importance of the U.S. private shipbuilding and repairing industry in 2019, in terms of employment, labor income, and GDP.[3] The study quantifies the industry's ***operational impact*** (due to its purchases of intermediate inputs) and ***capital investment impact*** (due to its investment in new structures and equipment) at the national and state level. These economic impacts represent all of the backward linkages of the U.S. shipbuilding and repairing industry to its suppliers. They do not capture any forward linkages (i.e., the economic impact on production in sectors that use ships as an input). All economic impacts are reported in gross terms, which means they do not take account of what would have taken place in the absence of the shipbuilding and repairing industry.

In describing the economic importance of the U.S. private shipbuilding and repairing industry through its employment and purchases of goods and services, this report considers three separate channels—the direct impact, the indirect impact, and the induced impact—that in aggregate provide a measure of the economic importance of the U.S. private shipbuilding and repairing industry.

- **Direct impact** is measured as the jobs, labor income, and GDP within the U.S. private shipbuilding and repairing industry.
- **Indirect impact** is measured as the jobs, labor income, and GDP occurring throughout the supply chain of the U.S. private shipbuilding and repairing industry. The indirect impact also includes suppliers to the companies providing goods and services to the U.S. private shipbuilding and repairing industry.
- **Induced impact** is measured as the jobs, labor income, and GDP resulting from household spending of labor income earned either directly or indirectly from the U.S. private shipbuilding and repairing industry's spending under standard input-output modeling assumptions. It should be interpreted with caution as it involves personal spending decisions by employees of shipyards and its supply chain that are further removed from direct shipyard expenditure activities and are more difficult to estimate.

Together these effects demonstrate the private shipbuilding and repairing industry's economic importance and relationship to all sectors of the U.S. economy.

The IMPLAN model, an input-output (I-O) model based on Federal government data, was used to estimate the industry's overall economic impact. I-O modeling is typically employed to analyze how a change in economic activity in one sector of the economy affects activities in other sectors of the economy. In a so-called "marginal" impact analysis, I-O model results can be viewed as showing the impact of small changes in activity in one sector (e.g., shipbuilding) on the rest of the economy before any price adjustments and any adjustments away from other sectors of the economy. The ultimate economic impact of a change in activity can be less pronounced than shown in initial I-O results, particularly if induced price changes are large.

I-O models can also be used in an economic contribution analysis, as done in this study. By simulating a "complete shutdown" of an existing industry, an economic contribution study attempts to quantify the portion of a region's economy that can be attributed to such an existing industry. It uses the I-O model to identify all backward (i.e., upstream) linkages in the study area. An economic

[3] Gross domestic product (GDP) reflects the income earned by labor (e.g., wages and salaries) and capital (e.g., profits) and any indirect business taxes (including excise taxes, property taxes, fees, licenses, and sales taxes paid by businesses).

contribution analysis, when compared with the entire regional economy, offer insights into the relative extent and magnitude of the industry in the study area. However, this is not to say that a complete shutdown of the shipbuilding and repairing industry would result in the permanent loss of the jobs and output attributable to the industry as these resources may find employment in other industries.

The rest of this report is organized as follows. **Section II** provides a brief overview of the U.S. private shipbuilding and repairing industry. **Section III** presents estimates of the industry's economic impact in 2019 in terms of employment, labor income, and GDP at the national and state levels. **Appendix A** provides additional details on the industry's economic impact at the state level. **Appendix B** provides a description of the data sources and methodology used for the study.

II. Overview of the U.S. Private Shipbuilding and Repairing Industry

A. Industry Definition

Economic activity directly associated with the U.S. private shipbuilding and repairing industry is primarily captured in government data under the North American Industry Classification System (NAICS) sector 336611, Shipbuilding and Repairing. According to the U.S. Census Bureau, this industry comprises establishments that are primarily engaged in operating shipyards, which are fixed facilities with drydocks and fabrication equipment. Shipyard activities include ship construction, repair, conversion, and alteration. They also include the production of prefabricated ship and barge sections, and other specialized services.[4] The industry may also include manufacturing and other facilities outside of the shipyard, which provide parts or services for ship building activities within a shipyard.

The industry also includes a portion of NAICS sector 488390, Other Support Activities for Water Transportation. Among other activities, NAICS sector 488390 includes routine repair and maintenance of ships from floating drydocks, as well as ship scaling services not done in a shipyard. According to the 2017 Economic Census, approximately 76.7 percent of the revenues of NAICS sector 488390 were derived from routine repairs and maintenance of maritime vessels.[5]

B. Description of the Industry

Currently there are 154 private shipyards in the United States, spread across 29 states and the U.S. Virgin Islands, that are classified as active shipbuilders. In addition, there are more than 300 private shipyards engaged in ship repairs or capable of building ships but not actively engaged in shipbuilding.[6] As shown in **Figure 1**, below, the majority of active shipbuilders are located in the coastal states. However, there also are active shipyards on major inland waterways such as the Great Lakes, the Mississippi River, and the Ohio River. The industry also includes manufacturing and other facilities outside of these shipyards that provide parts or services for the shipbuilding and repairing industry. Furthermore, the industry includes routine maintenance and repairs conducted from floating drydocks. As a result, the scope of economic activity directly attributable to the U.S. shipbuilding and repairing industry[7] is wider than the 29 states with active private shipyards, as displayed in **Figure 1**, below.

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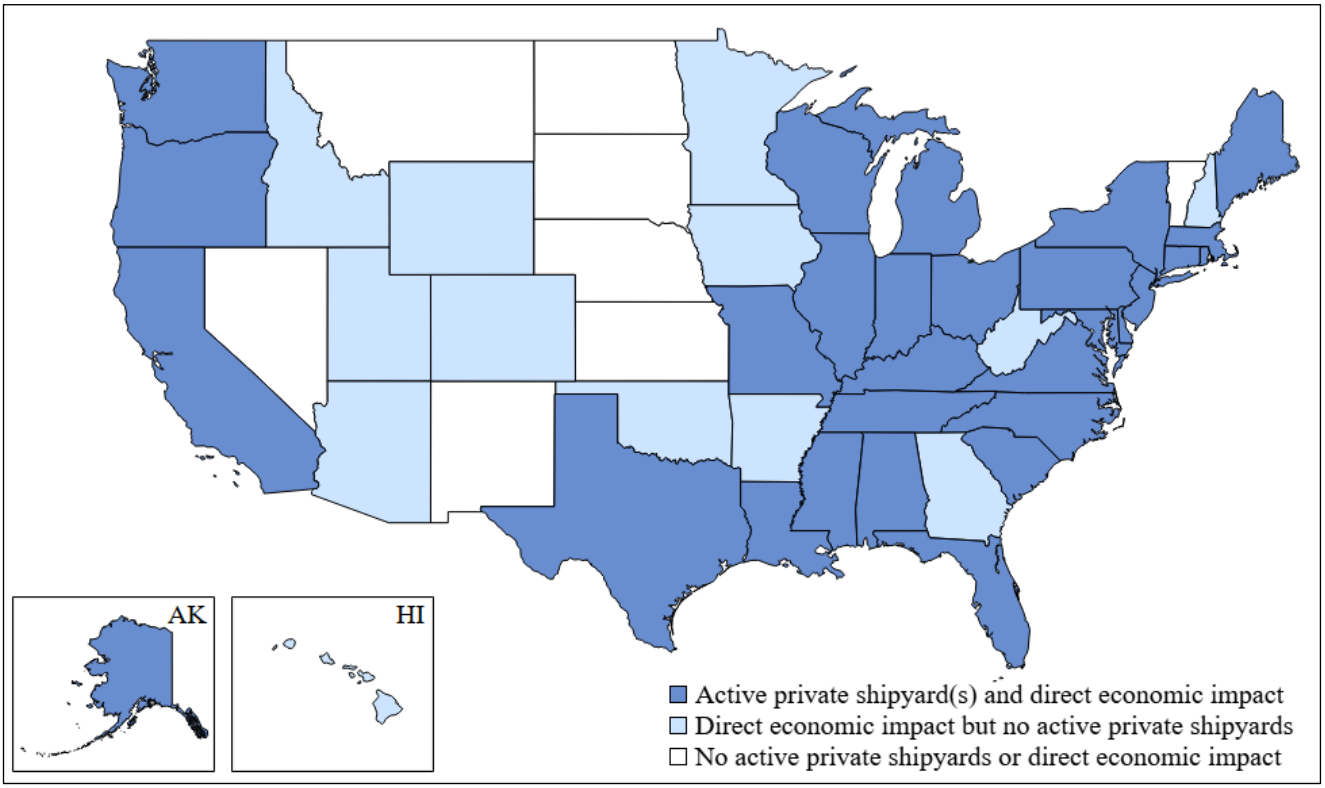
[4] https://www.census.gov/cgi-bin/sssd/naics/naicsrch?chart=2017

[5] U.S. Census Bureau, 2017 Economic Census, "All Sectors: Industry by Products for the U.S.: 2017."

[6] See the directory of shipyards at http://shipbuildinghistory.com. Of the 154 private shipyards summarized in Figure 1, 25 are mid-sized to large shipyards capable of building naval ships and submarines, oceangoing cargo ships, drilling rigs and high-value, high-complexity mid-sized vessels, and 129 are smaller yards capable of building the simpler types of smaller commercial vessels, such as tugs, towboats, offshore service vessels, fishing vessels, ferries and barges. In addition to these 154 private shipyards, there are five public shipyards operated by the U.S. Navy or U.S. Coast Guard and eight shipyards that actively or occasionally produce large yachts. Shipbuildinghistory.com also lists more than 300 shipyards and boatyards that are classified as inactive.

[7] Information on the BLS definition of the scope of activities included in the industry can be found at https://data.bls.gov/cew/apps/bls_naics/v2/bls_naics_app.htm#tab=search&naics=2017&keyword=336611&searchType=titles&fromHier=true&filter=nothing&sort=text_asc&resultIndex=0

Figure 1: States with Active Private Shipbuilders and Direct Economic Impact from the Private Shipbuilding and Repairing Industry



Source: Directory of shipyards at http://shipbuildinghistory.com and data from the U.S. Census Bureau, U.S. Bureau of Labor Statistics, and U.S. Bureau of Economic Analysis.

1. Private Employment

The U.S. private shipbuilding and repairing industry accounted for an estimated 107,180 jobs in 2019, including both payroll employees and self-employed workers and both full-time and part-time workers. The vast majority of these jobs (100,830) were in shipbuilding and repairing (NAICS sector 336611), with the remainder (6,350) accounted for by routine maintenance and repair conducted outside of a shipyard (NAICS sector 488390).[8]

Employment in private shipbuilding and repairing is concentrated in a relatively small number of states (see **Figure 2**, below). As shown in **Table 1**, below, 64 percent of all private direct employment in the industry is located in just five states: Virginia, Connecticut, Mississippi, California, and Louisiana.

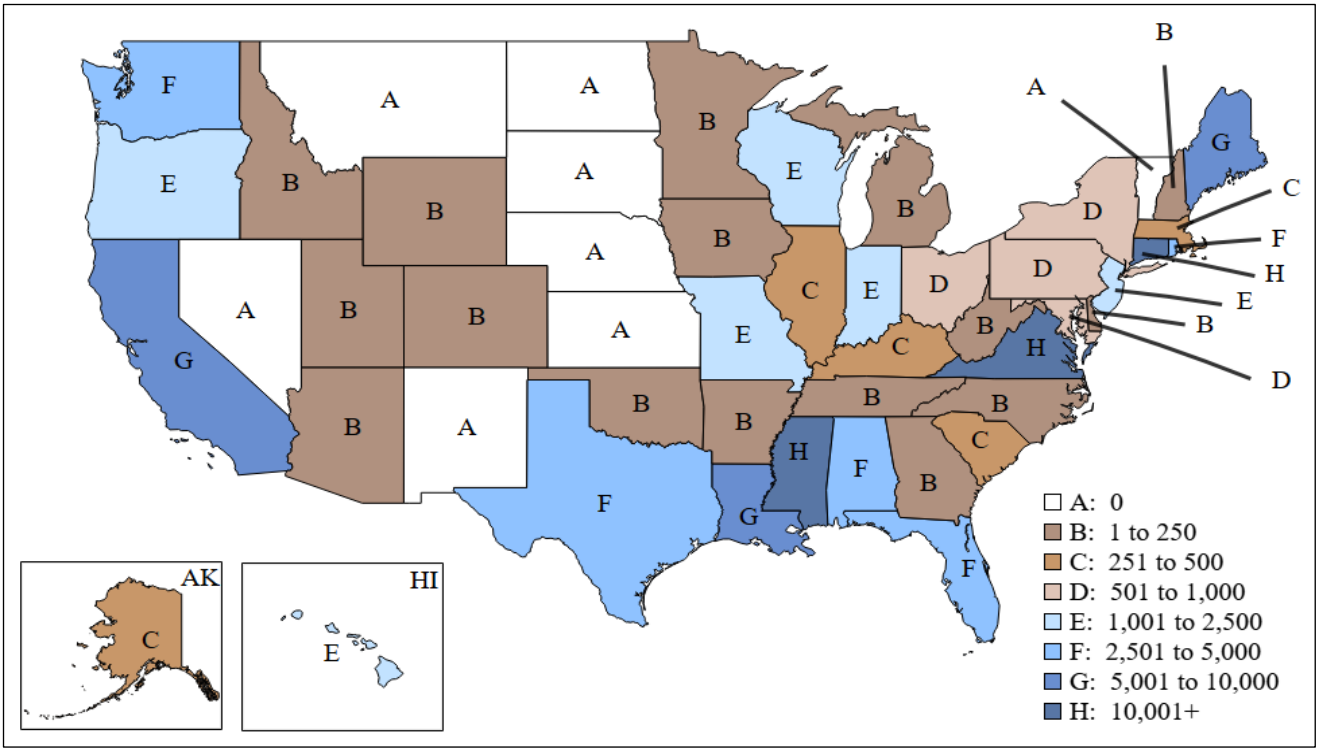
[8] These numbers do not include Federal government employment. According to the U.S. Bureau of Labor Statistics, total employment at Federal government-operated shipyards was 39,156 in 2019.

Table 1: Total Direct Employment in the U.S. Private Shipbuilding and Repairing Industry: Top 10 States, 2019

State	Private Employment[a]	Percent of U.S. Total
Virginia	30,270	28.2%
Connecticut	11,820	11.0%
Mississippi	11,190	10.4%
California	8,490	7.9%
Louisiana	6,620	6.2%
Maine	5,700	5.3%
Florida	4,700	4.4%
Alabama	4,290	4.0%
Texas	3,400	3.2%
Rhode Island	2,580	2.4%
All other states combined	18,120	16.9%
U.S. Total	**107,180**	**100%**

Source: Estimates based on data from the U.S. Census Bureau, U.S. Bureau of Labor Statistics, and U.S. Bureau of Economic Analysis.
Note: Details may not add to totals due to rounding.
[a] Employment is defined as the number of payroll and self-employed jobs, including part-time jobs.

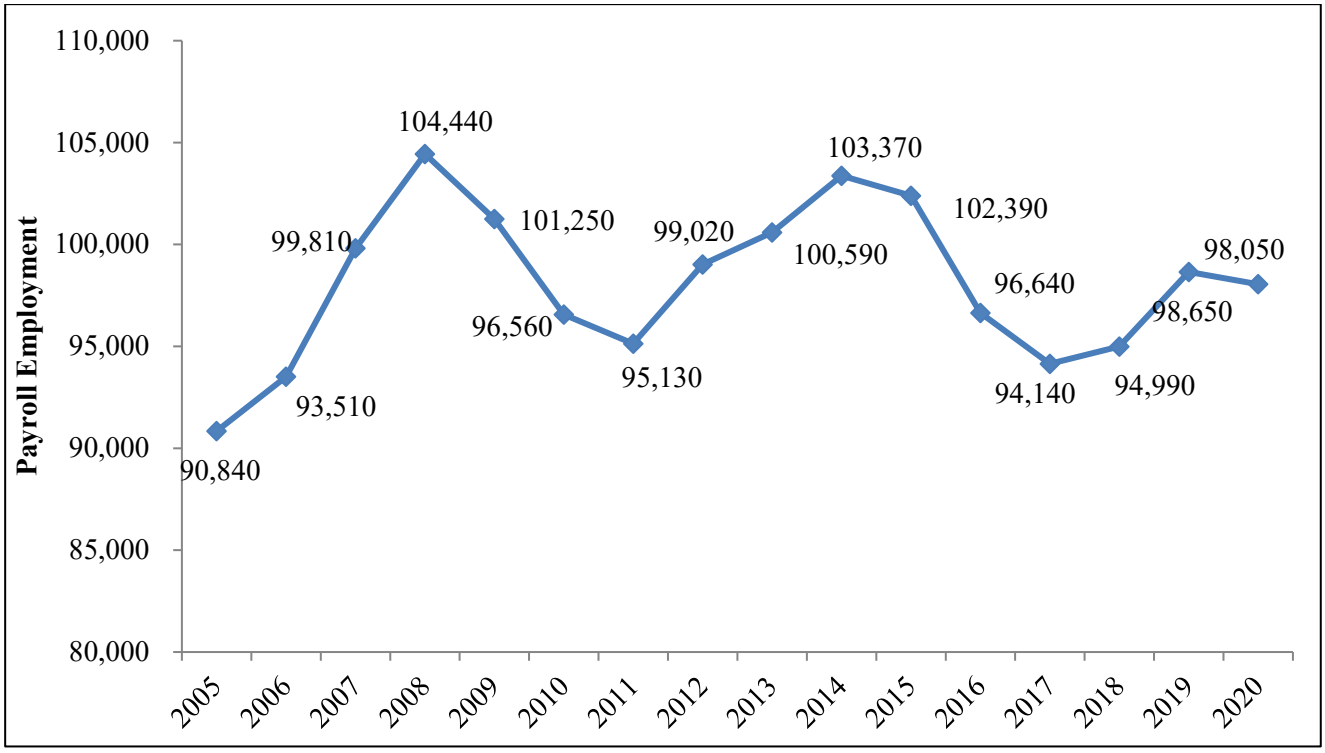
Figure 2: Direct Employment in the U.S. Private Shipbuilding and Repairing Industry by State, 2019



Source: Estimates based on data from the U.S. Census Bureau, U.S. Bureau of Labor Statistics, and U.S. Bureau of Economic Analysis.

Nearly all jobs in the U.S. private shipbuilding and repairing industry are payroll jobs. In 2019, private payroll employment accounted for 98,650 of the total 100,830 jobs in NAICS sector 336611, or 98 percent of the total, with self-employed jobs accounting for the remainder. Private sector payroll employment in NAICS 336611 grew rapidly between 2005 and 2008, from 90,840 to 104,440 (see **Figure 3**). As a result of the global recession that began in the United States in 2008, the industry contracted, losing more than 9,000 payroll jobs between 2008 and 2011, before rebounding in 2012. After 2014, private sector payroll employment in NAICS sector 336611 started to decline again, reaching a low of 94,140 in 2017, before rebounding to 98,650 in 2019. For the first six months of 2020, private sector payroll employment declined by 600 jobs due to the Covid-19 pandemic to 98,050.

Figure 3: Direct Payroll Employment in the U.S. Private Shipbuilding and Repairing Industry, 2005 to 2020*



Source: Total private sector payroll employment for NAICS sector 336611 from U.S. Bureau of Labor Statistics, *Quarterly Census of Employment and Wages* (Downloaded March 1, 2021). Excludes the portion of the industry classified in NAICS sector 488390.
*Data for 2020 is average for January through June.

2. Labor Income

Total labor income in the U.S. private shipbuilding and repairing industry (including wages and salaries and benefits as well as proprietors' income) amounted to $9.9 billion in 2019. As with private employment, industry labor income is concentrated in a relatively small number of states, with five states (Virginia, Connecticut, Mississippi, California, and Louisiana) accounting for 67 percent of all direct labor income for the private U.S. shipbuilding and repairing industry (see **Table 2**, below).

Average labor income per job was approximately $92,770 in 2019, 49 percent higher than the national average for the private sector economy ($62,090).

Table 2: Total Direct Labor Income in the U.S. Private Shipbuilding and Repairing Industry: Top 10 States, 2019

State	Private Labor Income[a] ($ millions)	Percent of U.S. Total
Virginia	$3,101.4	31.2%
Connecticut	$1,347.0	13.5%
Mississippi	$952.8	9.6%
California	$748.0	7.5%
Louisiana	$541.2	5.4%
Maine	$465.1	4.7%
Alabama	$368.0	3.7%
Florida	$344.8	3.5%
Texas	$280.4	2.8%
Washington	$237.1	2.4%
All other states combined	$1,324.0	13.3%
U.S. Total	**$9,943.2**	**100%**

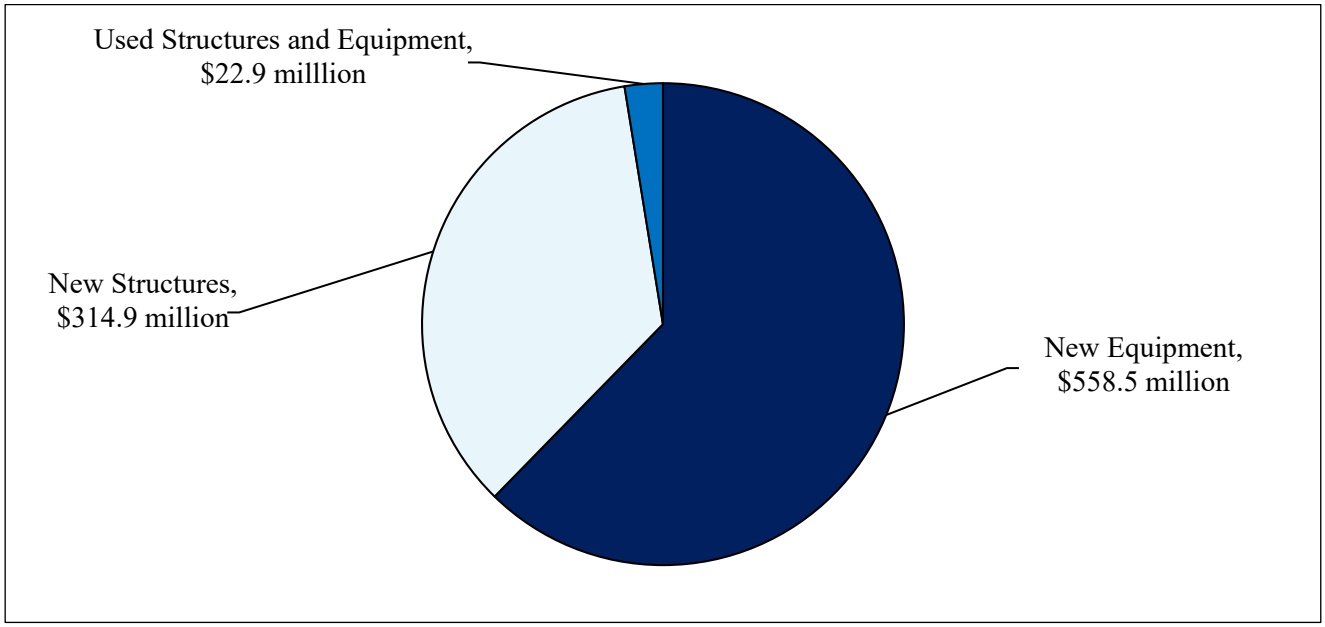
Source: Calculations using the IMPLAN Modeling system (2019 database) and data from the U.S. Census Bureau, U.S. Bureau of Labor Statistics, and U.S. Bureau of Economic Analysis.
Note: Details may not add to totals due to rounding.
[a] Labor income is defined as wages and salaries, benefits, and proprietors' income.

3. Capital Expenditures

Based on data from the U.S. Census Bureau, it is estimated that the U.S. private shipbuilding and repairing industry spent a total of $896.3 million on new and used capital assets in 2019. The majority of capital spending for the industry is spending on new structures and equipment. In 2019, the industry spent an estimated $873.4 million on new capital assets ($558.5 million on new equipment and $314.9 million on new structures) and $22.9 million on used structures and equipment (see **Figure 4**, below).[9]

9 The industry's spending on used structures and equipment is not taken into account in modeling the industry's capital investment impact.

Figure 4: Capital Expenditures by U.S. Private Shipbuilding and Repairing Industry by Type, 2019



Source: Estimated based on the U.S. Census Bureau's 2019 *Annual Survey of Capital Expenditures* and the 2017 *Economic Census*.

4. Industry Output

U.S. shipbuilders delivered 608 vessels of all types in 2020, up from 577 vessels in 2019 (see **Table 3**). More than 60 percent of vessels delivered during the last six years have been inland tank and dry cargo barges. However, deliveries of inland tank barges and dry cargo barges showed the greatest decrease in terms of vessels delivered between 2015 to 2020.

Table 3: Deliveries by U.S. Shipyards, by Type of Vessel, 2015–2020

Type of Vessel	2015	2016	2017	2018	2019	2020
Deep-Draft Vessels and Structures	18	28	18	20	14	15
Offshore Service Vessels	43	21	11	5	5	1
Tugs and Towboats	122	110	88	85	87	122
Passenger Vessels (>50 feet)	25	32	51	46	47	40
Commercial Fishing Vessels (>50 feet)	7	16	9	7	6	4
Other Self-Propelled Vessels (>50 feet)	8	9	11	3	12	13
Large Oceangoing Barges	7	11	10	7	0	5
Inland Tank Barges	268	117	87	84	182	135
Inland Dry Cargo Barges	940	985	301	229	224	273
Total Delivered	**1,438**	**1,329**	**586**	**486**	**577**	**608**

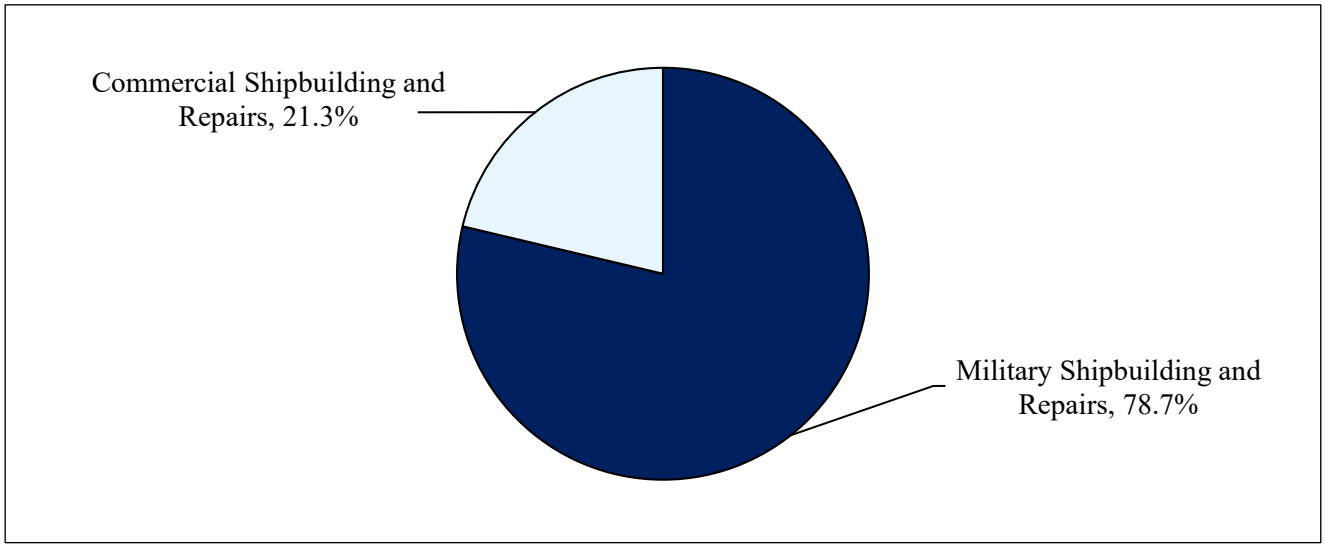
Source: www.shipbuildinghistory.com
Note: The delivery date for a vessel was determined by the date on which its Certificate of Documentation was issued, which should be, but may not be, the date on which the shipyard made delivery.

The Federal government, including the U.S. Navy, U.S. Army, and U.S. Coast Guard, remains an important source of demand for private U.S. shipbuilders. While only 16 of the 608 vessels delivered

in 2020 were delivered to the U.S. government, nearly all deliveries of large deep-draft vessels (14 of 15) were to U.S. government agencies (seven to the U.S. Navy and seven to the U.S. Coast Guard).

Total revenues for the U.S. shipbuilding and repairing industry are estimated to be $27.9 billion in 2019, up from $26.9 billion in 2018.[10] In 2019, 78.7 percent of these revenues came from military shipbuilding and repairs, and 21.3 percent from commercial shipbuilding and repairs (see **Figure 5**).

Figure 5: U.S. Private Shipbuilding and Repairing Industry Revenues by Product Type, 2019

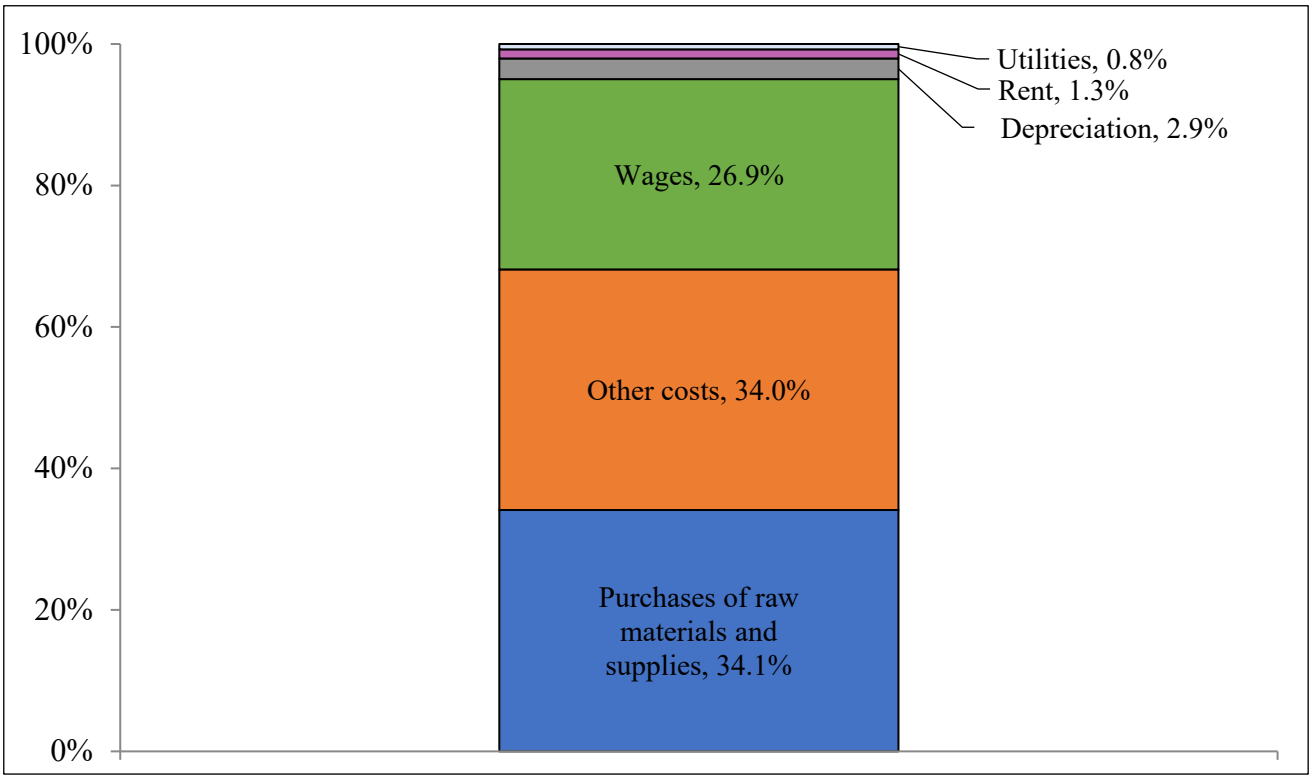


Source: IBISWorld, "Staying Afloat: Steady Demand from Defense Spending, Oil Production and Freight Transport Will Likely Drive Growth." Industry Report 33661a, September 2020.

Figure 6, below, provides a breakdown of industry costs. The largest expense for ship builders is purchases of raw materials and supplies used in the construction and repair of ships, including paints, steel plates, copper tubing, aluminum, and iron castings. These purchases account for an estimated 34.1 percent of total industry costs. Other costs (which include research and development, insurance, security, cleaning costs, equipment repairs, and site maintenance) are the second largest expenditure for the industry, amounting to approximately 34.0 percent of industry costs. Wages account for 26.9 percent of industry costs. Depreciation, rent, and utilities account for the remaining 5.0 percent of industry costs.

[10] U.S. Census Bureau, *Annual Survey of Manufacturers* for 2018 and 2019; *Service Annual Survey* for 2018 and 2019; and *Economic Census* for 2017. These data points include the private and public shipbuilding and repairing industry.

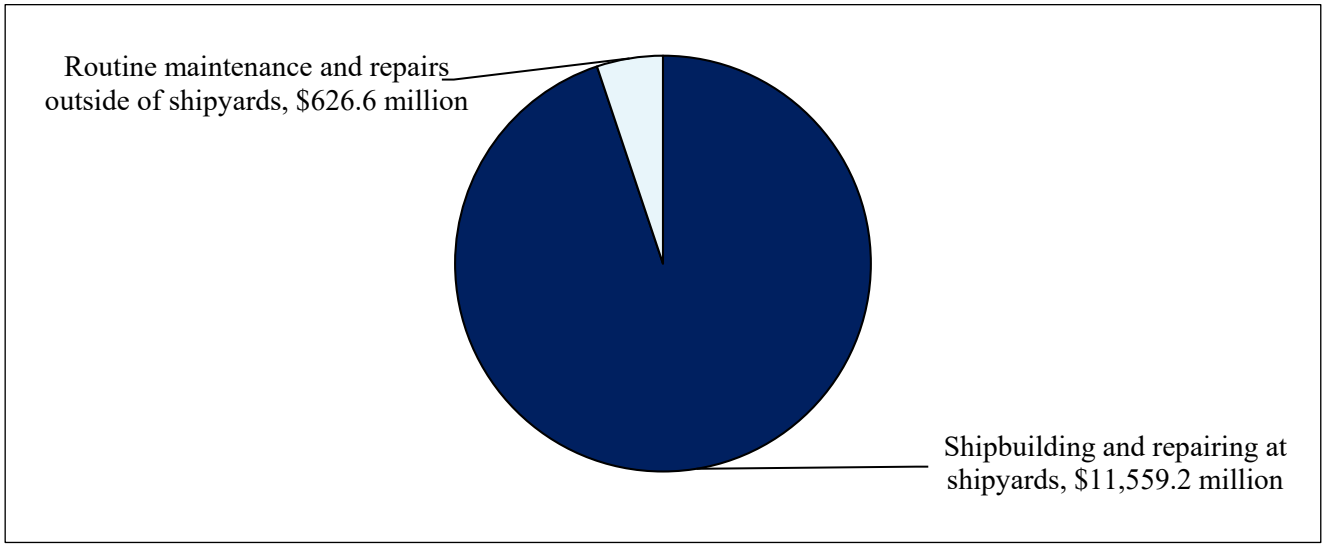
Figure 6: U.S. Private Shipbuilding and Repairing Industry Costs by Type, 2019



Source: IBISWorld, "Staying Afloat: Steady demand from defense spending, oil production and freight transport will likely drive growth" Industry Report 33661a, September 2020.

Total GDP in the U.S. private shipbuilding and repairing industry (including routine maintenance and repairs conducted outside of shipyards) amounted to $12.2 billion in 2019. As with employment, the majority of the industry's GDP ($11.6 billion) was related to shipbuilding and repairing tied to shipyards (NAICS sector 336611), compared to $0.6 billion for routine maintenance and repairs conducted outside of a shipyard (see **Figure 7**).

Figure 7: Total Direct GDP in U.S. Private Shipbuilding and Repairing Industry, 2019



Source: Calculations based on the IMPLAN Modeling system (2019 database).

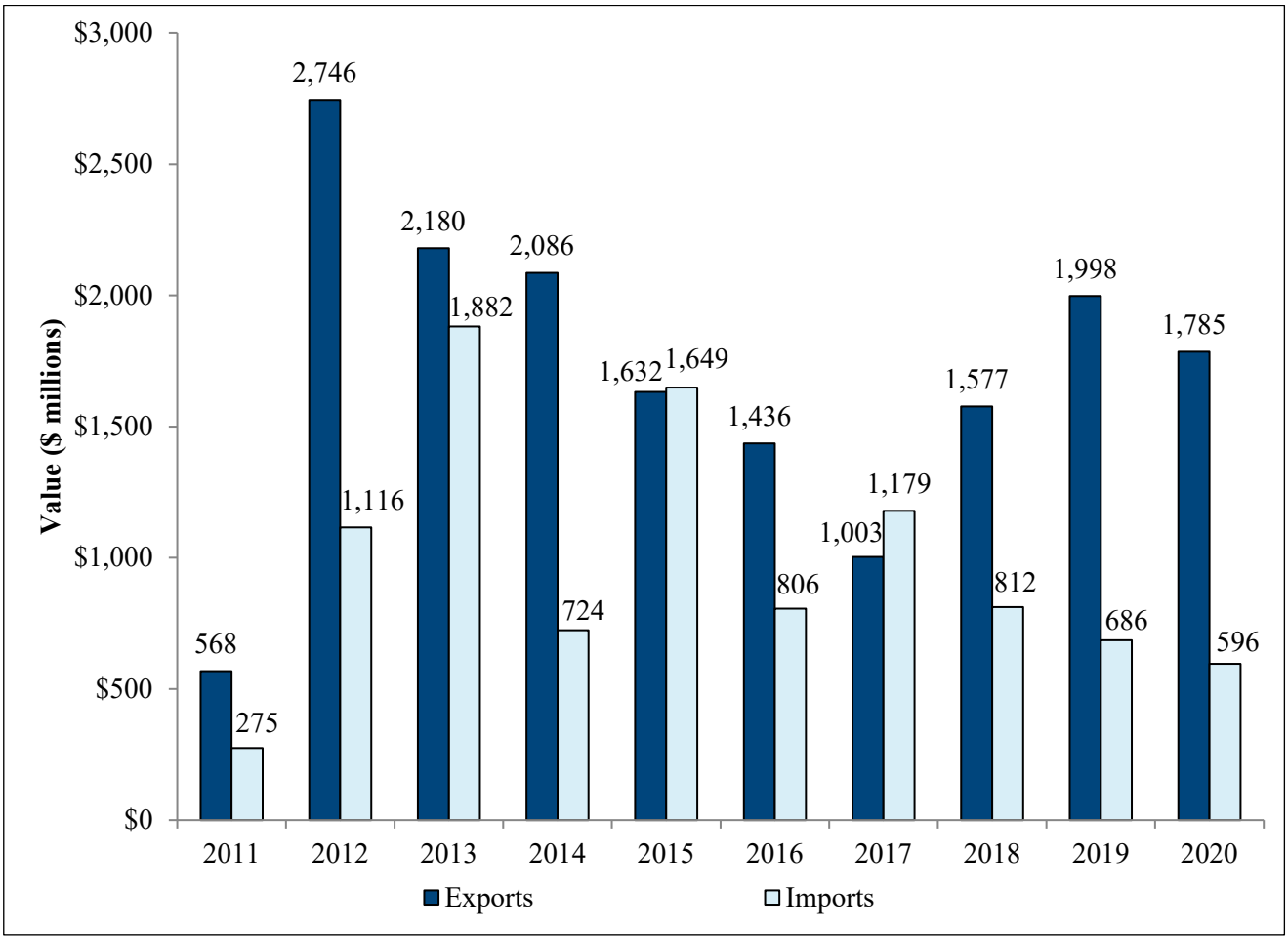
5. *Foreign Trade*

The value of imports and exports of ships and repair services varies considerably over time, in part due to the long lead time associated with manufacturing and delivering finished ships (see **Figure 8**).

Imports of finished ships, inputs, and repair services amounted to $596 million in 2020, down from $686 million in 2019. Industry imports are limited by regulation; in particular, the Jones Act (section 27 of the Merchant Marine Act of 1920) requires that all vessels carrying goods between U.S. ports be manufactured (or rebuilt) in the United States and be owned, operated, and crewed by U.S. citizens. In addition, imports for U.S. government needs are generally limited because defense contracts typically require access to sensitive military technology and information.

In contrast, exports by U.S. shipbuilders have remained relatively strong in recent years, reaching $1.8 billion in 2020 and $2.0 billion in 2019 (representing 7.5 percent of industry revenues in 2019). As a result, the U.S. shipbuilding industry has run a trade surplus in eight out of the last ten years and a cumulative trade surplus of $7.3 billion over this period.

Figure 8: Imports and Exports for the U.S. Shipbuilding and Repairing Industry, 2011–2020



Source: IBISWorld, "Staying Afloat: Steady demand from defense spending, oil production and freight transport will likely drive growth" Industry Report 33661a, September 2020.

III. The Economic Impact of the U.S. Private Shipbuilding and Repairing Industry

In this study, the economic impact of the U.S. private shipbuilding and repairing industry is measured in terms of its direct, indirect and induced impacts at the national and state levels.

The IMPLAN model, an input-output (I-O) model based on Federal government data, is used to quantify these linkages.[11] The IMPLAN model does not track capital expenditures (such as spending on equipment) by industry; consequently, the activity associated with capital spending by the shipbuilding and repairing industry has been separately calculated. See **Appendix B** for a more detailed description of the methodology used for this study.

A. National Impact

In 2019, on a national basis, the U.S. private shipbuilding and repairing industry directly provided 107,180 jobs (see **Table 4)**. Including direct, indirect, and induced impacts, 393,390 jobs were supported by the industry. Total labor income associated with all direct, indirect, and induced jobs was $28.1 billion. The industry directly and indirectly contributed $42.4 billion to GDP in 2019.

Table 4: Economic Importance of the U.S. Private Shipbuilding and Repairing Industry, 2019

	Direct Impacts	Indirect & Induced Impacts		Total Impacts	Total / Direct ("Multiplier")[c]
		Operational Impacts	Capital Investment Impacts		
Employment (jobs)[a]	107,180	276,100	10,110	393,390	3.67
Labor Income ($ billions)[b]	$9.9	$17.4	$0.7	$28.1	2.84
GDP ($ billions)	$12.2	$29.1	$1.1	$42.4	3.48

Source: Calculations using the IMPLAN Modeling system (2019 database) and data from the U.S. Census Bureau, U.S. Bureau of Labor Statistics, and U.S. Bureau of Economic Analysis.
Note: Details may not add to totals due to rounding.
[a] Employment is defined as the number of payroll and self-employed jobs, including part-time jobs.
[b] Labor income is defined as wages and salaries and benefits as well as proprietors' income.
[c] Economic multiplier represents the overall impact (including direct, operational, and capital investment contributions) relative to the direct impact.

By segment, over 90 percent of the direct economic activity is in the primary industry code, shipbuilding and repairing (NAICS 336611), which was responsible for 100,830 direct jobs, paid $9.4 billion in labor income, and generated $11.6 billion in GDP in 2019. Routine ship maintenance and repair activities (part of NAICS 488390) directly accounted for 6,350 jobs, $588 million in labor income, and $627 million in GDP (see **Table 5**, below).

[11] The IMPLAN model is based on input-output (I-O) tables that map the flow of value along the supply chain for the different industries in the economy. For example, for the shipbuilding and repairing industry these tables provide the value of inputs purchased from other industries that supply the shipbuilding and repairing industry. The supplying industries also purchase inputs from other industries to deliver their products; these impacts are also captured. See **Appendix D** for a description of the model.

Table 5: Direct Economic Impact of the U.S. Private Shipbuilding and Repairing Industry, by Segment, 2019

NAICS	Segment Description	Employment [a] (jobs)	Labor Income [b] ($ millions)	GDP ($ millions)
336611	Shipbuilding and repairing	100,830	$9,355	$11,559
488390	Routine ship maintenance and repairs	6,350	$588	$627
	Total	**107,180**	**$9,943**	**$12,186**

Source: Calculations using the IMPLAN Modeling system (2019 database) and data from the U.S. Census Bureau, U.S. Bureau of Labor Statistics, and U.S. Bureau of Economic Analysis.
[a] Employment is defined as the number of payroll and self-employed jobs, including part-time jobs.
[b] Labor income is defined as wages and salaries and benefits as well as proprietors' income.

Most of the indirect and induced economic impact of the industry is associated with the industry's ongoing operations, as its capital expenditures account for less than five percent (see **Table 6**, below). The largest amount of indirect and induced economic activity associated with the industry is in the services sector.[12] Other significant indirect and induced activities occur in wholesale and retail trade; finance, insurance and real estate; and manufacturing.

Considering the indirect and induced impacts, each direct job in the U.S. private shipbuilding and repairing industry is associated with another 2.67 jobs in other parts of the national economy; each dollar of direct labor income and GDP is associated with another $1.82 in labor income and $2.48 in GDP, respectively, outside of the U.S. private shipbuilding and repairing industry.

[12] The services sector, such as management of companies, architectural, engineering, and related services, other professional services, employment services, and business support services, received nearly half of the indirect impact due to its importance in the supply chain to the shipbuilding and repairing industry. The services sector further received more than half of the induced impact from consumer spending attributable to the industry.

Table 6: Indirect and Induced Activities Attributable to the U.S. Private Shipbuilding and Repairing Industry, by Industry, 2019

Sector Description	Employment (jobs)[a]	Labor Income ($ millions)[b]	GDP ($ millions)
Direct Impact	**107,180**	**$9,943**	**$12,186**
Indirect and Induced Impact on Other Industries	**286,210**	**$18,135**	**$30,184**
Operational Impact	***276,100***	***$17,412***	***$29,083***
Agriculture	3,380	$108	$168
Mining	910	$110	$231
Utilities	1,130	$196	$597
Construction	2,430	$160	$205
Manufacturing	27,250	$2,264	$3,972
Wholesale and retail trade	33,960	$2,011	$3,687
Transportation and warehousing	18,680	$1,041	$1,298
Information	5,310	$724	$1,607
Finance, insurance, real estate, rental and leasing	30,300	$2,040	$6,591
Services	148,740	$8,424	$10,296
Other	4,010	$334	$432
Capital Investment Impact	***10,110***	***$723***	***$1,101***
Agriculture	90	$3	$4
Mining	30	$3	$7
Utilities	30	$5	$15
Construction	1,010	$66	$68
Manufacturing	1,850	$160	$249
Wholesale and retail trade	1,220	$78	$141
Transportation and warehousing	530	$30	$37
Information	200	$30	$69
Finance, insurance, real estate, rental and leasing	730	$47	$155
Services	4,390	$299	$350
Other	30	$3	$5
Total Economic Impact	**393,390**	**$28,078**	**$42,370**

Source: Calculations using the IMPLAN Modeling system (2019 database).
Note: Details may not add to totals due to rounding.
[a] Employment is defined as the number of payroll and self-employed jobs, including part-time jobs.
[b] Labor income is defined as wages and salaries and benefits as well as proprietors' income.

In 2019 the U.S. private shipbuilding and repairing industry generated a total of $2.4 billion in Federal, state, and local taxes. Including the additional taxes supported by the industry's supply chain and its employees, the industry's total tax contribution was $8.5 billion in 2019 (see **Table 7**, below).

Table 7: Direct, Indirect, and Induced Taxes Supported by the U.S. Private Shipbuilding and Repairing Industry, 2019

Tax Level	Tax Category	Direct ($ millions)	Indirect ($ millions)	Induced ($ millions)	Total ($ millions)
Federal	Corporate Income Taxes	$47.7	$98.1	$123.7	$269.5
	Personal Income Taxes	$751.8	$636.7	$692.7	$2,081.3
	Excise Taxes	$13.5	$57.5	$96.1	$167.1
	Customs Duties	$6.7	$28.5	$47.6	$82.8
	Social Insurance Contributions	$1,138.4	$896.6	$957.0	$2,992.0
	Other	$1.0	$4.5	$7.4	$12.9
	Federal Total	**$1,959.2**	**$1,721.8**	**$1,924.5**	**$5,605.6**
State & Local	Corporate Income Taxes	$18.9	$38.9	$49.0	$106.8
	Personal Income Taxes	$195.3	$165.4	$180.0	$540.7
	Property Taxes	$70.4	$300.8	$502.1	$873.2
	Sales Taxes	$77.2	$329.8	$550.6	$957.6
	Social Insurance Contributions	$19.8	$15.0	$15.9	$50.7
	Other	$68.9	$104.8	$146.6	$320.3
	State & Local Total	**$450.5**	**$954.7**	**$1,444.2**	**$2,849.3**
	Federal, State & Local Total	**$2,409.7**	**$2,676.5**	**$3,368.7**	**$8,454.9**

Source: Calculations using the IMPLAN Modeling system (2019 database).
Note: Details may not add to totals due to rounding.

B. State Impacts

State-level IMPLAN models were used to estimate the U.S. private shipbuilding and repairing industry's state-by-state impacts. The study also estimates interstate spillover effects (i.e., indirect and induced impacts in a given state resulting from direct shipbuilding and repair activities in another state).

The U.S. private shipbuilding and repairing industry directly provided employment in 42 states in 2019. The five states with the largest direct employment impacts are Virginia, Connecticut, Mississippi, California, and Louisiana (see **Table 8**, below). Operations in these states represented approximately 64 percent of total industry operations in 2019.

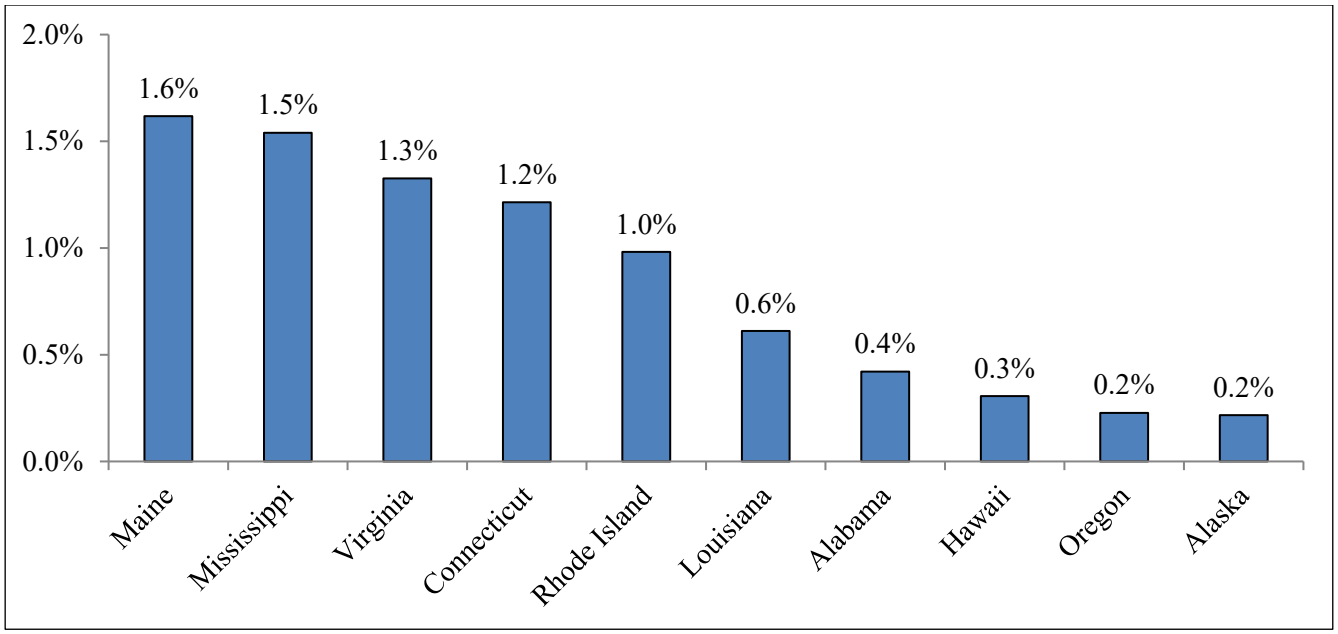
Table 8: Direct Impact of the U.S. Private Shipbuilding and Repairing Industry, by State, 2019

State	Direct Employment [a]		Direct Labor Income [b]		Direct GDP	
	Jobs	% of U.S. Total	($ millions)	% of U.S. Total	($ millions)	% of U.S. Total
Alabama	4,290	4.0%	$368	3.7%	$453	3.7%
Alaska	420	0.4%	$28	0.3%	$29	0.2%
Arizona	120	0.1%	$9	0.1%	$10	0.1%
Arkansas	40	0.0%	$3	0.0%	$4	0.0%
California	8,490	7.9%	$748	7.5%	$906	7.4%
Colorado	*	0.0%	$1	0.0%	$0	0.0%
Connecticut	11,820	11.0%	$1,347	13.5%	$1,467	12.0%
Delaware	10	0.0%	$1	0.0%	$1	0.0%
District of Columbia	-	-	-	-	-	-
Florida	4,700	4.4%	$345	3.5%	$383	3.1%
Georgia	140	0.1%	$13	0.1%	$14	0.1%
Hawaii	1,110	1.0%	$92	0.9%	$111	0.9%
Idaho	70	0.1%	$3	0.0%	$4	0.0%
Illinois	440	0.4%	$27	0.3%	$31	0.3%
Indiana	1,720	1.6%	$156	1.6%	$204	1.7%
Iowa	10	0.0%	$0	0.0%	$0	0.0%
Kansas	-	-	-	-	-	-
Kentucky	470	0.4%	$39	0.4%	$45	0.4%
Louisiana	6,620	6.2%	$541	5.4%	$691	5.7%
Maine	5,700	5.3%	$465	4.7%	$554	4.5%
Maryland	560	0.5%	$45	0.5%	$61	0.5%
Massachusetts	310	0.3%	$22	0.2%	$23	0.2%
Michigan	70	0.1%	$5	0.1%	$6	0.0%
Minnesota	30	0.0%	$2	0.0%	$3	0.0%
Mississippi	11,190	10.4%	$953	9.6%	$1,143	9.4%
Missouri	1,410	1.3%	$79	0.8%	$77	0.6%
Montana	-	-	-	-	-	-
Nebraska	-	-	-	-	-	-
Nevada	-	-	-	-	-	-
New Hampshire	40	0.0%	$3	0.0%	$3	0.0%
New Jersey	1,620	1.5%	$123	1.2%	$139	1.1%
New Mexico	-	-	-	-	-	-
New York	970	0.9%	$136	1.4%	$145	1.2%
North Carolina	60	0.1%	$3	0.0%	$6	0.0%
North Dakota	-	-	-	-	-	-
Ohio	530	0.5%	$46	0.5%	$53	0.4%
Oklahoma	40	0.0%	$2	0.0%	$3	0.0%
Oregon	1,540	1.4%	$175	1.8%	$182	1.5%
Pennsylvania	750	0.7%	$67	0.7%	$73	0.6%
Rhode Island	2,580	2.4%	$233	2.3%	$425	3.5%
South Carolina	490	0.5%	$47	0.5%	$51	0.4%
South Dakota	-	-	-	-	-	-
Tennessee	210	0.2%	$20	0.2%	$22	0.2%
Texas	3,400	3.2%	$280	2.8%	$336	2.8%
Utah	240	0.2%	$17	0.2%	$21	0.2%
Vermont	-	-	-	-	-	-
Virginia	30,270	28.2%	$3,101	31.2%	$3,981	32.7%
Washington	2,530	2.4%	$237	2.4%	$299	2.5%
West Virginia	50	0.0%	$5	0.1%	$6	0.0%
Wisconsin	2,140	2.0%	$156	1.6%	$222	1.8%
Wyoming	*	0.0%	$0	0.0%	$0	0.0%
U.S. Total	**107,180**	**100%**	**$9,943**	**100%**	**$12,186**	**100%**

Source: Calculations using the IMPLAN modeling system (2019 database).
Note: Details may not add to totals due to rounding.
* Indicates less than 5 jobs.
[a] Employment is defined as the number of payroll and self-employed jobs, including part-time jobs.
[b] Labor income is defined as wages and salaries and benefits as well as proprietors' income.

In five states the total (direct, indirect, and induced) economic activity attributable to the shipbuilding and repairing industry is 1 percent or more of total state employment (see **Figure 9**).

Figure 9: Private Shipbuilding and Repairing Industry's Total Employment Impact as a Percent of Total State Employment: Top Ten States, 2019

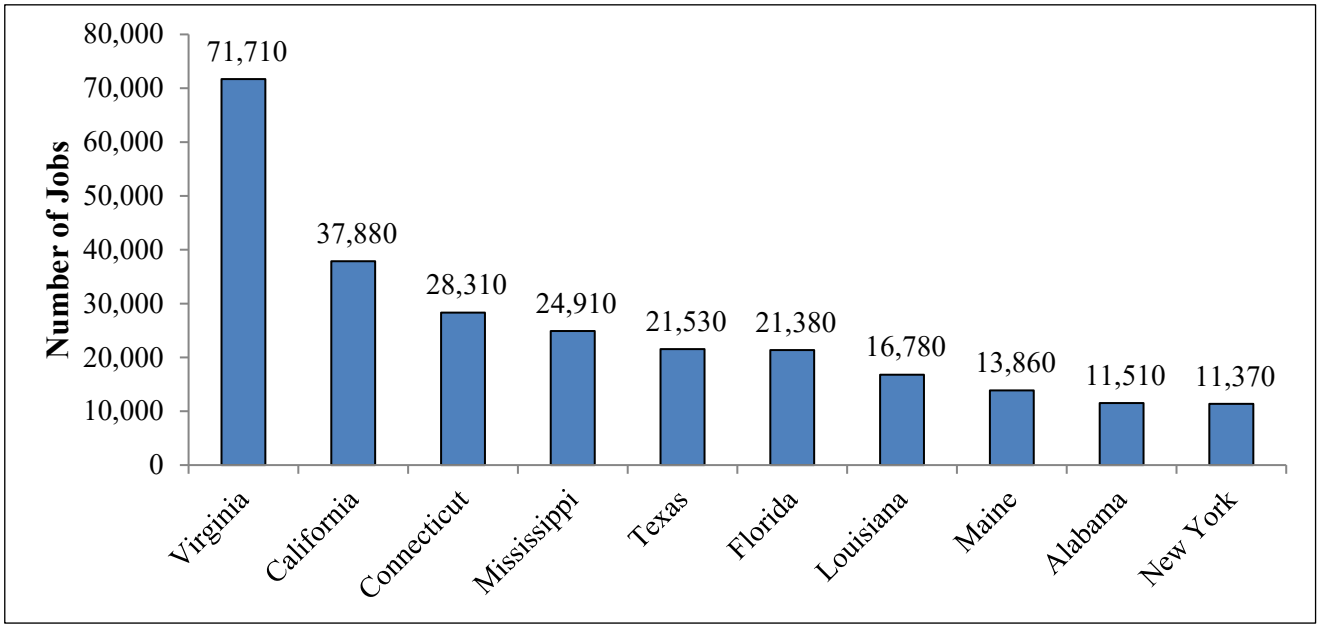


Source: Calculations using the IMPLAN modeling system (2019 database).

In terms of the total number of direct, indirect, and induced jobs, employment associated with the operations of the U.S. private shipbuilding and repairing industry is highest in Virginia, California, Mississippi, Louisiana, Texas, Connecticut, and Florida (see **Figure 10** and **Table 9**, below).

Additional detail is provided in **Appendix A**.

Figure 10: Total (Direct, Indirect, and Induced) Employment Impact Attributable to the U.S. Private Shipbuilding and Repairing Industry: Top Ten States, 2019



Source: Calculations using the IMPLAN modeling system (2019 database).

Table 9: Total (Direct, Indirect, and Induced) Economic Activities Attributable to the U.S. Private Shipbuilding and Repairing Industry, 2019

State	Total Employment [a]		Total Labor Income [b]		Total GDP	
	Jobs	% of U.S. Total	($ millions)	% of U.S. Total	($ millions)	% of U.S. Total
Alabama	11,510	2.9%	$716	2.5%	$1,038	2.4%
Alaska	1,000	0.3%	$63	0.2%	$93	0.2%
Arizona	3,110	0.8%	$192	0.7%	$314	0.7%
Arkansas	1,400	0.4%	$75	0.3%	$128	0.3%
California	37,880	9.6%	$2,999	10.7%	$4,650	11.0%
Colorado	2,690	0.7%	$186	0.7%	$293	0.7%
Connecticut	28,310	7.2%	$2,539	9.0%	$3,421	8.1%
Delaware	420	0.1%	$29	0.1%	$60	0.1%
District of Columbia	550	0.1%	$62	0.2%	$84	0.2%
Florida	21,380	5.4%	$1,238	4.4%	$1,881	4.4%
Georgia	5,060	1.3%	$316	1.1%	$547	1.3%
Hawaii	2,850	0.7%	$188	0.7%	$278	0.7%
Idaho	870	0.2%	$46	0.2%	$73	0.2%
Illinois	7,310	1.9%	$530	1.9%	$870	2.1%
Indiana	7,570	1.9%	$500	1.8%	$792	1.9%
Iowa	1,730	0.4%	$110	0.4%	$191	0.5%
Kansas	1,400	0.4%	$84	0.3%	$141	0.3%
Kentucky	2,950	0.7%	$177	0.6%	$273	0.6%
Louisiana	16,780	4.3%	$1,043	3.7%	$1,546	3.6%
Maine	13,860	3.5%	$871	3.1%	$1,214	2.9%
Maryland	3,670	0.9%	$264	0.9%	$424	1.0%
Massachusetts	4,140	1.1%	$347	1.2%	$525	1.2%
Michigan	4,800	1.2%	$317	1.1%	$492	1.2%
Minnesota	3,000	0.8%	$210	0.7%	$333	0.8%
Mississippi	24,910	6.3%	$1,491	5.3%	$2,081	4.9%
Missouri	6,030	1.5%	$347	1.2%	$505	1.2%
Montana	450	0.1%	$22	0.1%	$38	0.1%
Nebraska	980	0.2%	$62	0.2%	$108	0.3%
Nevada	1,440	0.4%	$81	0.3%	$143	0.3%
New Hampshire	810	0.2%	$61	0.2%	$91	0.2%
New Jersey	7,640	1.9%	$589	2.1%	$864	2.0%
New Mexico	680	0.2%	$33	0.1%	$64	0.2%
New York	11,370	2.9%	$1,072	3.8%	$1,718	4.1%
North Carolina	4,580	1.2%	$277	1.0%	$490	1.2%
North Dakota	390	0.1%	$24	0.1%	$43	0.1%
Ohio	6,990	1.8%	$458	1.6%	$746	1.8%
Oklahoma	1,740	0.4%	$103	0.4%	$161	0.4%
Oregon	5,970	1.5%	$443	1.6%	$627	1.5%
Pennsylvania	7,870	2.0%	$573	2.0%	$860	2.0%
Rhode Island	6,440	1.6%	$450	1.6%	$789	1.9%
South Carolina	3,350	0.9%	$200	0.7%	$310	0.7%
South Dakota	440	0.1%	$25	0.1%	$45	0.1%
Tennessee	3,780	1.0%	$244	0.9%	$374	0.9%
Texas	21,530	5.5%	$1,477	5.3%	$2,305	5.4%
Utah	2,080	0.5%	$121	0.4%	$202	0.5%
Vermont	310	0.1%	$17	0.1%	$26	0.1%
Virginia	71,710	18.2%	$5,553	19.8%	$8,150	19.2%
Washington	8,560	2.2%	$683	2.4%	$1,067	2.5%
West Virginia	740	0.2%	$44	0.2%	$73	0.2%
Wisconsin	8,140	2.1%	$509	1.8%	$800	1.9%
Wyoming	260	0.1%	$16	0.1%	$31	0.1%
U.S. Total	**393,390**	**100.0%**	**$28,078**	**100.0%**	**$42,370**	**100.0%**

Source: Calculations using the IMPLAN modeling system (2019 database).
Note: Details may not add to totals due to rounding.
[a] Employment is defined as the number of payroll and self-employed jobs, including part-time jobs.
[b] Labor income is defined as wages and salaries and benefits as well as proprietors' income.

Appendices

Appendix A: Economic Impact Breakdown: State-Level Detail

Tables A1, A2, and A3 provide the state-by-state breakout of the direct, indirect, and induced impacts attributable to the U.S. private shipbuilding and repairing industry.

Table A1: Employment Attributable to the U.S. Private Shipbuilding and Repairing Industry, 2019

State	Direct Contribution	Indirect Contribution	Induced Contribution	Total Contribution	Total State Percentage
Alabama	4,290	3,440	3,780	11,510	0.4%
Alaska	420	240	340	1,000	0.2%
Arizona	120	1,170	1,820	3,110	0.1%
Arkansas	40	590	770	1,400	0.1%
California	8,490	12,270	17,120	37,880	0.2%
Colorado	*	1,020	1,660	2,690	0.1%
Connecticut	11,820	6,520	9,960	28,310	1.2%
Delaware	10	140	270	420	0.1%
District of Columbia	-	170	380	550	0.1%
Florida	4,700	7,070	9,610	21,380	0.2%
Georgia	140	2,020	2,900	5,060	0.1%
Hawaii	1,110	690	1,050	2,850	0.3%
Idaho	70	310	500	870	0.1%
Illinois	440	2,940	3,930	7,310	0.1%
Indiana	1,720	2,660	3,190	7,570	0.2%
Iowa	10	780	940	1,730	0.1%
Kansas	-	570	830	1,400	0.1%
Kentucky	470	1,080	1,410	2,950	0.1%
Louisiana	6,620	4,620	5,530	16,780	0.6%
Maine	5,700	3,480	4,680	13,860	1.6%
Maryland	560	1,210	1,900	3,670	0.1%
Massachusetts	310	1,430	2,390	4,140	0.1%
Michigan	70	2,190	2,540	4,800	0.1%
Minnesota	30	1,220	1,740	3,000	0.1%
Mississippi	11,190	6,750	6,970	24,910	1.5%
Missouri	1,410	2,010	2,610	6,030	0.2%
Montana	-	150	300	450	0.1%
Nebraska	-	370	610	980	0.1%
Nevada	-	540	900	1,440	0.1%
New Hampshire	40	360	410	810	0.1%
New Jersey	1,620	2,430	3,590	7,640	0.1%
New Mexico	-	220	460	680	0.1%
New York	970	3,650	6,750	11,370	0.1%
North Carolina	60	1,860	2,660	4,580	0.1%
North Dakota	-	150	240	390	0.1%
Ohio	530	2,910	3,550	6,990	0.1%
Oklahoma	40	710	990	1,740	0.1%
Oregon	1,540	1,780	2,650	5,970	0.2%
Pennsylvania	750	2,920	4,210	7,870	0.1%
Rhode Island	2,580	1,640	2,220	6,440	1.0%
South Carolina	490	1,280	1,580	3,350	0.1%
South Dakota	-	160	280	440	0.1%
Tennessee	210	1,520	2,050	3,780	0.1%
Texas	3,400	7,710	10,410	21,530	0.1%
Utah	240	760	1,070	2,080	0.1%
Vermont	-	110	200	310	0.1%
Virginia	30,270	17,970	23,470	71,710	1.3%
Washington	2,530	2,470	3,560	8,560	0.2%
West Virginia	50	280	410	740	0.1%
Wisconsin	2,140	2,860	3,140	8,140	0.2%
Wyoming	*	100	160	260	0.1%
U.S. Total	**107,180**	**121,480**	**164,730**	**393,390**	**0.2%**

Source: Calculations using the IMPLAN modeling system (2019 database).
Note: Details may not add to totals due to rounding.
* Less than five jobs.
Employment is defined as the number of payroll and self-employed jobs, including part-time jobs.

Table A2: Labor Income Attributable to the U.S. Private Shipbuilding and Repairing Industry, 2019

State	Direct Contribution ($ millions)	Indirect Contribution ($ millions)	Induced Contribution ($ millions)	Total Contribution ($ millions)	Total State Percentage
Alabama	$368	$184	$164	$716	0.4%
Alaska	$28	$16	$19	$63	0.2%
Arizona	$9	$85	$98	$192	0.1%
Arkansas	$3	$37	$36	$75	0.1%
California	$748	$1,091	$1,160	$2,999	0.2%
Colorado	$1	$87	$98	$186	0.1%
Connecticut	$1,347	$552	$640	$2,539	1.2%
Delaware	$1	$11	$17	$29	0.1%
District of Columbia	-	$23	$40	$62	0.1%
Florida	$345	$427	$466	$1,238	0.2%
Georgia	$13	$142	$161	$316	0.1%
Hawaii	$92	$40	$56	$188	0.3%
Idaho	$3	$19	$23	$46	0.1%
Illinois	$27	$248	$256	$530	0.1%
Indiana	$156	$178	$167	$500	0.2%
Iowa	*	$60	$49	$110	0.1%
Kansas	-	$40	$44	$84	0.1%
Kentucky	$39	$70	$69	$177	0.1%
Louisiana	$541	$260	$242	$1,043	0.6%
Maine	$465	$190	$215	$871	1.6%
Maryland	$45	$102	$117	$264	0.1%
Massachusetts	$22	$147	$179	$347	0.1%
Michigan	$5	$170	$141	$317	0.1%
Minnesota	$2	$101	$107	$210	0.1%
Mississippi	$953	$276	$262	$1,491	1.5%
Missouri	$79	$135	$133	$347	0.2%
Montana	-	$9	$13	$22	0.1%
Nebraska	-	$27	$35	$62	0.1%
Nevada	-	$35	$46	$81	0.1%
New Hampshire	$3	$32	$26	$61	0.1%
New Jersey	$123	$220	$246	$589	0.1%
New Mexico	-	$13	$20	$33	0.1%
New York	$136	$386	$550	$1,072	0.1%
North Carolina	$3	$131	$143	$277	0.1%
North Dakota	-	$11	$13	$24	0.1%
Ohio	$46	$218	$194	$458	0.1%
Oklahoma	$2	$51	$50	$103	0.1%
Oregon	$175	$129	$140	$443	0.2%
Pennsylvania	$67	$240	$266	$573	0.1%
Rhode Island	$233	$104	$113	$450	1.0%
South Carolina	$47	$80	$73	$200	0.1%
South Dakota	-	$11	$15	$25	0.1%
Tennessee	$20	$105	$118	$244	0.1%
Texas	$280	$599	$597	$1,477	0.1%
Utah	$17	$50	$54	$121	0.1%
Vermont	-	$7	$10	$17	0.1%
Virginia	$3,101	$1,266	$1,185	$5,553	1.3%
Washington	$237	$206	$240	$683	0.2%
West Virginia	$5	$19	$20	$44	0.1%
Wisconsin	$156	$192	$162	$509	0.2%
Wyoming	*	$8	$8	$16	0.1%
U.S. Total	**$9,943**	**$8,839**	**$9,297**	**$28,078**	**0.2%**

Source: Calculations using the IMPLAN modeling system (2019 database).
Note: Details may not add to totals due to rounding.
* Less than $0.5 million.
Labor income is defined as wages and salaries and benefits as well as proprietors' income.

Table A3: GDP Attributable to the U.S. Private Shipbuilding and Repairing Industry, 2019

State	Direct Contribution ($ millions)	Indirect Contribution ($ millions)	Induced Contribution ($ millions)	Total Contribution ($ millions)	Total State Percentage
Alabama	$453	$297	$288	$1,038	0.4%
Alaska	$29	$29	$35	$93	0.2%
Arizona	$10	$139	$164	$314	0.1%
Arkansas	$4	$65	$60	$128	0.1%
California	$906	$1,716	$2,028	$4,650	0.1%
Colorado	*	$131	$162	$293	0.1%
Connecticut	$1,467	$849	$1,105	$3,421	1.2%
Delaware	$1	$23	$36	$60	0.1%
District of Columbia	-	$29	$55	$84	0.1%
Florida	$383	$688	$810	$1,881	0.2%
Georgia	$14	$248	$286	$547	0.1%
Hawaii	$111	$63	$104	$278	0.3%
Idaho	$4	$31	$38	$73	0.1%
Illinois	$31	$398	$440	$870	0.1%
Indiana	$204	$299	$288	$792	0.2%
Iowa	*	$101	$89	$191	0.1%
Kansas	-	$65	$76	$141	0.1%
Kentucky	$45	$112	$116	$273	0.1%
Louisiana	$691	$418	$438	$1,546	0.6%
Maine	$554	$289	$370	$1,214	1.8%
Maryland	$61	$162	$201	$424	0.1%
Massachusetts	$23	$220	$283	$525	0.1%
Michigan	$6	$256	$231	$492	0.1%
Minnesota	$3	$156	$174	$333	0.1%
Mississippi	$1,143	$455	$483	$2,081	1.8%
Missouri	$77	$206	$222	$505	0.2%
Montana	-	$15	$23	$38	0.1%
Nebraska	-	$47	$62	$108	0.1%
Nevada	-	$58	$84	$143	0.1%
New Hampshire	$3	$47	$42	$91	0.1%
New Jersey	$139	$325	$399	$864	0.1%
New Mexico	-	$26	$38	$64	0.1%
New York	$145	$623	$950	$1,718	0.1%
North Carolina	$6	$222	$262	$490	0.1%
North Dakota	-	$20	$23	$43	0.1%
Ohio	$53	$350	$343	$746	0.1%
Oklahoma	$3	$76	$82	$161	0.1%
Oregon	$182	$211	$233	$627	0.2%
Pennsylvania	$73	$362	$425	$860	0.1%
Rhode Island	$425	$163	$201	$789	1.2%
South Carolina	$51	$131	$127	$310	0.1%
South Dakota	-	$18	$27	$45	0.1%
Tennessee	$22	$164	$188	$374	0.1%
Texas	$336	$984	$986	$2,305	0.1%
Utah	$21	$86	$95	$202	0.1%
Vermont	-	$11	$16	$26	0.1%
Virginia	$3,981	$1,981	$2,188	$8,150	1.5%
Washington	$299	$341	$428	$1,067	0.2%
West Virginia	$6	$33	$35	$73	0.1%
Wisconsin	$222	$302	$276	$800	0.2%
Wyoming	*	$15	$15	$31	0.1%
U.S. Total	**$12,186**	**$14,057**	**$16,127**	**$42,370**	**0.2%**

Source: Calculations using the IMPLAN modeling system (2019 database).
Note: Details may not add to totals due to rounding.
* Less than $0.5 million.

Appendix B: Data Sources and Methodology

This Appendix describes the methodology used to derive the results for the study. It first discusses the data sources used to develop the estimates of the U.S. private shipbuilding and repairing industry's direct economic impacts. It then describes the development of the indirect and induced impact estimates for the industry.

I. Estimates of the Industry's Direct Economic Impacts

The definition of the U.S. private shipbuilding and repairing industry is based on the *North American Industry Classification System* (NAICS) and combines NAICS sector 336611 ("Shipbuilding and repairing") and a portion of NAICS sector 488390 ("Other support activities for water transportation"). Among other activities, NAICS sector 488390 includes routine repair and maintenance of ships from floating drydocks, as well as related activities not done in a shipyard.

This study uses data on employment and self-employment from the U.S. Bureau of Labor Statistics (BLS) and Bureau of Economic Analysis (BEA) to estimate direct employment in NAICS sectors 336611 and 488390. In particular, direct employment was estimated by combining counts of payroll employees from the BLS' *Quarterly Census of Employment* with estimates of self-employment based on data from the BEA. For some states, the count of payroll employees was suppressed because of the small number of establishments in the industry in the state. Relying on employment counts available for the sector at the national-level and for higher-level industries at the state-level, a two-stage "raking" process was used to estimate the state-level employee count. The raking process uses information from known sectors within a state and across states to impute information for the sectors with suppressed data.[13] Because the BEA data are only available for more aggregated industries, self-employment was first estimated for the aggregated industries and then allocated across the subsectors according to each industry's share of paid employment.

Direct employment was separately estimated for the United States as a whole and for each of the 50 states and the District of Columbia. The state-level estimates were then scaled to match the national level estimates.

As noted above, only a portion of NAICS sector 488390 is part of the shipbuilding and repairing industry. Based on data from the 2017 Economic Census, it is estimated that approximately 76.7 percent of the employment in NAICS sector 488390 is for routine repair and maintenance of ships not conducted at a shipyard. As such, the initial estimates of employment in NAICS sector 488390 (based on the BLS and BEA data) were multiplied by 76.7 percent to derive our final estimates of direct employment.

A similar approach was used to estimate the national direct labor income associated with the industry's direct employment. The IMPLAN model was used to estimate the industry's direct GDP at the national and state levels. The state-level direct labor income was first estimated using the IMPLAN state models, and then controlled to the national direct labor income estimate.

Estimates of the U.S. private shipbuilding and repairing industry's new capital investment in 2019 were developed using data from the Census Bureau's *Annual Capital Expenditure Survey* and the 2017 *Economic Census*. In particular, expenditures on new capital for "other transportation equipment manufacturing" (comprised of NAICS sectors 3365, 3366, and 3369) were obtained from

[13] Oh, H.L. and Scheuren, F. (1987). Modified Raking Ratio Estimation. *Survey Methodology*, vol. 13, no. 2, pp. 209-219.

the 2019 *Annual Capital Expenditure Survey* database. The ratio of total capital spending in shipbuilding and repairing (NAICS sector 336611) to other transportation equipment manufacturing from the 2017 *Economic Census* was used to estimate the portion of new capital investment in other transportation equipment manufacturing that is attributable to private shipbuilding and repairing. In addition, a portion of the capital expenditures on new structures and equipment by the support activities for transportation sector (NAICS 488) is allocated to the U.S. private shipbuilding and repairing industry.

The U.S. private shipbuilding and repairing industry's capital investment was translated into purchases of capital assets by type through use of the "capital flow matrix" from the U.S. Department of Commerce.[14]

II. Estimates of Indirect and Induced Economic Activities

The initial round of output, income, and employment generated by shipbuilding and repairing leads to successive rounds of re-spending in the chain of production. Such indirect and induced economic impacts by the shipbuilding and repairing industry can be measured using various approaches. The most common is multiplier analysis. In broad terms, a multiplier is an index that indicates the overall change in the level of economic activity that results from a given initial change. It effectively adds up all the successive rounds of re-spending, based on a number of assumptions that are embedded in the method of estimation.

There are different methods available for calculating multipliers. The method used in this report is *input-output* analysis. It is the most commonly used approach in regional economic impact studies. The input-output model developed by IMPLAN is a well-known input-output model for conducting regional economic studies in the United States and is widely used by government, academics and private-sector researchers. The IMPLAN modeling system is similar to the Regional Input-Output Modeling System developed by the U.S. Department of Commerce. The IMPLAN model is developed by IMPLAN Group LLC.[15]

The IMPLAN database represents a consistent set of economic data processed from various published sources (such as the BEA's *National Income and Product Accounts* and *Regional Economic Information System* , the Census Bureau's *County Business Patterns*, and the BLS' *Covered Employee and Wages Program*) in a variety of formats and under varying disclosure restrictions.

Estimates of indirect and induced economic impacts by the U.S. shipbuilding and repairing industry were derived based on the IMPLAN model for the national economy and IMPLAN regional models for each of the 50 states and the District of Columbia.

IMPLAN uses an "input-output" framework that relates the output of each industry to inputs purchased from other industries. Output in one industry requires purchases of inputs from other industries, and these supply industries in turn make purchases from their suppliers, and so on. Employees and business owners make personal purchases out of the income that is generated by this process, which ripple through the economy. Multipliers describe these relationships. The Type I multiplier measures the direct and indirect effects of a change in economic activity. It captures the inter-industry effects only, i.e., industries buying from local industries. The Type II (Social Accounting Matrix or SAM) multiplier captures the direct and indirect effects and, in addition, it also reflects induced effects. The indirect and induced impacts of the shipbuilding and repairing industry

[14] http://www.bea.gov/newsreleases/industry/capflow/capitalflownewsrelease.htm
[15] More information on IMPLAN is available at www.implan.com.

on other sectors of the economy in terms of employment, labor income (including wages and salaries and benefits as well as proprietors' income), and GDP were calculated using the IMPLAN model.[16]

Because individual state models do not account for cross-state impacts, the sum of the state indirect and induced impacts will not add to the national totals. The indirect and induced effects crossing state borders ("cross-state spillover effects") were allocated across the 50 states and the District of Columbia in proportion to each state's share of the total national employment, labor income, and GDP in each industry. The state indirect and induced effects reported throughout this study include the allocation of these cross-state spillover effects.

[16] Because the IMPLAN models are used for total impact analysis (as opposed to marginal impact analysis) in this study, necessary adjustments are made to the initial indirect and induced impact estimates to prevent double counting. For instance, any indirect or induced effects from the initial estimates for IMPLAN sectors that are fully mapped to the shipbuilding and repairing industry are removed. Similarly, indirect and induced effects for IMPLAN sectors that are partially mapped to the shipbuilding and repairing industry are proportionately adjusted.

Appendix C: Longitudinal Data Comparison

This appendix compares key data points from the 2015 and 2021 iterations of this report.[17]

Table A4: Longitudinal Data Comparison (2015 and 2021 Reports)

Data Point	2015 Report	2021 Report
Total GDP (Direct, Indirect, and Induced) Impacts	$37.3B	$42.4B
Direct GDP Impacts	$10.7B	$12.2B
Indirect and Induced GDP Impacts	$26.6B	$30.2B
GDP Total/Direct ("Multiplier")	3.49	3.48
Total Labor Income (Direct, Indirect, and Induced) Impacts	$25.1B	$28.1B
Direct Labor Income Impacts	$9.2B	$9.9B
Indirect and Induced Labor Income Impacts	$15.9B	$18.1B
Labor Income Total/Direct ("Multiplier") Impacts	2.73	2.84
Total Employment Impact (Direct, Indirect, and Induced)	399,420	393,390
Direct Employment Impacts	110,390	107,180
Indirect and Induced Employment Impacts	289,030	286,210
Employment Total/Direct ("Multiplier")	3.62	3.67
Private Shipyards[18]	119	154
Military Ship Purchases (Large Deep-Draft Vessels)	10	14

[17] The 2015 report predominately conveys 2013 data and the 2021 report predominately conveys 2019 data. Exceptions are for the private shipyards (2015 and 2020 values are reported) and the military ship purchases figures (2014 and 2020 values are reported).

[18] The 2015 report lists 124 active shipyards in the United States, 119 of which were private. This table displays only the private shipyards.