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ECONOMIC IMPACTS OF
**Washington's
Maritime
Industry** 2022



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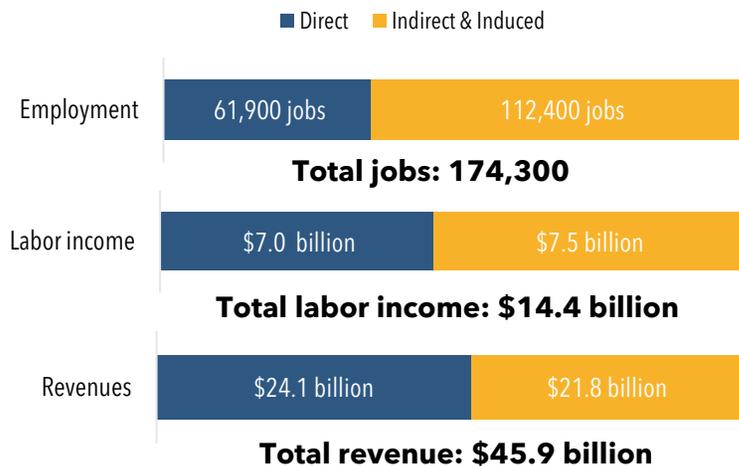
Key Findings

The Washington Maritime Federation commissioned McKinley Research Group, in association with High Peak Strategy, to conduct a study of the economic impact of Washington’s maritime industry in 2022. The following are key findings from the study.

In 2022, the maritime sector supported 174,300 jobs, \$14.4 billion in labor income, and \$45.9 billion in business revenues.

Each direct job in the maritime sector was associated with a total of 2.8 jobs across the state economy. Every dollar of sales by the maritime industry supported an additional 90 cents in sales in other parts of the state economy (a multiplier of 1.9).

Washington Maritime Industry Total Employment, Income, and Revenue Impacts, 2022

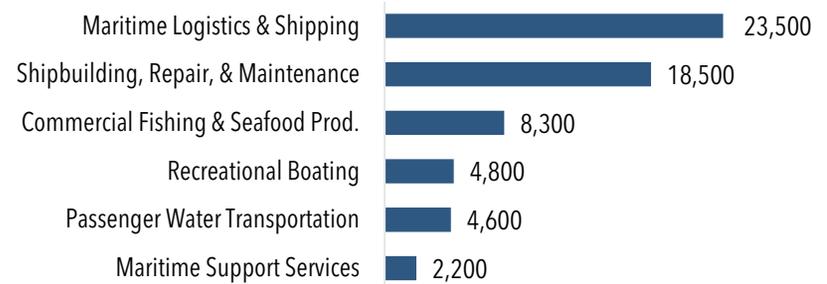


Maritime activities in Washington state supported an estimated \$382 million in state taxes in 2022, including all direct, indirect, and induced impacts. Tax impacts included an estimated \$149 million in state taxes generated through direct activities and an additional \$233 million through indirect and induced spending.

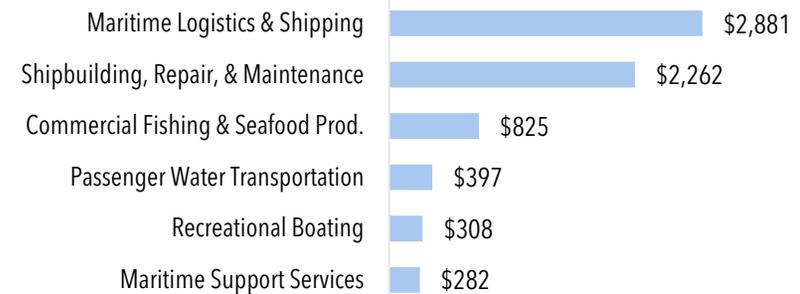
The industry covers a wide range of interdependent subsectors.

Maritime logistics and shipping is the largest in terms of employment, followed by shipbuilding, fishing/seafood, recreational boating, passenger water transportation, and support services.

Washington Maritime Industry Direct Employment, 2022, By Sector



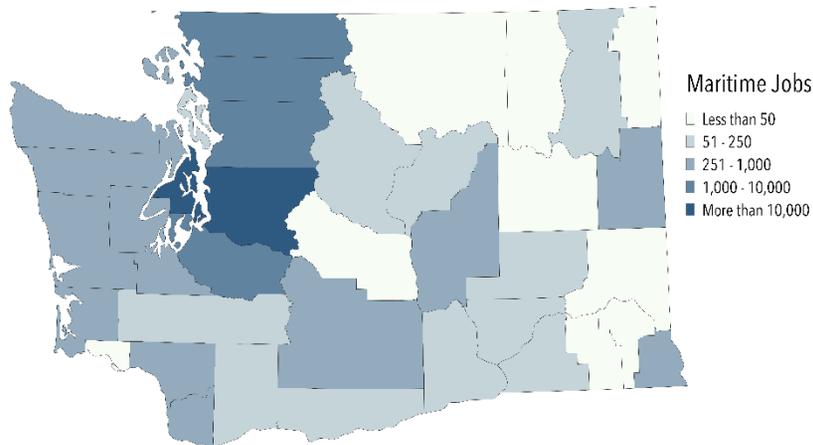
Washington Maritime Industry Direct Labor Income, 2022, By Sector (\$Millions)



Average earnings among maritime workers reached \$112,000 in 2022, including benefits. Average earnings were highest among workers in support services (\$128,000), maritime logistics and shipping (\$123,000), and shipbuilding, repair, and maintenance (\$122,000). These averages are annualized and reflect seasonality in some subsectors, such as fishing and recreational boating.

Maritime sector jobs and activities can be found in nearly every county in Washington state. While the majority of activities are along the Puget Sound coast, maritime jobs exist in Central and Eastern Washington through river ports, rail operations, recreational boating, and logistics. Counties with the largest number of maritime workers were King (24,000 jobs) and Kitsap (19,000 jobs).

Washington Maritime Employment by County, 2022



The maritime industry represents a diverse workforce, from executive-office positions to factory-floor workers and fishermen. Maritime workers represent a wide range of skills and educational backgrounds. The most common maritime occupation in 2022 was “welders, cutters, solderers, and brazers,” followed by “cargo and freight agents,” “heavy and tractor-trailer truck drivers,” “laborers and freight, stock, and material movers,” and “captains, mates, and pilots of water vessels.” Many of these positions provide a living wage for workers without requiring a four-year college degree.

The industry is positioning itself to meet future challenges: with workforce development initiatives, technological innovation, and environmental stewardship. A multitude of educational and training programs have been developed in recent years to address current and expected workforce shortages in the maritime sector, including apprenticeship programs, skill centers, and the first-ever Maritime High School in the state. Washington is also rapidly becoming a hub of maritime innovation, with dozens of local startups creating products ranging from kelp-based snacks to shipping logistics apps to new ballast water treatment systems. And, as awareness of the industry’s footprint on oceans and waterways has increased, so too have efforts to minimize environmental impacts, such as more efficient vessel design; reduced underwater noise impacts on wildlife; cleaner fuels; and improved vessel routing.

Through these and similar efforts, Washington’s maritime stakeholders are working together to ensure a sustainable and thriving industry into the future.

Introduction

Washington's maritime industry is one of the pillars of the state's economy. Maritime activities range from shipping to fishing, tourism, recreation, and shipbuilding, and occur on coasts and waterways throughout the state. Many of these sectors are interdependent - for example, commercial fishermen rely on the shipbuilding sector to build and repair their vessels - creating a symbiotic web of economic connections.

While the state's maritime industry is as vibrant as ever, it faces challenges such as workforce shortages, environmental impacts associated with climate change, aging infrastructure, and regulatory changes. At the same time, exciting developments in the world of maritime are underway: in innovation, decarbonization, shipbuilding, and new education/training programs, for example.

Now more than ever it is important to understand and communicate the unique and varied role of maritime in our economy. The Washington Maritime Federation (WMF) commissioned McKinley Research Group, in association with High Peak Strategy, to conduct this study of the economic impact of Washington's maritime industry in 2022.

Methodology

Data from the following agencies were used to inform the analysis:

- U.S. Bureau of Labor Statistics
- Washington State Employment Security Department (ESD)
- Washington State Department of Revenue

- Alaska Department of Fish and Game
- Washington State Department of Fish and Wildlife
- National Oceanic and Atmospheric Administration
- U.S. Census Bureau.

Economic impacts were calculated using the Washington State Input-Output Model.

Throughout this report, "Telling the Maritime Story" insets go beyond the numbers to highlight particularly dynamic and/or growing areas of the industry: for example, maritime innovation, workforce development programs, and environmental stewardship.

The study team collaborated closely with the WMF board to establish study goals and general content. The team communicated with a wide variety of maritime professionals to gather input on methods and findings, including representatives of seafood companies, workforce development programs, state and federal agencies, industry associations, ports, and maritime support firms. A full list of companies, organizations, detailed methodological notes, and sources are provided in the Appendix.

It is important to note that 2022 was not a typical year for Washington's maritime sector. In addition to continuing to recover from COVID, the industry experienced impacts from supply chain issues, waterfront labor negotiations, and geopolitical factors influencing trade volumes and routing decisions. While fluctuations in such a diverse industry are to be expected, this report should be viewed in the context of last year's unique circumstances.

Washington's Maritime Sectors

This section provides an overview of the six main sectors of Washington's maritime industry, along with direct employment, wages, revenue, and number of businesses associated with each sector.

Maritime Logistics and Shipping

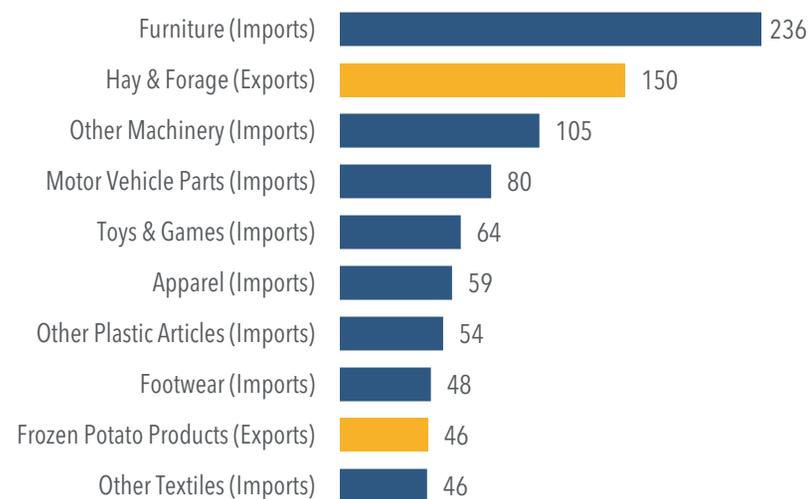
Washington state is among the largest domestic and international gateways for marine cargo in the United States, particularly for cargo moving to and from Northeast Asia and shipping between the Pacific Northwest, Alaska, and Hawaii. There are 11 deep-draft sea and river ports across the state, facilitating the movement of containerized and bulk cargo to and from destinations globally and across the Western United States.



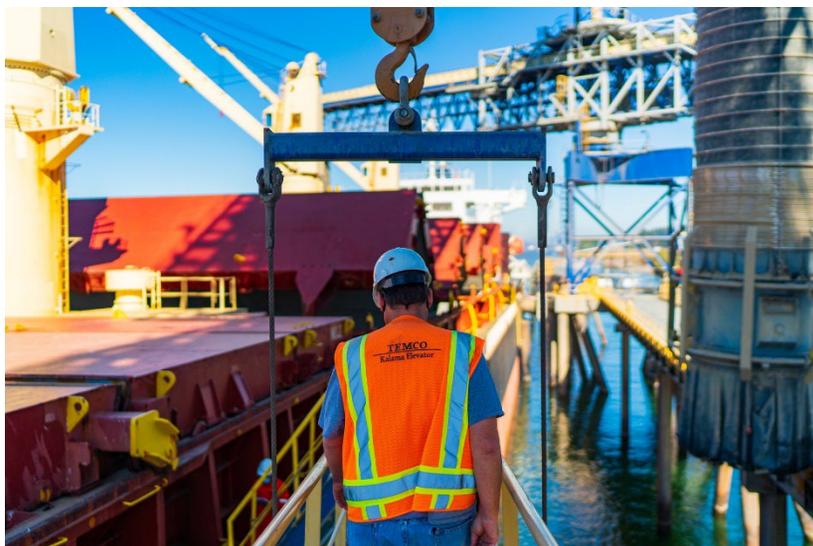
Source: Port of Seattle.

Statewide, Washington ports in 2022 handled the import and export of **15.6 billion** tons of containerized cargo and **55.5 billion** tons of non-containerized cargo (e.g., automobiles, timber, grain) worth **\$36.5 billion**.¹ The Northwest Seaport Alliance (NWSA), representing the containerized operations at the Ports of Seattle and Tacoma, is the fourth-largest container gateway in North America. In 2022, The NWSA handled nearly **3.4 million** twenty-foot equivalent units (TEUs), the standard measure for containerized cargo volumes, including more than **2.6 million** international (import and export) TEUs.² Furniture imports accounted for the highest share of containerized cargo at The NWSA in 2022 (**236,329** TEUs), followed by hay and forage exports (**150,075** TEUs; Figure 1). China was the largest source of imported volume (nearly **700,000** TEUs), followed by Vietnam and Japan.³

Figure 1. Largest Containerized Products Handled at The Northwest Seaport Alliance, 2022 (thousands of TEUs)



Source: The Northwest Seaport Alliance, 2023.



Source: Port of Kalama.

Marine cargo handling involves an extensive, intermodal system of services and activities concentrated at and near the ports while extending to many other parts of the state. Washington is also home to numerous inland river ports along the Columbia and Snake Rivers critical for the export of grain to overseas markets.

The logistics and shipping sector covers a wide range of activities, reflecting Washington's strategic position as a hub for the transportation of goods and provision of maritime services. The following subsectors are part of shipping and logistics in Washington:

- **Freight forwarding**, involving freight arrangement and related services.
- **Deep sea freight transportation**, i.e., operations among international shipping marine lines.

- **Coastal and great lakes freight transportation**, primarily Jones Act shipping operations between Washington state, Alaska, and Hawaii.⁴
- **Inland water freight transportation**, such as river barges moving grain down river from grain elevators to seaports for international shipping.
- **Port and harbor operations**, including port staff.
- **Tugs and pilotage**, essential for the safe movement of vessels and cargo into and out of harbors and other maritime systems.
- **Marine cargo handling**, including on-dock stevedoring and offsite transloading, or the reformatting of cargo from 40-foot marine containers to 53-foot containers common on a standard truck chassis.
- **Warehousing and storage**, including the constellation of facilities in the Kent Valley that store and distribute marine cargo and refrigerated warehousing and storage for various perishable products.
- **Trucking**, including drayage and long-distance movement of cargo to and from port terminals.
- **Rail and rail support**, including rail operations at the Ports of Seattle and Tacoma and rail yards across the state.



SNAPSHOT: Maritime Logistics and Shipping

980 Businesses

23,500 Jobs

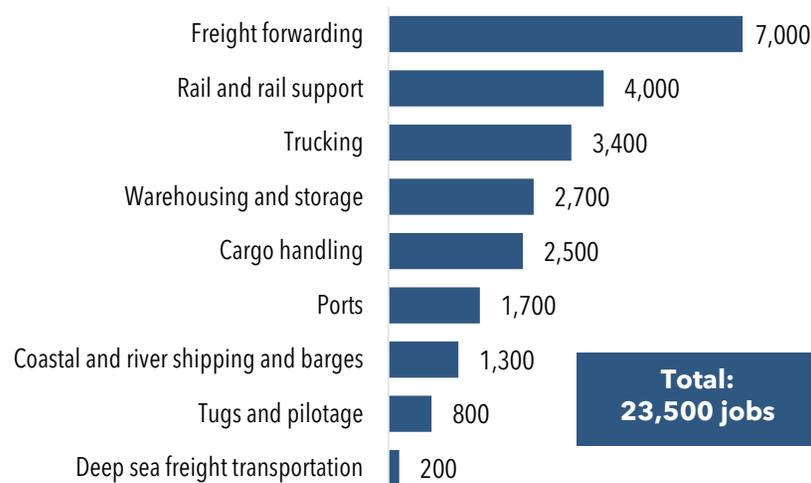
\$9.4B in Revenues

\$2.9B in Labor Income

The above activities support high-paying jobs that in turn drive wealth creation in communities across the state. In 2022, the maritime logistics and shipping sector directly supported an estimated **23,500** workers on an annualized basis. The sector generated **\$9.4 billion** in business revenues and **\$2.9 billion** in labor income (including wages & salaries and benefits).

The average income among maritime shipping and logistics workers, across all activities, was **\$122,000** in 2022, inclusive of wages and benefits. The largest source of jobs was in freight forwarding (**7,000**; Figure 2), followed by rail and rail support (**4,000**) and trucking (**3,400**).

Figure 2. Employment in Maritime Logistics and Shipping, by Subsector, 2022



Source: U.S. Bureau of Labor Statistics, 2023.



TELLING THE MARITIME STORY *The Columbia-Snake River System*

The Columbia-Snake River System plays a critical role both regionally and nationally. Stretching 360 miles from Vancouver to Clarkston, the system carried over **8.5 million** tons of commercial cargo in 2019. "The system provides significant economic value to the State of Washington, the Pacific Northwest, and the entire nation," said Heather Stebbings, former executive director of the Pacific Northwest Waterways Association (PNWA).

The Lower Columbia receives cargo by both barge and rail and is the number one wheat export gateway in the country - accounting for **60%** of all U.S. wheat exports - and the second largest gateway for corn and soy. Wood, mineral, and vehicles are also commonly exported via the Lower Columbia. The ability to transport goods via barge greatly reduces truck traffic on Washington's highways - one barge is equivalent to **134** large semi-trucks in terms of capacity.

In addition to facilitating industrial commerce, the Columbia-Snake River System is treasured by residents and visitors alike for its recreation and scenic value. Sportfishing, paddle-boarding, sailing, windsurfing, jet-skiing, swimming, and kayaking



are just a few of the river system's popular activities. The Columbia-Snake is also the **#2** region for river cruising in the U.S. (after the Mississippi), carrying over **30,000** passengers in 2022.

Note: Sources for highlight sections can be found in the Appendix.

Shipbuilding, Repair, and Maintenance

The shipbuilding, repair, and maintenance sector includes commercial and government vessel construction as well as repair and maintenance of these vessels. Washington's shipyards and boatyards build some of the most advanced – and increasingly efficient – fishing vessels, U.S. and foreign coast guard ships, naval ships, and recreational vessels in the world. This sector is spread across the state, from the large commercial shipyards of Puget Sound to aluminum boat manufacturers on the rivers of Eastern Washington.



Source: Dakota Creek Industries.

Statewide, in 2022 the shipbuilding, repair, and maintenance sector directly supported **18,500** jobs, **\$8.2 billion** in business revenue, and **\$2.4 billion** in labor income, including wages and benefits. The average total income per worker across the sector was **\$122,600**.



SNAPSHOT: Shipbuilding, Repair, & Maintenance

145 Businesses

18,500 Jobs

\$8.2B in Revenues

\$2.3B in Labor Income

This sector's workforce is comprised of workers from a broad and diverse range of educational and skills backgrounds, from welders and other technical workers to naval architects and engineers. The manufacture of ships and boats also entails an extensive supply chain to source components, some of which are produced in Washington state.⁵

There are **61** commercial shipyards and boatyards in Washington state, serving both industry operators and yacht and private vessel construction and maintenance. The Puget Sound Naval Shipyard (PSNS) in Bremerton is the largest single employer in the shipbuilding sector, accounting for **13,700** civilian U.S. Department of Defense (DOD) workers in 2022.⁶ Major commercial shipyards include Vigor (with locations in Seattle, Tacoma, Everett, Vancouver, and Port Angeles), Dakota Creek (Anacortes), Westport Yachts (Port Angeles), and Safe Boats (Bremerton and Tacoma).

Ship and boat builders are also major exporters. In 2022, shipyards exported vessels and vessel components valued at **\$91 million**. The value of U.S. DOD contracts awarded to Washington-based shipyards and boatyards totaled **\$377.4 million**.⁷



TELLING THE MARITIME STORY *The Alaska Seafood Connection*

The commercial fishing and seafood industries of Washington and Alaska are inextricably linked. As Jeremy Woodrow of Alaska Seafood Marketing Institute points out, "Alaska and Washington's seafood relationship is of incredible economic importance to both states, which is why it has prospered for decades and for multiple generations of hardworking fishing families." Seattle's Fisherman's Terminal is known as the home port of the North Pacific fleet for its historic role servicing vessels participating in fisheries in Alaska, from halibut longliners to the large catcher processor ships that harvest numerous groundfish species in Alaska as well as Pacific whiting near Washington. More than half of North Pacific fishing vessels over 58 feet in length homeport in Washington state, supporting jobs at shipyards, wholesalers who provision fishing vessels, and various seafood support services.

In addition, a large share of fishing fleets operating in Alaska are manned by Washington residents, many of whom return in between the fishing seasons and spend their earnings on goods and services in the state. About **65%** of 2022 Washington permit holders fishing in Alaska participated in salmon fisheries, including more than **500** who fished in the Bristol Bay drift gillnet salmon fishery. Washington residents are also active in Alaska fisheries that target pollock, Pacific cod, flatfish, halibut, sablefish, and other species.



Commercial Fishing and Seafood Production

Washington is home to a large and diversified commercial fishing and seafood sector, supporting operations in communities across the state and serving as a key hub for commercial fishing on the West Coast and farther north in Alaska (see inset at left). Some of the biggest seafood processing businesses in the country are headquartered in Seattle. These firms employ shoreside and at-sea workers as well as sales, marketing, and management teams critical to the operation of fishing fleets.

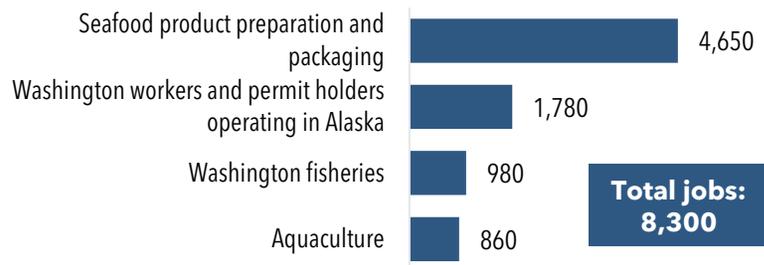


Source: Port of Seattle.

Washington's commercial fishing sector generated an estimated **8,300** annual-equivalent jobs in 2022. More than half of these jobs were in "seafood product preparation and packaging" (**4,650**; Figure 3), which includes shoreside processing operations and crew aboard large catcher-processor fishing vessels based in Washington and largely operating in the northern waters of the Bering Sea and the Gulf of Alaska.

In 2022, more than **2,700** annual-equivalent jobs involved commercial seafood harvesting, including fisheries in Washington and Washington crew working on vessels in Alaska. Aquaculture operations in Washington generated an additional **860** jobs. The main aquaculture product produced in Washington is Pacific oysters.

Figure 3. Washington Commercial Fishing and Seafood Production Jobs, 2022 (annual-equivalent)



Sources: U.S. Bureau of Labor Statistics, 2023; State of Alaska Department of Fish and Game, 2023.

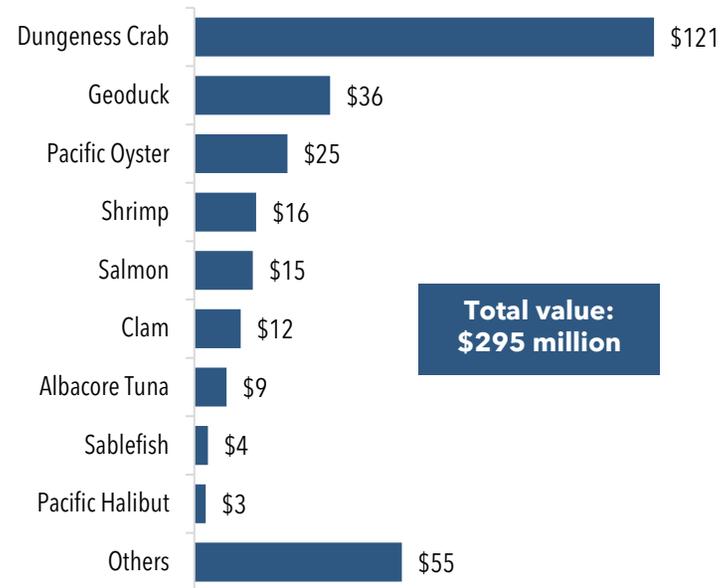
Note: Numbers do not exactly sum to 8,300 due to rounding.



Source: Washington Department of Fish & Wildlife.

Within Washington, the most important types of seafood by value harvested in 2021 were Dungeness crabs, geoducks, and Pacific oysters (Figure 4).

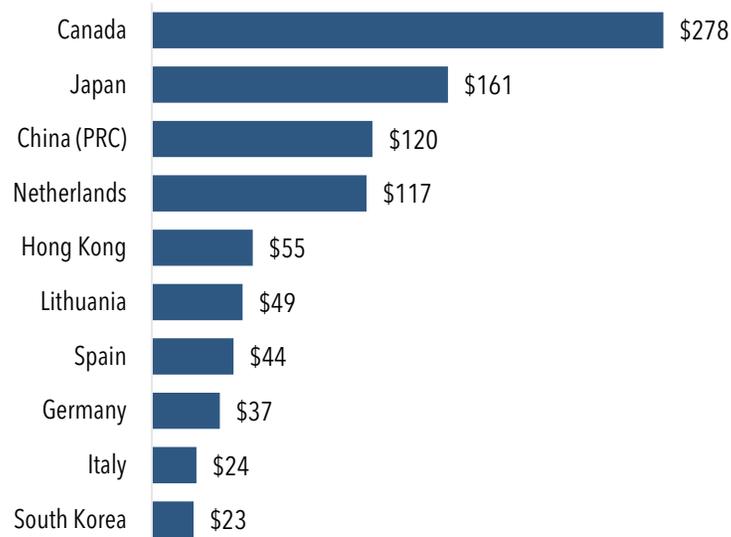
Figure 4. Harvest Value by Species in Washington, 2021 (\$millions)



Source: National Oceanic and Atmospheric Administration (NOAA), 2023. Excludes Pacific whiting (hake) due to data suppression in 2021.

Washington is an important node in the global seafood supply chain, and residents play a key role in bringing seafood products to market. In 2022, **\$1.5 billion** in seafood products were exported out of the Seattle customs district, including **\$1.1 billion** that was processed or caught in Washington. In terms of value, Canada and Japan are the main destinations of these seafood products (Figure 5).

Figure 5. Top 10 Destinations for Washington Seafood Exports, 2022 (\$Millions)



Source: U.S. Census Bureau, 2023.

In total, the Washington fishing and seafood production sector generated approximately **\$825 million** in labor income in 2022. An estimated **780** businesses generated **\$3.8 billion** in revenue.



SNAPSHOT: Commercial Fishing & Seafood Production

| | |
|--------------------|------------------------|
| 780 Businesses | 8,300 Jobs |
| \$3.8B in Revenues | \$825M in Labor Income |



TELLING THE MARITIME STORY

Environmental Stewardship

As awareness of climate change and industry's footprint on oceans and waterways has increased, so has environmental stewardship. New container ship designs are improving economy of scale; better voyage planning and cleaner, dual fuel engines that can run on alternative fuels are reducing fuel and emissions; innovations are improving ballast water treatment; and safer routing distances offshore and voluntary standards of care are increasing safety and protection of whales.

Green Marine, a voluntary environmental certification program for the maritime industry, reports that participation among Washington state companies and organizations has increased ten-fold over the last decade. "Our maritime community is going above and beyond, leading and collaborating to strengthen the industry's sustainability," according to Eleanor Kirtley of Green Marine. Green Marine's members include ports, shipping companies, shipyards, passenger vessel operators, and associations.

The state's commercial fishing industry relies on healthy oceans and waterways. They are reducing their footprint through vessel and gear innovations and are partners on fisheries and marine research work. The startup Net Your Problem recycles used fishing gear. Founded in Dutch Harbor, the non-profit runs a warehouse in Seattle, where they collect gear components to recycle.

Other stewardship work includes Quiet Sound, a voluntary program to reduce noise impacts to Southern Resident Killer Whales from large commercial vessels, and electrification of the Washington State Ferries. The Port of Seattle is partnering with cruise lines and ports in Canada and Alaska to create a "maritime green corridor" between Washington and Alaska, accelerating deployment of zero greenhouse gas emission ships and operations. The Port has also converted two cruise ship terminals for shore power, with a third planned in 2024. Broadly, PNW ports' proximity to Asia offer a lower greenhouse gas footprint than other U.S. ports.

Recreational Boating

Recreational boating is an important economic driver and a favorite pastime in Washington, encompassing a wide range of water-based activities: sportfishing, charter fishing, sailing and private yachting, and sightseeing, to name just a few. Economic impacts of recreational boating include the purchase of boats, vessel maintenance services, fishing equipment, tackle, licenses, fuel, and various other expenses among local retailers and suppliers. Furthermore, this subsector is spread throughout the state - wherever there is access to lakes, rivers, or the ocean.



Source: Port of Anacortes.

The recreational boating subsector includes charter fishing companies, recreational marinas, retail boat dealers, and scenic and sightseeing tour providers. Over **237,000** recreational vessels were registered in Washington state in 2022. An estimated **179** marinas on Washington coastline and rivers provide space for boaters to dock and recreate, employing over **800** workers.⁸

In addition to purchasing vessels, recreational boaters contribute to local economies with spending on maintenance and upkeep, defined as boat repairs, fuel, dockage, insurance, provisions, and fees.⁹ Annual maintenance spending generally equates to 7% of a vessel's assessed value.¹⁰ Since 2015, the assessed value of Washington's recreational fleet has neared **\$6 billion** annually, with associated estimated spending of **\$456 million** on upkeep and maintenance.^{11 12}

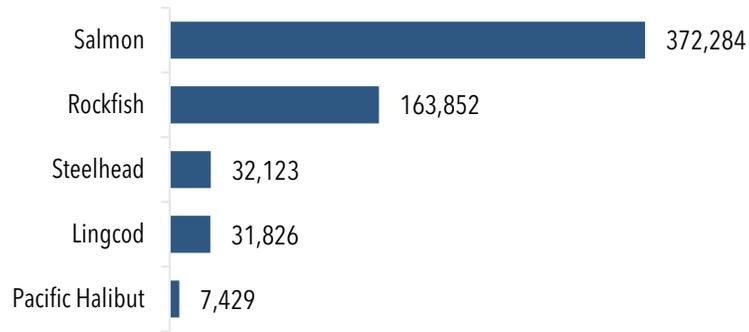
Sportfishing is an important component of the recreational boating industry. In 2020, **1.3 million** sportfishing licenses were sold to residents and nonresidents, generating **\$26 million** in revenues for the Washington State Department of Fish and Wildlife.¹³ In 2022, anglers purchased close to **\$113 million** in durable goods related to fishing (tackle, rods, reels, and other equipment).¹⁴



Source: Washington State Department of Fish & Wildlife.

Salmon is the most popular species in terms of sportfish catch volume, with more than **372,000** salmon caught in 2020; they were followed by rockfish, steelhead, lingcod, and halibut (Figure 6). Over **200,000** pounds of clams and shrimp each were harvested the same year.¹⁵

Figure 6. Top Washington Sportfish Catch Volume by Species, 2020



Source: Washington State Department of Fish and Wildlife, 2023.

In total, recreational boating represented **470** businesses earning **\$1.2 billion** in revenues in 2022. This subsector is associated with **2,500** jobs and **\$134 million** in labor income.

SNAPSHOT: Recreational Boating

| | |
|--------------------|------------------------|
| 470 Businesses | 2,500 Jobs |
| \$1.2B in Revenues | \$134M in Labor Income |



TELLING THE MARITIME STORY

Agricultural Ties

Agriculture is one of the cornerstones of Washington's economy, representing roughly **36,000** farms and over **160,000** jobs across the state. As Derek Sandison, Director of the Washington State Department of Agriculture, points out, "the success of our maritime and agricultural and food industries are closely interrelated." The maritime shipping and logistics subsector is essential infrastructure for Washington state farms, conveying wheat, apples, pears, dairy, beef, and other agricultural commodities through a system of trucks, barges, and ultimately shipping vessels for foreign export.

Washington's agricultural and food exports totaled **\$8 billion** in 2022. The top five exports were fish/seafood, wheat, frozen potato products, apples, and dairy products. Roughly **90%** of Washington's wheat is exported, along with **70%** of potatoes (and frozen potato products), making these crops particularly dependent on the maritime ecosystem. The top five export destinations were Canada, Japan, China, South Korea, and Mexico.

Washington also serves as an essential conduit for food products originating in other, mostly Northern, states: in 2022, agricultural and food products valued at **\$23 billion** passed through Washington on their way to ports for shipping overseas. These products are conveyed through the Snake and Columbia river systems or by rail to Washington state ports for export. Major grain terminals operate at the ports of Vancouver, Longview, Tacoma, Seattle, and Grays Harbor.



Passenger Water Transportation

Water transportation includes ferries, cruise ships, river transportation, and various activities tied to these operations. Water transportation services are essential for regional commerce, recreation, and tourism spending.



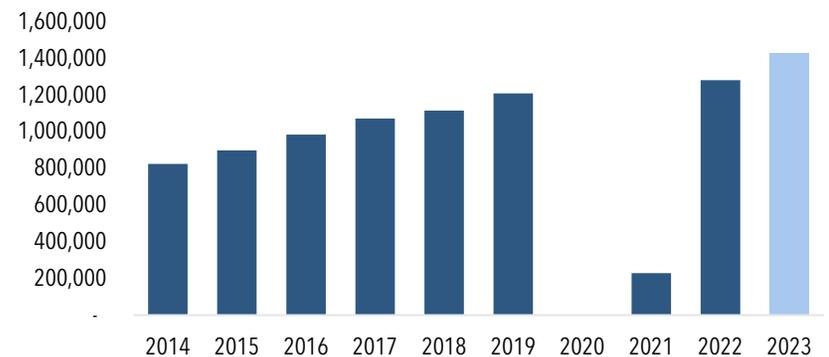
Source: Washington State Ferries.

Washington state is home to the nation’s largest ferry system. In 2022, the Washington State Department of Transportation (WSDOT) operated **21** ferries carrying **17 million** passengers; prior to the pandemic (2019), passenger volumes totaled nearly **24 million**.^{16,17} Ferries are essential infrastructure in Western Washington, operating as a marine highway linking Seattle, Edmonds, and other cities along the eastern coastline of Puget Sound with islands and the Olympic Peninsula.

|  SNAPSHOT: Passenger Water Transportation | |
|---|-------------------------------|
| 63 Businesses and Government Agencies¹⁸ | 4,600 Jobs |
| \$529M in Revenues | \$397M in Labor Income |

Cruise ships using Seattle as a homeport for Alaska sailings have become an important seasonal driver of economic activity over the last two decades. Cruise ships entail cruise line personnel, vessel provisioning, fueling, and out-of-town cruise passenger spending at restaurants, hotels, attractions, gift shops, and other local businesses before and after sailing. In 2022, cruise ships made **296** calls at the Port of Seattle, representing **1.3 million** passenger visits (**640,000** passengers transiting the Port twice, once on embarkation and again on disembarkation), a **74%** increase from a decade earlier (Figure 7).¹⁹

Figure 7. Port of Seattle Cruise Passenger Volume, 2014-2022; 2023 proj.



Source: Port of Seattle, 2023.

Note: The Port of Seattle counts each passenger twice, once on embarkation and again on disembarkation.

In 2022, passenger water transportation activities directly supported an estimated **4,600** jobs and **\$397 million** in labor income (wages and benefits). The sector generated an estimated **\$529 million** in revenues for the Washington state economy, such as through direct business sales, ferry operating budgets, and cruise passenger spending.



Source: Port of Seattle.



TELLING THE MARITIME STORY

Maritime Innovation

Innovation in the global maritime sector has accelerated in recent years, particularly in Washington state, and it is impacting every area of the industry. According to Joshua Berger of Washington Maritime Blue, "our region is quickly becoming a global center of excellence for maritime innovation because we organized early, and aligned vision, goals, and opportunity across industry, government, research institutions, and community organizations."

Founded in 2019, Washington Maritime Blue is a non-profit that supports startups working in maritime at various stages from initial concept to early revenue generation. They have supported more than **50** companies and organizations that collectively have raised more than **\$400 million** and created over **400** jobs since coming through their program. With startup business incubators and accelerators in both Seattle and Tacoma, Maritime Blue also works with entities around the world. Examples of their successful startups include Blue Dot Kitchen (kelp-based snacks); Silverback Marine (sustainable, low-emission boat building); OpenTug (logistics platform for tug and barge operations), OneTank (ballast water treatment), and Gybe (digital tools for frontline workers).

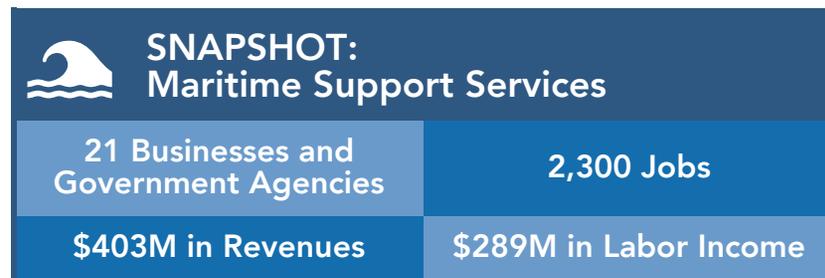
Maritime Blue is joined by many other organizations in Washington driving innovation. WAV-C: Washington Autonomous Vehicle Cluster, based in Kitsap County, works with government agencies, academic institutions, corporations, entrepreneurs, and funders to advance innovative solutions in autonomous underwater vehicles. Examples of the applications include fisheries data collection, search and rescue operations, and environmental assessments. Pacific Northwest Tech Bridge, also based in Kitsap, identifies Department of Navy patents and technologies with commercial potential. There are also organizations supporting innovation across sectors including maritime: Washington Technology Industry Association, Clean Technology Alliance, Northwest Innovation Resource Center, Innovation Cluster Accelerator, Startup253, and VertueLab, among others.

Maritime Support Services

The maritime support services sector represents a diverse constellation of businesses, nonprofits, sole proprietors, and government agencies that support and/or are closely aligned with maritime activities. Examples include law, accounting, and insurance firms that specialize in the maritime sector; maritime construction firms; naval architecture firms; educational institutions; and research and public agencies, such as the National Oceanic and Atmospheric Administration (NOAA).

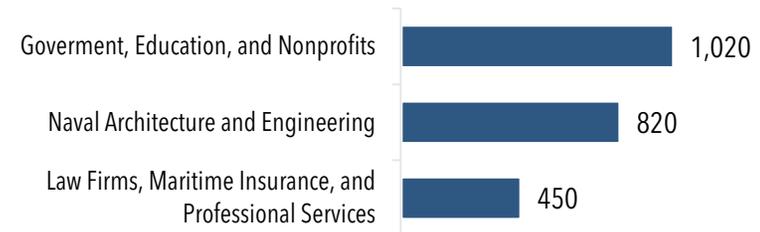


Source: Seattle Maritime Academy.



In 2022, these activities directly supported **2,300** jobs and generated **\$403 million** in revenues. Government, education, and nonprofits represented the largest number of jobs, directly employing an estimated **1,020** workers, followed by **820** workers in naval architecture and engineering, and **450** maritime lawyers, insurance brokers, and other professionals (Figure 8).

Figure 8. Jobs by Maritime Services Subsector, 2022



Sources: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, 2023; Washington State Employment Security Department, 2023; interviews, 2023.

Many of these services are closely linked to other segments of the maritime sector. For example, naval architecture firms work with ship and boat builders to design vessels, including materials and key components integrated into the final product. Design firms have also been at the forefront of the next generation of clean, all-electric ferries and energy-efficient fishing vessels.

Maritime-focused law firms offer legal support for maritime business and Jones Act compliance, for example. Maritime insurance firms and brokers use maritime expertise to prepare insurance plans to serve the unique needs of maritime businesses.

Maritime educational institutions help train the next generation of mariners and ship engineers, as well as continuing training for a wide range of mariner professions.

NOAA employs nearly **1,000** workers in the Seattle area whose work focuses on maritime operations and publishes important fisheries data while also managing the regional office of the National Weather Service, providing critical maritime weather data for commercial operations and recreational boaters.



Source: Northwest Maritime Center.

TELLING THE MARITIME STORY: *Workforce Development*

Workforce shortages in the maritime industry have become an increasingly critical issue over the last decade. Factors include an aging maritime workforce, a tightening labor market, and limited awareness of maritime opportunities among prospective workers. To address these challenges, the industry is finding success through development of new education and training programs, as well as expansion of existing programs. According to Ann Avary of Skagit Valley College, one of the state's leaders in maritime workforce development, "The workforce education side of maritime industry is growing in a significant and meaningful way for the first time in 10 to 15 years." In particular, Avary notes that technological innovations are helping inform and drive the recent growth in educational programming.

The Maritime High School in Des Moines is a prime example of a new initiative to train future mariners. Opened in 2021, MHS is a collaborative project of Highline Public Schools, Northwest Maritime Center, Port of Seattle, and the Duwamish River Cleanup Coalition and is the first such program in the state. Other examples of new and/or expanding programs include a maritime skill center in Pierce County, Northwest Maritime Apprenticeship program serving Whatcom, Skagit, San Juan, and Island counties, the Port of Seattle Youth Career Launch, and the Youth Marine Foundation in Tacoma, which prepares young people for careers in the maritime industry.

An overarching effort to address the workforce shortage by developing a statewide maritime sector workforce place is underway by the Center of Excellence for Marine Manufacturing & Technology. Working with over 100 stakeholders representing industry, labor, economic and workforce development, education, and community-based organizations, the group is working toward understanding where jobs and training are most needed and identifying high quality existing programs for scaling up, all with a goal of meeting the growing demand for maritime workers.

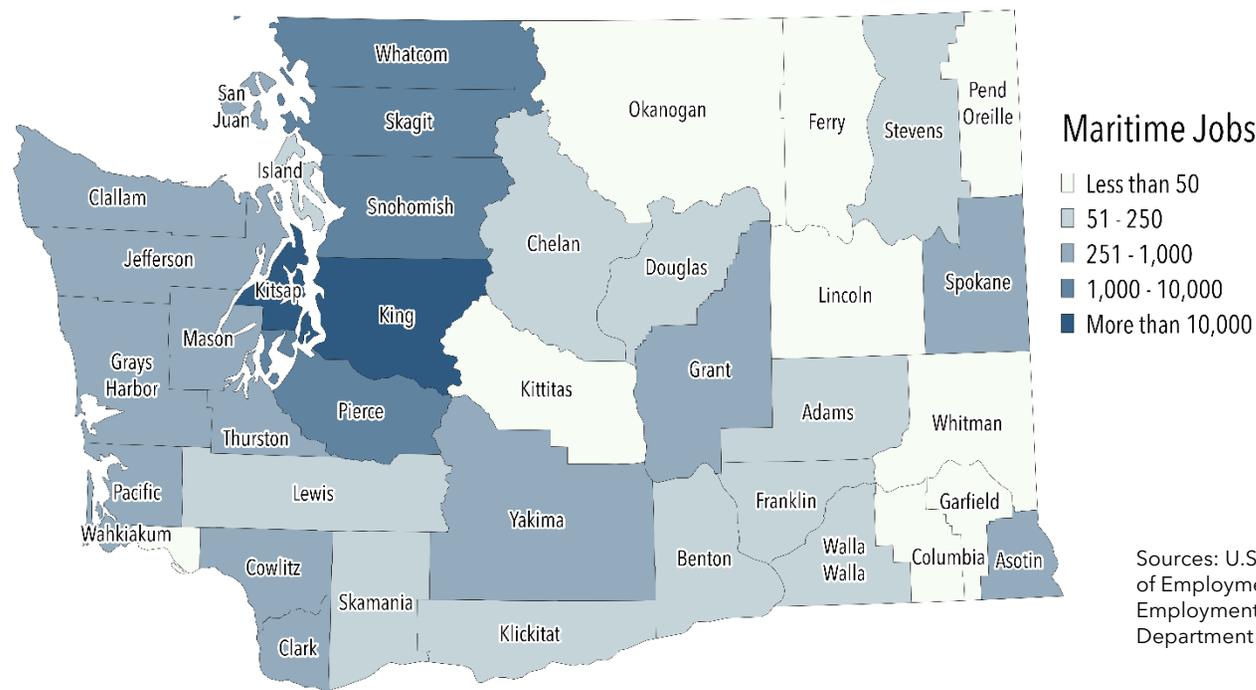
Maritime Employment by County

Maritime sector jobs and activities can be found in nearly every county in Washington state. While the majority of activities are along the Puget Sound coast, maritime jobs exist in Central and Eastern Washington through river ports, rail operations, recreational boating, and logistics. The largest concentration of maritime direct jobs is in King County, with nearly **24,000** (Figure 9). The county is home to the Port of Seattle and a dense web of shipping and

logistics operations, homeport for a large share of the North Pacific fishing fleet, cruise ships, ferry routes, shipyards, seafood processing operations, NOAA, and various maritime support services.

Kitsap County is the next largest county by maritime direct jobs, with nearly **19,000**, including **13,700** civilian U.S. DOD workers employed at the Puget Sound Naval Shipyard and many other workers employed among shipbuilders and related operations. The Port of Tacoma and NWSA activities drive Pierce County's maritime footprint, including shipbuilding and the array of warehousing and logistics operations near the port.

Figure 9. Washington Maritime Employment by County, 2022



Sources: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, 2023; Washington State Employment Security Department, 2023; State of Alaska Department of Fish and Game, 2023.

Economic Impacts

Economic impacts include jobs, labor income, and business revenues supported statewide through: 1) activities **directly** tied to the maritime sector; 2) upstream business-to-business transactions, such as the purchase of provisions and fuel by the fishing industry from local suppliers, or **“indirect impacts”**; and 3) additional jobs, income, and revenues supported by workers employed in the maritime sector or among the various suppliers spending their earnings in the local economy, or **“induced impacts.”** The sum of direct, indirect, and induced effects represents the total statewide economic impact of the maritime sector.

Direct Impacts

Washington's maritime industry directly accounted for **61,900** jobs in 2022 (Figure 10). Maritime logistics and shipping accounted for the largest share at **23,500** jobs, followed by shipbuilding, repair, and maintenance (**18,500** jobs).

These jobs were associated with **\$7.0 billion** in labor income, including **\$2.9 billion** in the maritime logistics and shipping sector and **\$2.3 billion** in the shipbuilding, repair, and maintenance sector (Figure 11).

Figure 10. Washington Maritime Industry Direct Employment, 2022, Total and By Sector

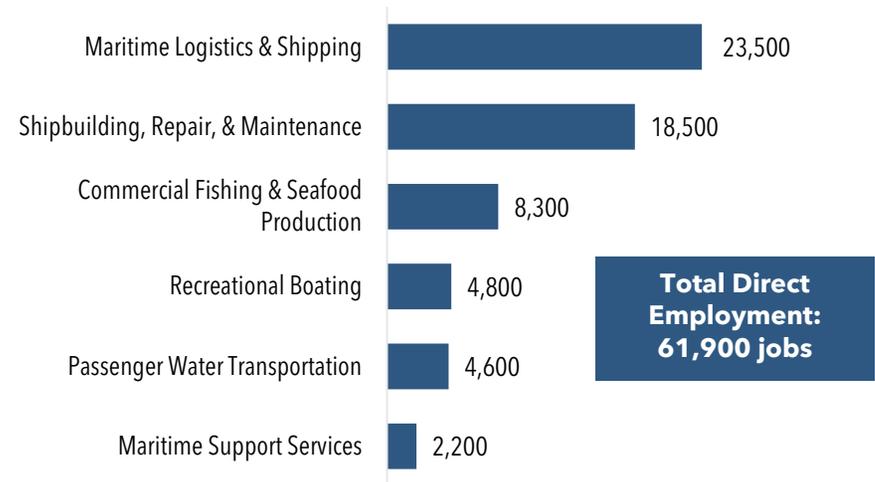
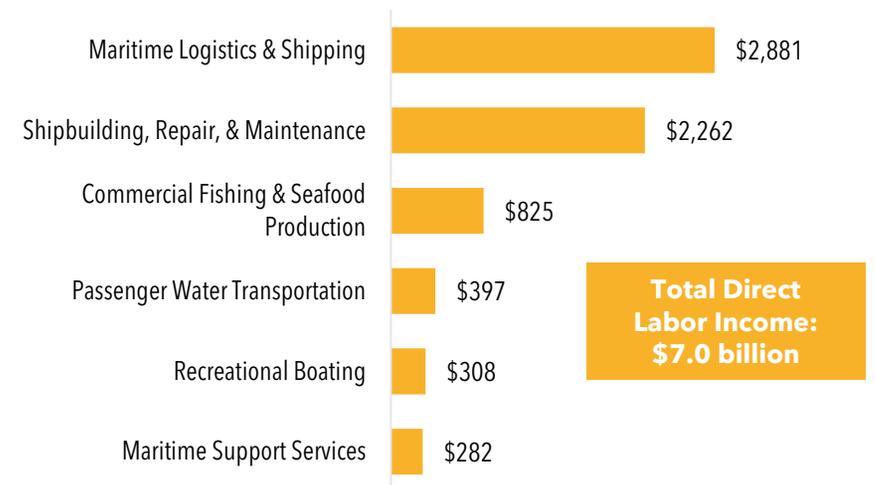


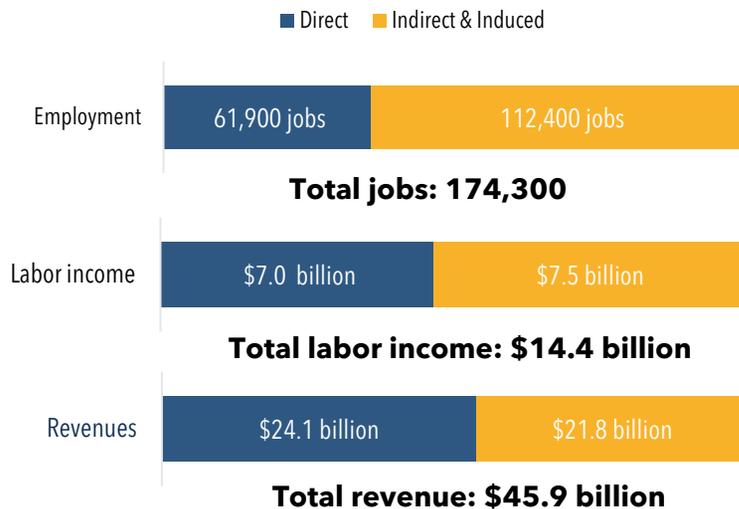
Figure 11. Washington Maritime Industry Direct Labor Income, 2022, Total and By Sector (\$Millions)



Total Impacts

In 2022, the maritime sector supported **174,300** jobs, **\$14.4 billion** in labor income, and **\$45.9 billion** in business revenues (Figure 12). Each direct job in the maritime sector was associated with a total of **2.8** jobs across the state economy. Every dollar of sales by the maritime industry supported an additional **90 cents** in sales in other parts of the state economy (a multiplier of 1.9).

Figure 12. Washington Maritime Industry Total Employment, Income, and Revenue Impacts, 2022



Sources: Washington State Office of Financial Management, 2022; U.S. Bureau of Economic Analysis, 2023.

Note: Some numbers do not exactly sum due to rounding.

State Government Revenues

The direct, indirect, and induced impacts of the maritime sector in turn yield business sales that are taxable and result in government revenues, or “fiscal impacts.” In 2022, maritime activities in Washington state supported an estimated **\$382 million** in state taxes, including all direct, indirect, and induced impacts. Tax impacts included an estimated **\$149 million** in state taxes generated through direct activities and an additional **\$233 million** through indirect and induced spending.

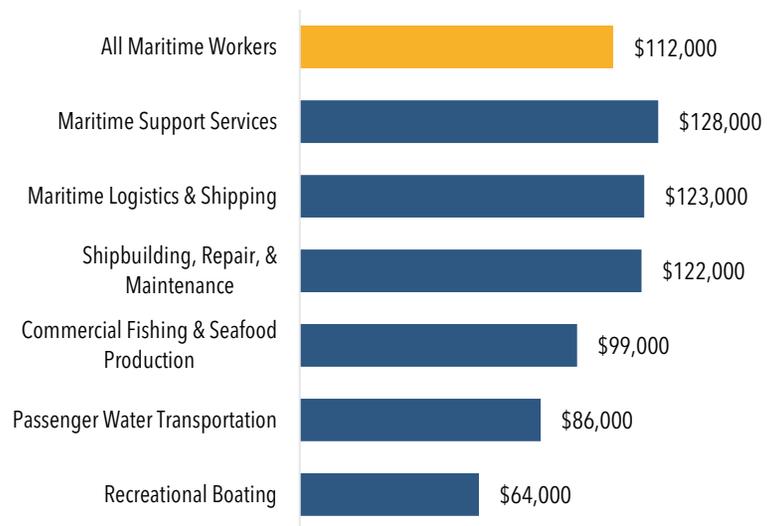


Source: Port of Seattle.

Washington's Maritime Workforce

Washington's maritime workers earned an average of **\$112,000** in 2022, including benefits.²⁰ Average earnings were highest among workers in support services (**\$128,000**), maritime logistics and shipping (**\$123,000**), and shipbuilding, repair, and maintenance (**\$122,000**). Average earnings are annualized and reflect seasonality in some subsectors, such as fishing and recreational boating.

Figure 13. Average Earnings Among Washington Maritime Workers, Total and by Subsector, 2022 (including benefits)



Sources: U.S. Bureau of Labor Statistics, 2023; U.S. Bureau of Economic Analysis, 2023.



Source: Port of Seattle.

The diversity of activities across the maritime industry is reflected in the sector's workforce composition. Maritime workers represent a wide range of skills and educational backgrounds and include executive-office positions as well as factory-floor workers and fishermen.

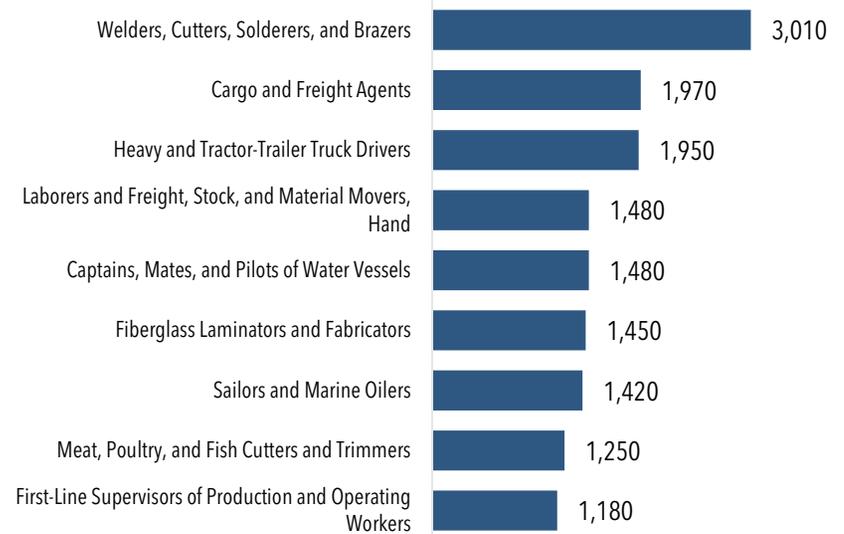


Source: Port of Seattle.

In 2022, the most common maritime occupation, sector-wide, was “welders, cutters, solderers, and brazers,” an occupation directly tied to manufacturing in the shipbuilding, repair, and maintenance sector (Figure 14). In 2022, an estimated **3,010** workers were employed in these positions, earning an average annual salary of about **\$58,000** per year across all industries.²¹ Annual wages can vary significantly across these occupations. For example, the average wage for welders in the maritime sector was **\$74,400** in 2022. Many of these positions provide a living wage for workers without a four-year college degree, and they are an essential component of Washington’s manufacturing sector.

Other common occupations, such as “cargo and freight agents,” “heavy and tractor-trailer truck drivers,” “laborers and freight, stock, and material movers,” and “captains, mates, and pilots of water vessels” (totaling nearly **2,000** jobs), are all related to the state’s role as a shipping and logistics hub.

Figure 14. Most Common Maritime Industry Occupations, 2022 (1,000+ workers)



Sources: Washington State Employment Security Department, 2023; U.S. Bureau of Labor Statistics, 2023.

Appendix

Participating Companies and Organizations

Representatives of the following entities contributed to this study in the form of data, interviews, and insights.

- Alaska Seafood Marketing Institute
- Blue Sky Maritime
- BNSF Railway
- Elliott Bay Design Group
- Freezer Longline Coalition
- Glosten
- Green Marine
- Groundfish Forum
- Miller Nash LLP
- National Oceanic and Atmospheric Administration (NOAA)
- Newfront
- Northwest Marine Trade Association
- Northwest Maritime Center
- Pacific Merchant Shipping Association
- Pacific Northwest Waterways Association
- Port of Seattle
- Puget Sound Pilots
- Recreational Boating Association of Washington
- Skagit Valley College Center of Excellence for Marine Manufacturing & Technology
- The American Waterways Operators

- WA Coast Economist
- Washington Maritime Blue
- Washington Maritime Federation
- Washington Sea Grant
- Washington State Department of Agriculture
- Washington State Department of Commerce
- Washington State Department of Natural Resources
- Washington State Department of Revenue
- Washington State Employment Security Department

Methodological Notes

The sections below detail our approach to each subsector analyzed in this report, key data sources, industry codes, and economic impact estimates. Sectors are typically defined by a grouping of subsectors according to North American Industry Classification System (NAICS) codes.

Maritime Shipping and Logistics

In addition to NAICS for shipping and marine cargo, the study team also produced custom estimates for rail, warehousing, and trucking operations. These categories were either unavailable (or suppressed) in state and federal sources, and/or not adequately represented in existing sources. Warehousing estimates were based on reported warehousing square footage for operations servicing The Northwest Seaport Alliance and estimated square footage per worker (to compute jobs). Rail operations estimates used existing reports released by BNSF and Union Pacific. Drayage and long-haul trucking estimates were computed based on the list of trucking firms

servicing The Northwest Seaport Alliance, with adjustments to capture additional workers.

Shipbuilding, Repair, and Maintenance

This category leveraged jobs, wages, and gross business income published for the NAICS code 3366 (ship and boat building). Exports data were collected from the U.S. Census Bureau's USATrade® Online portal for state-of-origin data series. The Puget Sound Naval Shipyard is the largest component of the subsector, but as a public entity does not generate business revenues. Instead, the economic value of PSNS operations were estimated and used as an input into subsequent economic impact estimates.

Commercial Fishing and Seafood Processing

This subsector includes aquaculture; Washington-based fishing, processing, and operations; and workers based in Washington state but working in waters off Alaska. Data for fishing and seafood processing were gathered based on NAICS codes. Washington-based fishing economic activities were estimated using ex-vessel landings data for fisheries in Washington, published by the National Oceanic and Atmospheric Administration (NOAA). Crew and permit holders based in Washington but fishing in Alaska waters were computed based on license data published by the Alaska Department of Fish and Game for Washington residents and Washington commercial fishing permit holders. Processing workers employed on catcher-processor vessels owned by Washington seafood processing companies and operating in Washington and Alaska waters are accounted for in Washington QCEW data. The study team analyzed several data sources to ensure seafood participants were not double-counted across these subsectors. All estimates were annualized.

Recreational Boating

Direct wages and employment for water-based scenic and sightseeing, marinas, and boat dealerships were gathered from the U.S. Bureau of Labor Statistics. Employment in the charter fishing subsector was based on the number of licensed charter boat operators and fishing guides reported by the Washington Department of Fish and Wildlife, while wages and revenues were estimated based on a saltwater charter fishing survey published by NOAA. Boater spending on maintenance and upkeep was determined by applying an industry standard percentage to the statewide recreational fleet's assessed value, estimated from published Washington watercraft excise tax (WET) revenues. Sportfishermen spending on durable goods was computed by adjusting NOAA's 2018 Fisheries Economics of the United States (FEUS) sportfishermen spending data by the increase in fishing licenses sold from the 2018 to 2020.

Passenger Water Transportation

Passenger water transportation includes the ferrying of passengers and, in the case of cruise ships, estimated spending by passengers as part of their visit to Washington. The most recent cruise ship visitor spending survey, published by the Port of Seattle, was used to estimate visitor spending per category.

Maritime Support Services

This subsector captures additional activities that are not represented by an entire NAICS code, necessitating custom estimates. A list of companies and organizations was submitted to the Washington State Employment Security Department (ESD) for custom aggregations. Employment in the maritime law sector was

estimated by compiling a list of maritime lawyers and then adjusted to account for staff supporting legal services, such as paralegals.

Key Data Sources

- **Quarterly Census of Employment and Wages (QCEW).** Data for Washington state published by the U.S. Bureau of Labor Statistics (BLS) and Washington State Employment Security Department (ESD). QCEW data includes the number of establishments (employers), employment, and wages covered by state unemployment insurance (UI) laws and federal workers covered by the Unemployment Compensation for Federal Employees (UCFE) program. Data is reported by NAICS codes.
- **Non-Employer Statistics.** Data on non-employer, self-employed workers by industry and state. Published by the U.S. Census Bureau.
- **Occupational Employment Statistics.** Data on employment by standard occupational classification (SOC) code for Washington state and Seattle MSA, including projections. Data published by the Washington State ESD.
- **Occupational-Employment Matrix.** Crosswalk between occupational employment headcount and industry headcount, providing estimates for number of workers by occupation in each industry. Data series for Washington state released by the Washington State ESD.
- **Gross Business Income.** Gross business income (GBI) represents gross receipts reported by Washington state businesses for the purpose of assessing business & occupation tax obligations. GBI is reported quarterly by NAICS code by the Washington State Department of Revenue.
- **Washington State Input-Output (I-O) Model (2012).** In addition to computing statewide economic impacts (discussed further below), the most recent I-O table allows imputation of output-to-worker ratios used to compute either jobs (based on business revenue) or revenues (based on jobs) when other sources were not available.
- **Implicit Price Deflators.** Indexed to 2012, used to adjust annual business revenues to 2022 dollars. Published by the U.S. Bureau of Economic Analysis.
- **Port of Seattle Cruise Passenger Visitor Spending Survey and Passenger Volumes.** Published by the Port of Seattle, including estimated spending by category and cruise passenger volumes.
- **Watercraft Excise Tax (WET).** State budgets. Published by State of Washington Office of Financial Management.
- **Salmon Sport Catch Volume.** Sport catch volume data for fishing license year 2020-2021. Published by Washington Department of Fish and Wildlife 2020 Sport Catch Report.
- **Registered Recreational Vessels.** Registered Washington state vessel count for 2022. Published by Washington Sea Grant via a special data request to Washington Department of Licensing.
- **Sportfishing Durable Goods Expenditures.** Data for spending on sportfishing equipment from the Fisheries Economics of the United States, 2020 report. Published in 2023 by NOAA and National Marine Fisheries Service (NMFS).
- **Charter Boat Operator Revenues.** Self-reported survey responses on earnings. Costs, Earnings, and Employment in the Alaska Saltwater Sport Fishing Charter Sector, 2017. Published in 2019 by NOAA and NMFS.
- **Recreational Boater Spending.** Average spending by yacht owners adjusted to reflect all boaters; only upkeep and maintenance considered. Published by U.S. Superyacht Association.

- **Washington Marinas.** Estimate of marinas in Washington state. Personal communication with the Northwest Marine Trade Association (NMTA).
- **Washington Resident Permit Holders in Alaska Fisheries** Count of permit holders ("skippers") who are Washington residents and revenue generated by these fishermen. Data published by the Alaska Commercial Fisheries Entry Commission.
- **Washington Resident Commercial Fishing Crew Members in Alaska Fisheries** Count of Alaska commercial fishing crew members ("deckhands") who are Washington residents. Data provided by the Alaska Department of Fish & Game.

NAICS Codes Used in This Report

- 112511 Finfish farming and fish hatcheries
- 112512 Shellfish farming
- 1141 Fishing
- 3117 Seafood product preparation and packaging
- 3366 Ship and boat building
- 441222 Boat dealers
- 483111 Deep sea freight transportation
- 483112 Deep sea passenger transportation
- 483113 Coastal and great lakes freight transportation
- 483114 Coastal and great lakes passenger transportation
- 483211 Inland water freight transportation
- 483212 Inland water passenger transportation
- 484110 General freight trucking, local
- 487210 Scenic and sightseeing transportation, water
- 488210 Support activities for rail transportation
- 488310 Port and harbor operations
- 488320 Marine cargo handling

- 488330 Navigational services to shipping
- 488390 Other support activities for water transportation
- 488510 Freight transportation arrangement
- 493120 Refrigerated warehousing and storage
- 713930 Marinas

Economic Impact Estimation

The Washington State Input-Output (I-O) Model was used to compute indirect and induced impact estimates in this report. The Washington State Input-Output Model is a modeled representation of the Washington state economy broken out by 52 industries and industry groupings, including production functions by industry, sales by industry, and sources of final demand by industry (personal consumption expenditures, investment, gross exports, government purchases).

The total economic impact of the each sector is the sum of direct, indirect, and induced impacts. In addition to direct impacts, indirect impacts refer to additional jobs, income, and business output (or revenue) supported through upstream business-to-business transactions, such as computer and electronic component suppliers. Induced impacts refer to additional jobs, income, and output through the spending of earned income on household consumption by workers employed through direct and indirect activities.

Differences with Previous Study (2017)

There are several important differences between this report and the previous Washington Maritime Federation economic impact study, published in 2017 and measuring 2015 impacts. Firstly, commercial fishing and seafood processing estimates include Washington-

based crew and permit holders who fish in waters off Alaska. Secondly, the recreational boating approach in this study includes estimated economic activities tied to private vessel maintenance spending and sportfishing, which were not computed in the previous study. However, this study includes recreational boat manufacturing in the "shipbuilding, repair, and maintenance," whereas the 2017 study separated out these manufacturers and included them under recreational boating.

Lastly, differences in the estimates reflect overall changes in the maritime sector. Not all industries are easily comparable across time, due to custom estimates developed for a specific year. However, some of the largest components of the maritime sector are captured in annual state and federal data and help explain some of the differences. For example, the NAICS code 3117 (seafood product preparation and packaging) experienced a nearly 1,700 covered employment decline between 2015 and 2022. Marine cargo handling covered employment declined by nearly 1,500 jobs over the same period.

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³ The Northwest Seaport Alliance, 2023. 2022 Annual Trade Report. <https://s3.us-west-2.amazonaws.com/nwseaportalliance.com.if-us-west-2-or/2023-04/2022%20NWSA%20Annual%20Cargo%20Report.pdf>

⁴ The Jones Act (46 U.S.C. § 55102) is a section of the 1920 Merchant Marine Act that strictly speaking, only applies to merchandise being transported by water between U.S. points. The law requires that this cargo is to be shipped solely aboard vessels that are U.S.-built, U.S.-citizen owned, and, registered in the U.S., which means crewed by Americans. Source: U.S. Department of Transportation Maritime Administration; <https://www.maritime.dot.gov/ports/domestic-shipping/domestic-shipping#act>

⁵ Many of Washington's shipyards serve businesses and operations regulated under the Jones Act, which requires that vessels engaged in port-to-port domestic commerce in the United States (e.g., U.S. fisheries and marine shipping between U.S. ports) be manufactured almost entirely using U.S. components.

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