EVALUATING EMPLOYMENT BY INLAND WATERWAYS OPERATORS

August 2025

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FINAL REPORT

Prepared for
National Waterways Foundation

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DISCLAIMER

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EXECUTIVE SUMMARY

Supply chain disruptions since the COVID-19 pandemic have intensified focus on transportation workforce availability and employment conditions. This study, conducted by the Texas A&M Transportation Institute's (TTI) Center for Ports and Waterways for the National Waterways Foundation (NWF), examined employment characteristics in the inland waterways industry, comparing it to the rail and trucking sectors, while quantifying the economic impact of inland waterways jobs to the national economy. Additionally, an educational toolkit was created, highlighting the advantages of working in the inland waterways industry.

An employment survey was developed and sent out to waterways operators as the first task of the report. Ten responses were received, representing about 31 percent of the estimated inland waterways jobs nationally. Responses included data on job positions, duty cycle, educational attainment, and geographic location. The survey results showed that positions generally required only a high school education, and typical lengths of employment for non-entry level positions were over 10 years. Geographically, workers resided in 29 states, with the highest concentrations along the Gulf Intracoastal Waterway (GIWW), and the Mississippi and Ohio River basins. Louisiana, Mississippi, and Texas were the states with the highest concentration of inland waterways workers surveyed.

The study also compared inland waterways employment to the trucking and rail sectors. Compared to trucking and rail jobs, waterways jobs require no prior experience, offer advancement based on merit, the opportunity to acquire additional certifications, and reliable scheduling of work periods. The trucking sector currently faces a critical driver shortage, high turnover rates, irregular work schedules, and health issues arising from the sedentary nature of the job. Railroad jobs have similar issues with irregular, unpredictable work schedules, and have faced significant reductions in the workforce in recent years.

This report found that compared to trucking and rail inland waterways employment offered several advantages, including safety, compensation, work-life balance, and job security. Inland waterway transportation is significantly safer than rail or trucking, with $1/25^{th}$ the fatalities of rail operations, and $1/120^{th}$ the fatalities of trucking operations. Median compensation for inland waterway transportation jobs exceeds trucking wages and is near rail wages, while offering a more predictable work schedule, with lower

turnover. The sector also offers job security as these jobs cannot easily be automated and demand for these positions is expected to continue to grow in the future.

Next, an IMPLAN based economic impact analysis was conducted to determine the impacts of waterways employment on the national economy. Bureau of Labor Statistics (BLS) data including employment numbers and wages were used as inputs into the IMPLAN model. The results showed that inland waterways jobs have a total economic output, including direct, indirect, and induced impacts, of $36.1 billion annually, contribute $10.2 billion to labor income, and support 127,500 jobs. Additionally, inland waterways employment contributes $4.2 billion in tax revenue nationally.

Finally, a video and a brochure that highlight the advantages of working in the inland waterway industry were developed. These educational materials can be distributed to middle and high school students who may be interested in a career in the industry. The brochure highlights the advantages of an inland waterways career, job duties associated with different positions, potential compensation for these positions, as well as typical career progression paths. Additionally, a five-minute video was created to showcase these topics and includes interviews with a current barge company executive and a towboat captain.

This report found that inland waterways employment offers several advantages over similar jobs in the trucking and rail industries including competitive wages, safer work environments, and predictable work schedules. The industry generates substantial economic benefits nationally while providing entry level positions that can develop into skilled careers without requiring a college degree. The educational toolkit developed alongside this report will provide educators and parents with the tools needed to explain the advantages of a career in the industry, helping these critical jobs to remain staffed in the future.

BACKGROUND AND SIGNIFICANCE

Introduction

Supply chain issues that have arisen since the onset of the COVID-19 pandemic have prompted increased awareness and a national discussion regarding the best practices for management of supply chains. One of the key issues has been the availability of labor. The inland waterways freight transportation system provides unique employment opportunities and working conditions when compared to other transportation modes. This employment also generates substantial benefits to the national economy.

This study undertook a comparative analysis of employment factors for rail, trucking, and inland waterways, and calculated the benefits the nation experiences as a result of employment in the inland waterway industry.

The project consisted of the following tasks:

- Task 1: Conduct a survey to collect inland waterways employment data
- Task 2: Determine the geographical and demographic reach of inland waterways employment
- Task 3: Describe typical working conditions of the three modes
- Task 4: Develop economic impact analysis of inland waterways employment
- Task 5: Prepare "toolkit" for educators/counselors/parents

Each task is more fully described and developed in the succeeding chapters.

TASK 1: CONDUCT A SURVEY TO COLLECT INLAND WATERWAYS EMPLOYMENT DATA

In consultation with NWF Trustees, the research team prepared a survey to be distributed to barge operating companies, using contact information provided by American Waterways Operators (AWO) and the NWF. The goal was to gather information that would facilitate an economic impact analysis of the barge industry workforce and provide data on where the workforce is drawn from. The survey was initially only distributed to the NWF Trustees as a test run. The feedback received from the test run resulted in a revised and simplified survey that was sent out to the industry at large. The survey instrument was designed to anonymize personal or confidential data to reduce the risk to participants. The survey was sent out with a letter of support from AWO.

The survey is included in Appendix A of this report.

The survey included questions on the operator's fleet profile, employee demographics, workforce profile, and specific features of employment. The survey was distributed in March 2025, and 10 responses were received from operators.

Fleet Profile

Fleet profile questions focused on vessel characteristics and operational area. Respondents provided number of vessels by horsepower (HP) group as well as their normal areas of operation. The number of vessels per operator ranged from 11 to 134 with a total of 581 vessels owned and operated by respondents to the survey. Operators were asked to use their own customary ranges for HP groups when responding to the survey leading to a variety of responses. On the lower end, HP groups started at 100HP and on the higher end, HP groups started at 4000HP. Respondents to the survey operated across all normal areas of operation: Lower Mississippi River, Upper Mississippi River, Illinois River, Ohio River, Tennessee River, Cumberland River, Arkansas River, Gulf Intracoastal Waterway-West, and Gulf Intracoastal Waterway-East.

Employee Demographics

Seven operators provided employee demographic data, totaling about 5,700 water transportation employees. This number includes only jobs such as captains, deckhands, engineers, mates, pilots, tankermen, and steersmen. Respondents included an additional 1,300 supporting jobs however these were not examined in the analysis. These 5,700

jobs account for 31 percent of the total estimated 18,300 inland waterways transportation jobs identified using Bureau of Labor Statistics (BLS) data.

Table 1. Survey Employment Summary

Position	Total Employees	Percent of Total	Average Years Employed
Captain	1,058	18.7%	10.7
Deckhand	1,884	33.3%	1.4
Engineer	607	10.7%	10.4
Mate	757	13.4%	6.6
Pilot	851	15.0%	6.6
Tankerman	471	8.3%	6.1
Steersman	32	0.6%	6.4

Deckhands made up about one-third of the total survey sample at 33.3 percent of the total employees. Captains were the next largest at 18.7 percent followed by pilots at 15.0 percent. Steersmen made up only 0.6 percent of the total sample. Captains and engineers had the longest time employed at 10.7 and 10.4 years, respectively. Mates, pilots, tankermen, and steersmen all had similar employment lengths ranging from 6.1 to 6.6 average years employed. Deckhands had the lowest employment length, averaging only 1.4 years employed.

Table 2. Survey Employment Education Level

Position	Not Indicated	Less Than HS Grad	HS Grad or Equivalent	Some College	Associate Degree	Technical School	Bachelors Degree	Masters Degree
Captain	18.9%	2.3%	66.2%	6.5%	0.9%	2.5%	1.4%	0.7%
Deckhand	5.7%	2.3%	74.5%	10.9%	1.2%	2.5%	1.4%	0.6%
Engineer	10.1%	0.8%	62.5%	11.5%	3.3%	7.7%	2.2%	1.9%
Mate	10.8%	2.3%	62.1%	15.4%	2.3%	3.8%	1.0%	1.8%
Pilot	3.5%	3.5%	63.4%	12.0%	2.0%	3.3%	1.8%	1.3%
Tankerman	2.0%	0.0%	81.4%	8.8%	2.0%	0.0%	1.0%	4.9%

Educational attainment for the surveyed positions was similar across positions. High school graduates and those who attended some college make up the majority of respondents, ranging from 72.7 percent for captains to 90.2 percent for tankermen. Those who did not graduate high school were highest at 3.5 percent for pilots, down to 0 percent for tankermen. Those with some type of college degree ranged from 15 percent for engineers to 6 percent for captains and deckhands.

Workforce Profile

The workforce profile questions split across the lowest HP class and the highest HP class asking questions related to number of employees per position, required experience, and their typical duty cycle. Responses were provided separately from the employee demographics so the total number of employees may differ across these questions. Table 3 provides an overview of the workforce profile for the lowest HP class vessels. The survey received limited responses in terms of the required experience for each position.

Table 3. Workforce Profile: Lowest HP Class

Position	Total Employees	Required Experience	Typical Duty Cycle (Days On/Days Off)
Captain	370	4 years	10/5 to 28/28
Deckhand	484	No experience required	10/5 to 28/28
Engineer	36	-	10/5 to 28/28
Mate	163	-	10/5 to 28/28
Pilot	156	4 years	10/10 to 28/28
Tankerman	94	-	7/7 to 28/28

Table 4 provides an overview of the workforce profile for the highest HP class vessels. One operator utilizes a two-watch system with 6 hours on and 6 hours off for their duty cycle of these vessels. The responses in terms of required experience were limited.

Table 4. Workforce Profile: Highest HP Class

Position	Total Employees	Required Experience	Typical Duty Cycle (Days On/Days Off)
Captain	379	4 years	20/20 – 28/28
Deckhand	1093	No experience required	20/20 – 28/28
Engineer	338	-	20/20 – 28/28
Mate	471	4 years	20/20 – 28/28
Pilot	245	4 years	20/20 – 28/28
Tankerman	44	2 years	21/21

Employment Features

The employment features section asked questions related to home ports, compensation for travel and in-house training. Six out of eight operators responding to the question

indicated that employees are typically assigned to a home port. Operators typically provide compensation for travel to the vessel and three operators indicated that travel time is covered either in total or in ½ day increments. Operators will either pay for employee transportation to the vessel, by providing a transportation service or a company driver, or by reimbursing mileage and/or airfare. One operator noted that the employee is responsible for the first 50 miles of travel and the company will reimburse for travel over 50 miles.

In-house training typically includes orientations for new hires (four out of seven respondents to the question). In addition to new hire training, operators indicated specific position training such as captain and pilot programs (1 respondent), deckhand and tankerman school (3), or steersman programs (2). Two operators have wheelhouse training programs available. One respondent indicated that captains and pilots have regular meetings where training can be included, and the same operator hosts a captain's summit. Two respondents indicated they used online training: one specifically for compliance topics. Finally, two operators included advanced or intermediate training in their response, a deckhand intermediate training and an advanced wheelhouse management program.

TASK 2: DETERMINE THE GEOGRAPHICAL AND DEMOGRAPHIC REACH OF INLAND WATERWAYS EMPLOYMENT

Using the employee-level zip code data from Task 1, demographic data for the representative regions was obtained from the American Community Survey (ACS) which provides estimates on population and demographic data in the years between US Census collection years. The ACS data focused on variables such as population, income, education, employment, and housing to illustrate the geographic and social impacts of inland waterway employment. Since the survey respondents represent a small sample of the inland waterway industry (about 31 percent), the impacts estimated from the data collected should not be generalized to the industry at large but utilized as an illustrative example of potential employment reach and social impacts.

Geographical location

The survey zip code data was sorted by seven main job titles: captain, deckhand, engineer, mate, pilot, tankerman, and steersman. Figure 1 illustrates the geographical locations of all positions reported by respondents. There is a high concentration of positions along the Gulf Intracoastal Waterway and the Mississippi River and Ohio River Basins. Researchers found that captain's and deckhand's reported residences tend to be more dispersed while pilot's residences are more closely aligned with the Gulf Intracoastal Waterway states. Similarly, tankermen tend to reside more in the south.

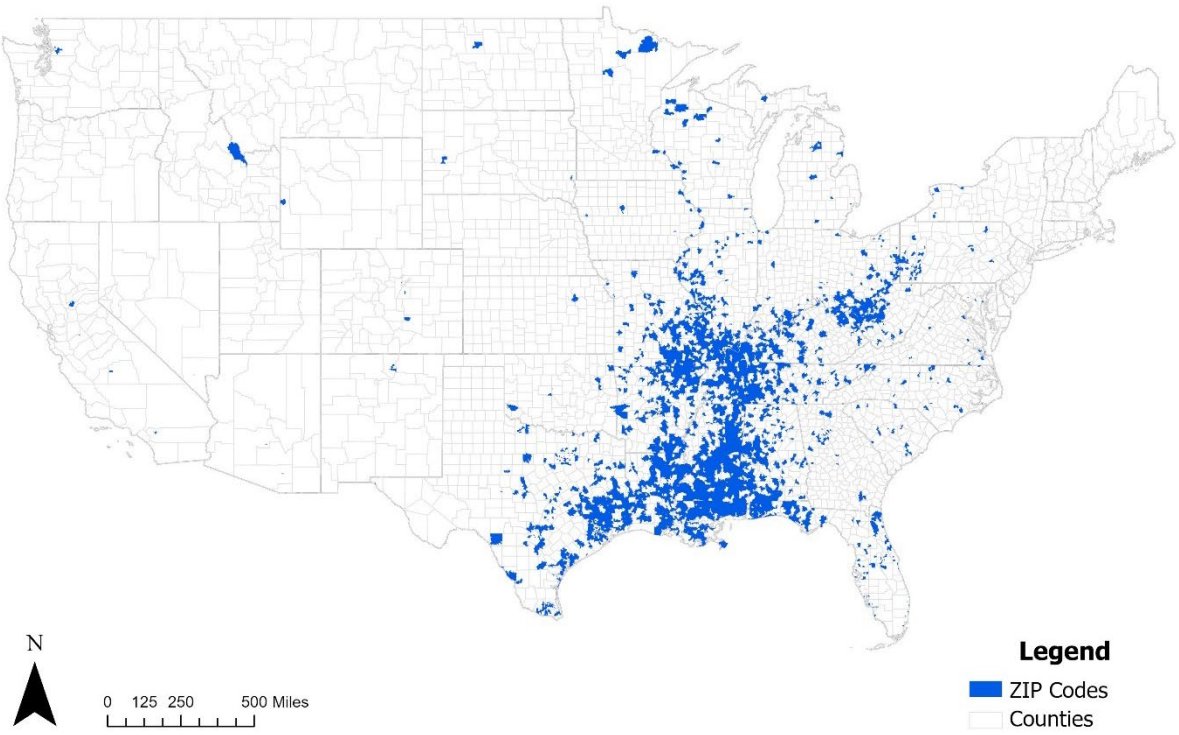


Figure 1. Reported Home Zip Code: All Positions

Of the respondents providing zip code data, 15 percent reported living in Louisiana, 14 percent in Mississippi, and 11 percent in Texas. Table 5 details the percentage of respondents that reported zip code residences in each state.

Table 5. Percent of Residents Reported by State

State	Percent of Respondents	State	Percent of Respondents
AL	9.1%	**MS**	**14.2%**
AR	4.8%	NC	0.3%
AZ	0.0%	ND	0.0%
CA	0.1%	NM	0.0%
CO	0.1%	NV	0.0%
FL	5.3%	NY	0.1%
GA	0.6%	OH	3.9%
IA	0.3%	OK	0.2%
ID	0.0%	PA	1.3%
IL	4.6%	SC	0.3%
IN	1.2%	SD	0.1%
KS	0.0%	TN	8.7%
KY	6.7%	**TX**	**11.1%**
LA	**15.3%**	VA	0.2%
MD	0.1%	WA	0.0%
MI	0.2%	WI	0.4%
MN	0.1%	WV	4.4%
MO	6.1%		

Captain

Surveyed employees holding a captain title lived in 27 different states with 722 unique zip codes as illustrated in Figure 2. In addition, 18 percent of captain positions were located in Louisiana and 15 percent in Texas.

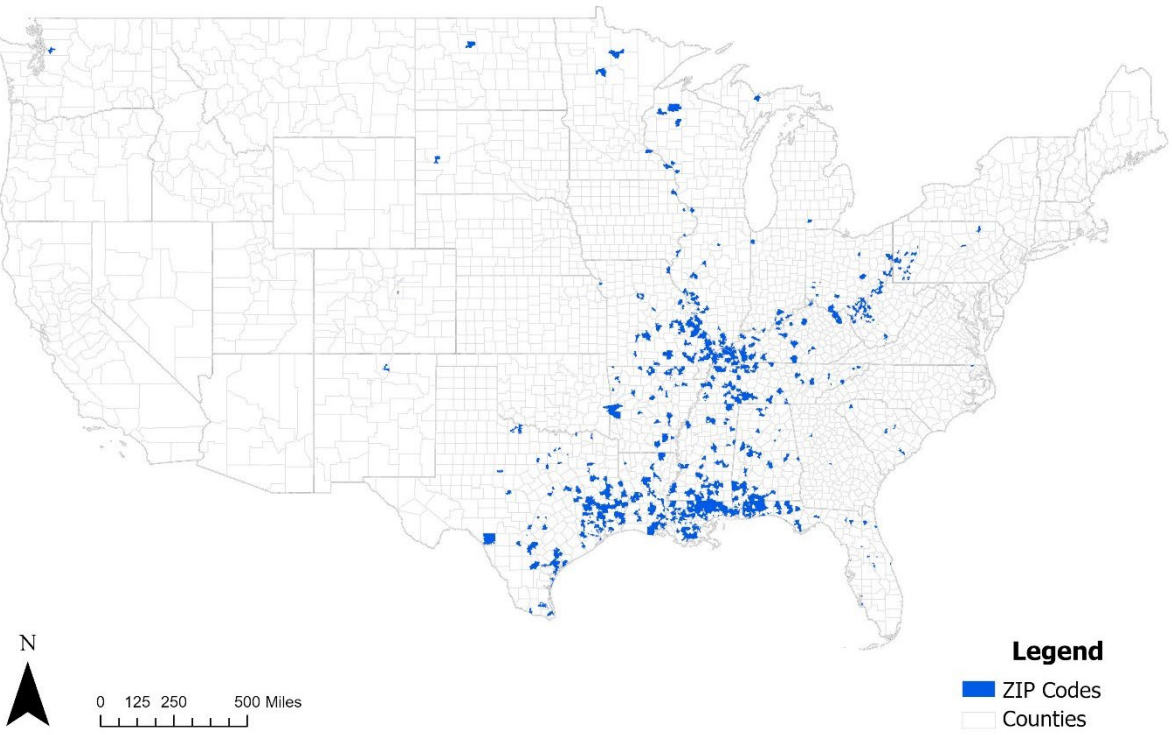


Figure 2. Reported Home Zip Code: Captain

Deckhand and Engineer

Surveyed employees holding a deckhand title lived in 29 states with more than 1,000 unique zip codes and engineers were located in 22 states with 422 unique zip codes as shown in Figure 3 and Figure 4.

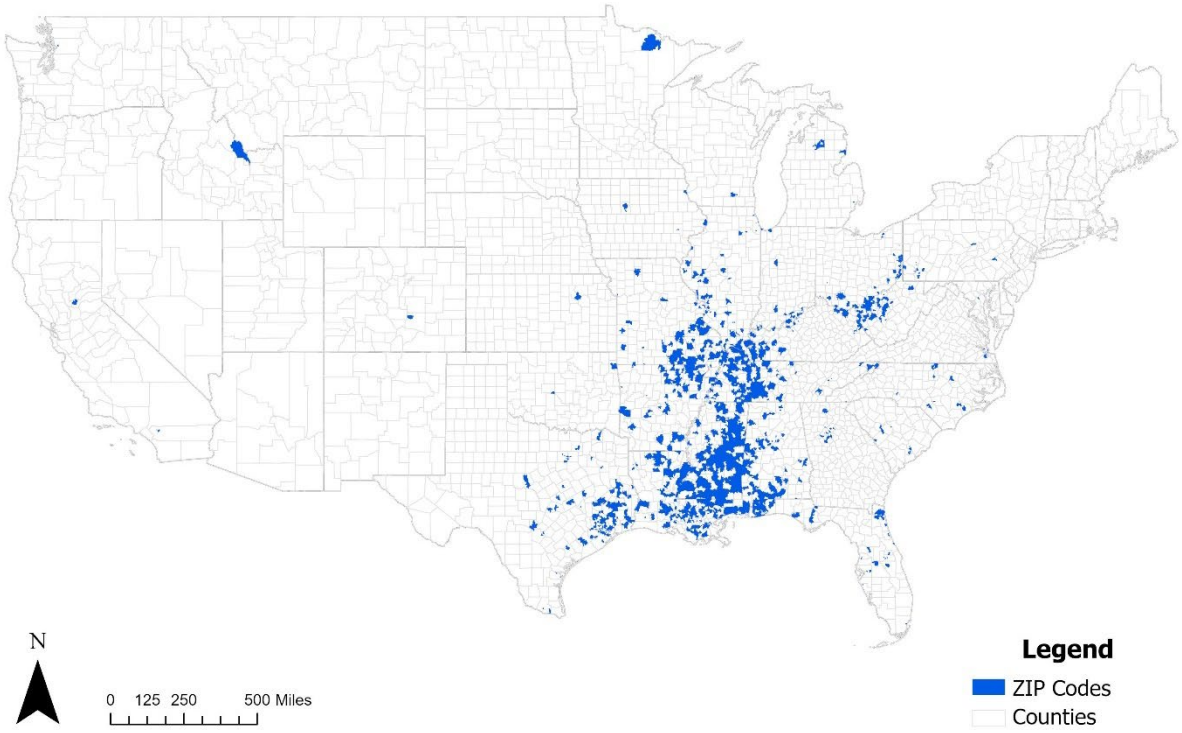


Figure 3. Reported Home Zip Code: Deckhand

The deckhand map shows a higher concentration in the state of Mississippi (21 percent) and along the Gulf of America in Louisiana (13 percent), Texas (11 percent), and Alabama (11 percent). The engineer map is more dispersed with a higher concentration of home zip codes in Tennessee (18 percent), Kentucky (13 percent), and Missouri (10 percent) regions near the Mississippi River.

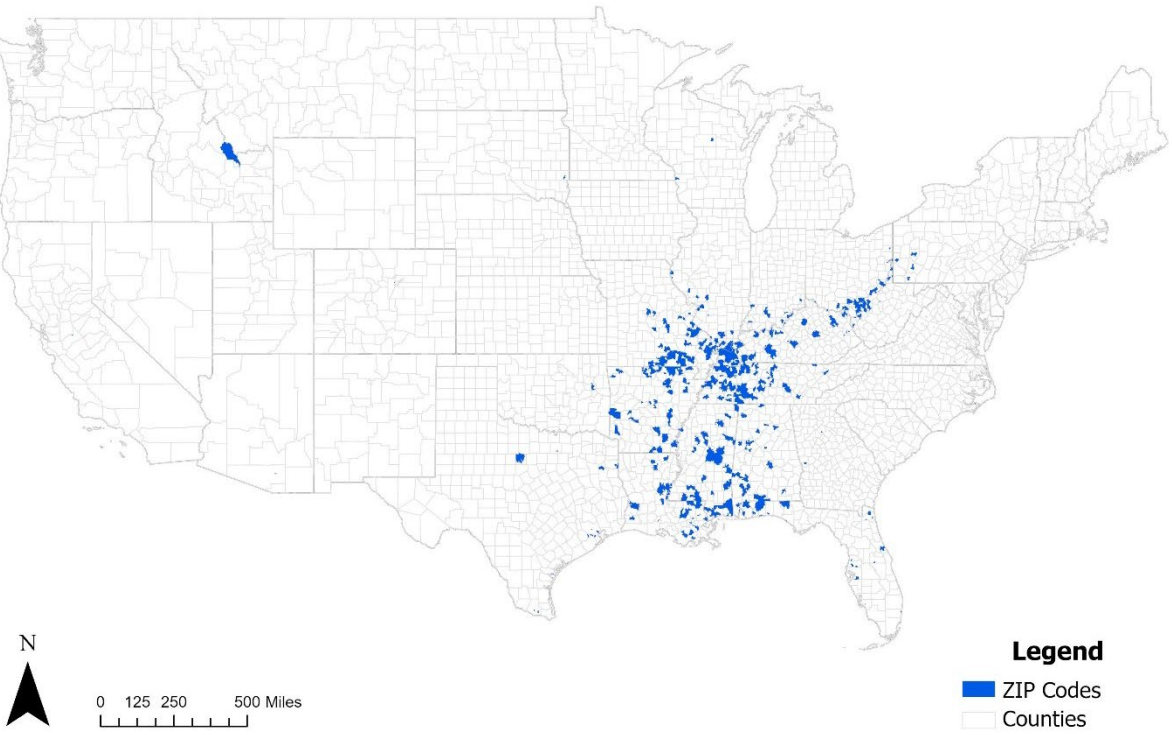


Figure 4. Reported Home Zip Code: Engineer

Mate and Pilot

Surveyed employees holding a mate title lived in 25 states with nearly 530 unique zip codes and pilots were located in 24 states with 588 unique zip codes. These both show a high number of resident locations in Mississippi (12-15 percent) and Louisiana (12-20 percent). Pilots also had a significant presence in Tennessee and Texas (10 percent in each state).

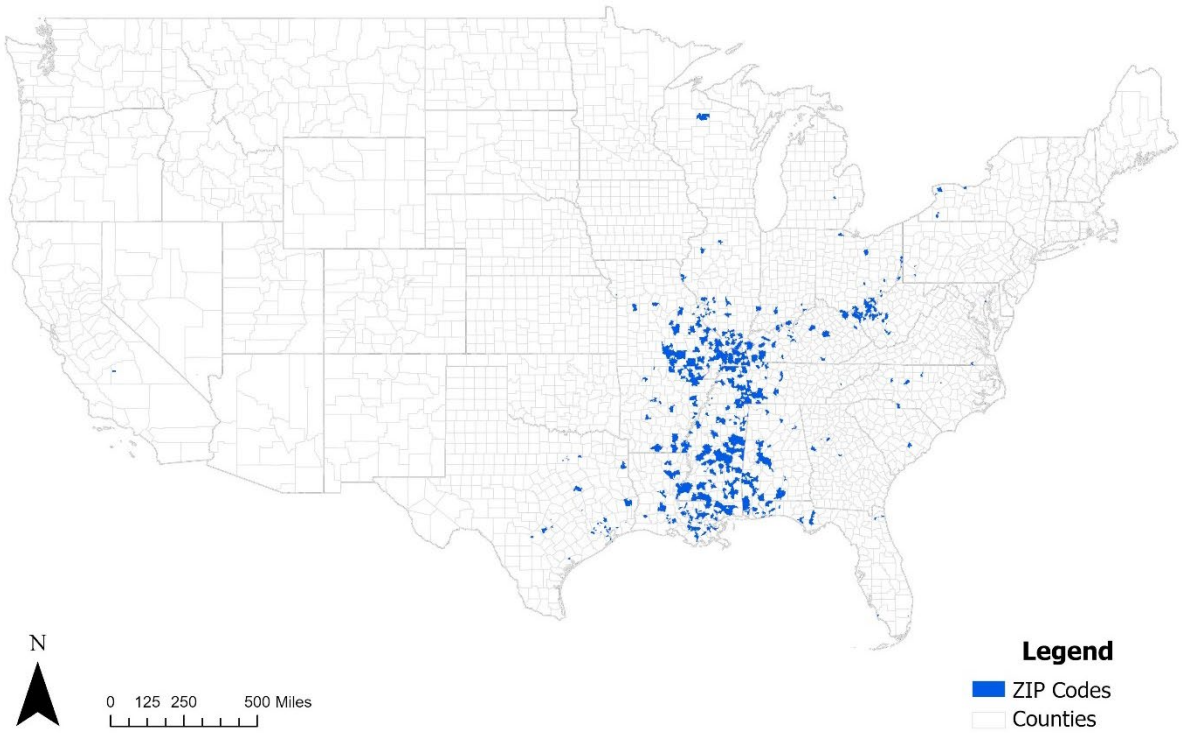


Figure 5. Reported Home Zip Code: Mate

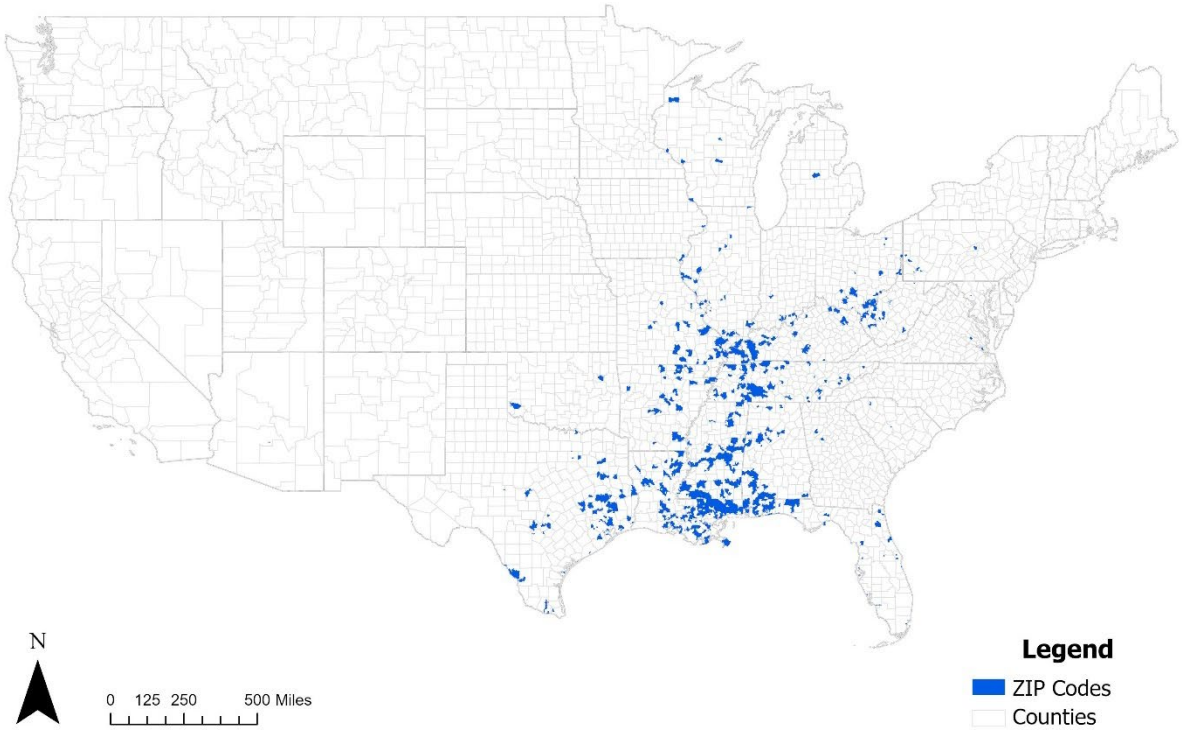


Figure 6. Reported Home Zip Code: Pilot

Tankerman and Steersman

The final two job titles include tankerman and steersman. These categories had the fewest employees reporting data. Surveyed tankerman lived in 18 states with 350 unique zip codes and steersman lived in 8 states and reported 32 unique zip codes.

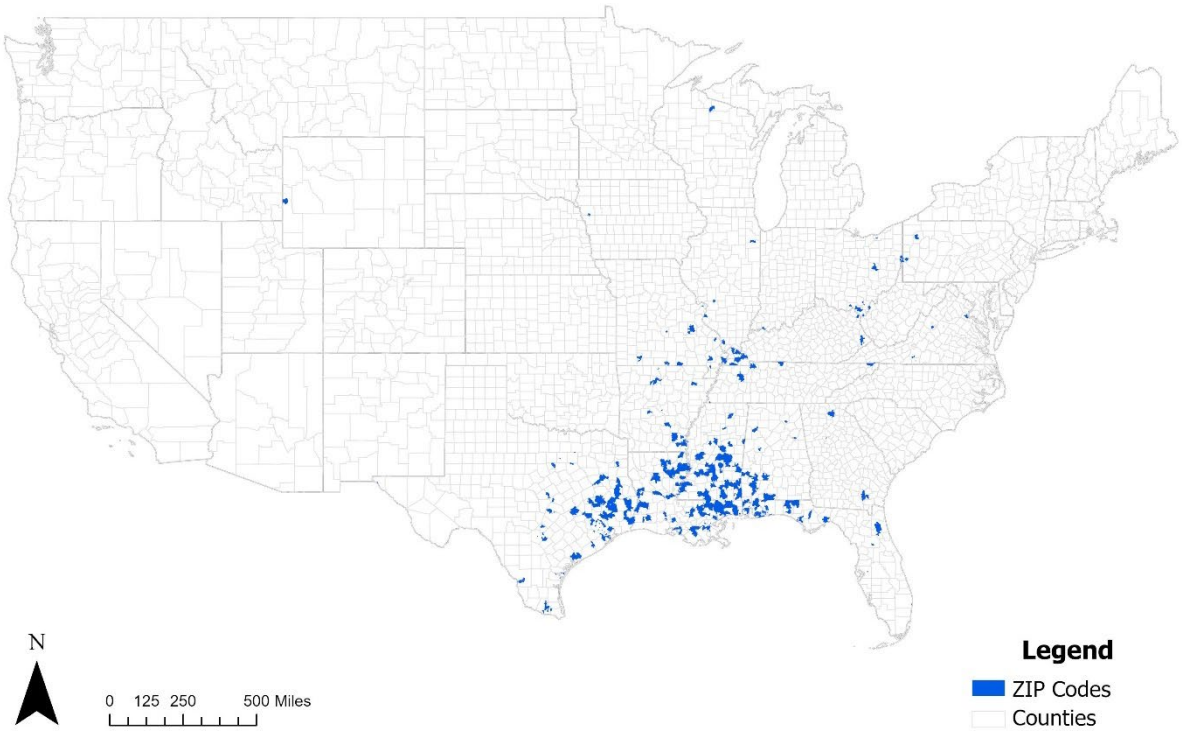


Figure 7. Reported Home Zip Code: Tankerman

Tankerman and steersman jobs both reported a high concentration of residents in Texas (25 percent and 13 percent) and Louisiana (24 percent and 16 percent.

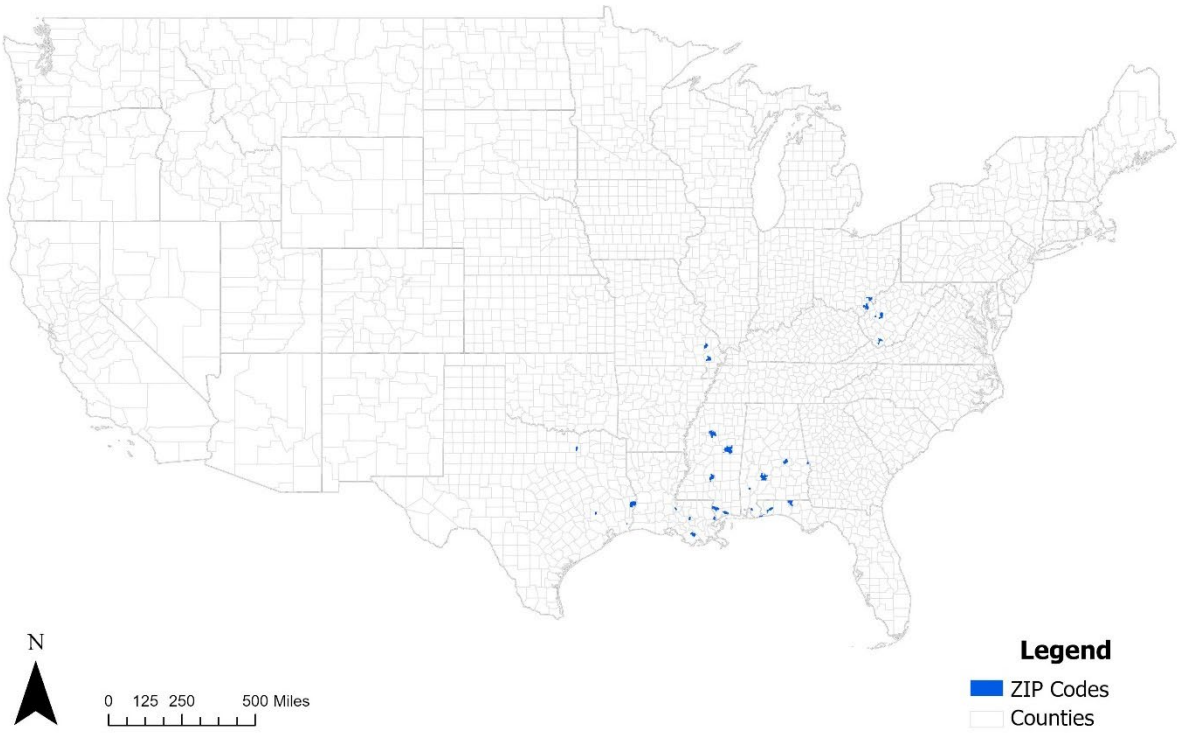


Figure 8. Reported Home Zip Code: Steerman

Overall, the majority (71 percent) of the survey respondents reported living in Louisiana (15 percent), Mississippi (14 percent), Texas (11 percent), Tennessee (9 percent), Alabama (9 percent), Kentucky (7 percent), and Missouri (6 percent).

Demographic and Social Impacts

Of the survey respondents, 40 percent reported living in Louisiana, Mississippi, and Texas. Researchers assembled demographic data from the U.S. Census Bureau's 2023 American Community Survey for the counties with the highest number of reported zip codes in these three states.

Table 6. Louisiana Demographic Data

Parish	Major City/ Region	Population	Employment Rate	Median Household Income	Total Households	Education (Bachelors or Higher)
Orleans	New Orleans	383,997	58.1%	$55,580	155,055	44.7%
Jefferson	New Orleans	440,781	58.8%	$61,085	176,635	30.0%
Plaquemines	New Orleans	23,515	56.7%	$82,874	8,200	19.8%
St. Tammany	New Orleans	264,570	59.7%	$76,420	106,164	37.1%
St. Bernard	New Orleans	43,764	54.6%	$57,638	15,803	17.2%
East Baton Rouge	Baton Rouge	456,781	58.6%	$59,443	117,309	37.6%
West Baton Rouge	Baton Rouge	27,199	59.5%	$87,320	10,400	23.1%
Ascension	Baton Rouge	126,500	65.8%	$90,190	48,526	26.2%
Calcasieu	Lake Charles	216,785	58.1%	$63,890	79,222	27.2%
Caddo	Shreveport	237,848	52.9%	$50,375	98,864	27.4%
Bossier	Shreveport	128,746	58.1%	$71,365	54,151	26.4%
Ouachita	Monroe	160,368	55.8%	$52,695	63,158	31.4%
Rapides	Alexandria	130,023	52.9%	$51,301	50,301	22.9%

Major cities and their surrounding areas in Louisiana reporting a high number of employees include New Orleans, Baton Rouge, Lake Charles, Shreveport, Monroe, and Alexandria. These areas have an average employment rate of 57.7 percent with an average annual median household income of more than $66,000.

Table 7. Mississippi Demographic Data

County	Major City/Region	Population	Employment Rate	Median Household Income	Total Households	Education (Bachelors or Higher)
Hinds	Jackson	227,742	57.9%	$50,904	88,687	30.8%
Rankin	Jackson	157,031	59.2%	$69,208	60,434	31.5%
Harrison	Gulfport/ Biloxi	208,621	54.6%	$56,159	86,167	28.4%
Forrest	Hattiesburg	78,158	59.5%	$52,157	30,255	34.8%
Lee	Tupelo	83,343	59.6%	$58,233	23,115	30.5%
Washington	Greenville	44,922	47.6%	$40,117	17,227	20.5%
Lauderdale	Meridian	72,984	53.4%	$50,542	29,693	22.4%
DeSoto	Olive Branch	185,314	66.3%	$81,486	70,666	30.1%
Pike	McComb	40,324	49.2%	$41,578	15,226	15.9%
Lowndes	Columbus	58,879	51.6%	$54,460	22,829	26.6%
Newton	Union	21,291	48.8%	$50,426	7,697	17.5%
Neshoba	Union	29,087	52.1%	$53,087	10,285	16.3%

Mississippi was unique in that survey respondents reported residing in a large portion of the state. Major cities and their surrounding areas in Mississippi reporting a high number of employees include Jackson, Gulfport, Biloxi, Hattiesburg, Tupelo, Greenville, Meridian, Olive Branch, Mccomb, Columbus, and Union. These areas have an average employment rate of 55.0 percent with an average annual median household income of nearly $55,000. These averages are slightly lower than those found in Louisiana.

Table 8. Texas Demographic Data

County	Major City/Region	Population	Employment Rate	Median Household Income	Total Households	Education (Bachelors or Higher)
Harris	Houston	4,731,145	64.4%	$72,336	1,791,013	34.2%
Galveston	Houston	350,682	60.8%	$83,514	142,199	35.0%
Brazoria	Houston	372,032	61.3%	$93,680	138,692	32.3%
Fort Bend	Houston	822,779	63.9%	$105,441	303,900	49.4%
Waller	Houston	56,794	57.8%	$76,135	17,981	26.6%
Montgomery	Houston	620,443	62.1%	$91,841	262,273	39.3%
Liberty	Houston	91,628	55.6%	$77,535	32,959	10.9%
Chambers	Houston	46,571	62.2%	$108,114	16,558	23.0%
Jefferson	Beaumont	256,526	53.5%	$59,725	94,005	17.2%
Orange	Beaumont	84,808	60.3%	$65,521	33,271	18.2%
Hardin	Beaumont	56,231	54.6%	$72,532	21,750	20.8%
Jasper	Beaumont	32,980	47.8%	$49,919	13,667	12.6%
San Patricio	Corpus Christi	68,755	62.8%	$60,494	25,735	15.9%
Nueces	Corpus Christi	353,178	59.7%	$64,034	132,759	25.6%
Refugio	Corpus Christi	6,741	49.2%	$58,016	2,372	13.8%
Cameron	Brownsville	421,017	56.4%	$52,210	143,033	22.7%

Survey respondents reported residents all along the Texas coast. Major cities and their surrounding areas in Texas reporting a high number of employees include Houston, Beaumont, Corpus Christi, and Brownsville. These areas have an average employment rate of 58.3 percent with an average annual median household income of nearly $75,000. While the employment rate is similar to those collected in Louisiana and Mississippi, the average median household income is significantly higher in Texas.

TASK 3: DESCRIBE TYPICAL WORKING CONDITIONS OF THE THREE MODES

Researchers developed a description of the normal on duty and travel requirements of the three modes: inland waterways, trucking, and rail. Additionally, the discussion includes a non-transportation job that a person interested in the inland waterways might consider as an alternative. In consultation with NWF, researchers chose employment in warehousing as the alternative.

The topics that were analyzed include:

- Types of jobs and duties and their required skills
- Educational requirements
- Labor demand
- Longevity
- Work schedules
- Compensation

Since the waterways analysis focuses on towboat crews (where the greatest demand for employees lies), this task focused on train crews (engineers and conductors in locomotives) and truck drivers.

Employment in the inland waterways industry

Types of jobs and duties

Inland waterway towboat operations can move either dry cargo or liquid cargo. The types of positions are somewhat different for these two categories. There are many variations in staffing and operations across the industry, but generally, the following types of positions are available.

Dry cargo

Deckhand

The entry level position for dry cargo operations is the deckhand. The duties of a deckhand tend to be:

- Help with docking
- Help set up towing rigs
- Maintain and repair machinery and tools on board

Inland Waterway Highlights

- Rapid advancement based on merit
- Growth in employee demand at national average
- Reliable schedules with extended breaks
- Wages higher than national average
- Jobs cannot be replaced by AI
- Injury and fatality rates are far less than for other modes

- Clean the deck and cabin areas
- Learn from the mates and Captain
- Stand watch
- Perform physical tasks
- Know safety duties
- Know security duties

Mate

The deckhand can move up to the mate position. The mate is responsible for all barge-related activities and equipment. If there is more than one deckhand, the mate is in charge of the group.

The mate can move up in two different directions.

Engineer

One direction would be the engineer position. The typical duties of an engineer include:

- Maintain and repair mechanical systems and complex machinery
- Monitor mechanical systems
- Assist the Captain and Mate

This position could lead to a shoreside port engineer position or to higher grades of engineer.

Steersman

The steersman position is essentially an apprentice position for piloting the vessel. This involves classroom training and steering the boat under the supervision of a licensed wheelsman. Initially, this might be done while performing the duties of a deckhand or mate, but as a steersman advances, they might be assigned to steer under supervision as their full-time job.

Pilot

The pilot is responsible for navigation when the captain is off duty. Finally, a pilot can become a relief captain or full captain.

Relief Captain/Captain

The captain is responsible for all aspects of the boat and operations. He manages the crew and communicates with other vessels. The relief captain takes over when the captain is not aboard (usually due to rotation schedules).

Liquid cargo

Deckhand

As with dry cargo operations, a new employee would start as a deckhand performing the same functions as a dry cargo deckhand. However, the next step up is tankerman.

Tankerman

This position requires some formal training; transfer of cargo is done under supervision. There can be various levels of tankerman, corresponding to the nature of the cargo they handle. Examples of specific skills a tankerman could develop, which would result in higher pay, include the handling of:

- Elevated temperature cargoes.
- Especially sensitive or hazardous cargoes.
- Liquified petroleum gas cargoes.
- Toxic inhalation hazards (such as anhydrous ammonia).

A tankerman could then become a shoreside tankerman, move into an engineering position, or move into a steersman position.

Engineer

This involves the same types of duties found in dry cargo operations.

Steersman

As in the dry cargo scenario, the steersman position is essentially an apprentice position for piloting the vessel. This involves classroom training and steering the boat under the supervision of a licensed wheelsman. Initially, this might be done while performing the duties of a deckhand or tankerman, but as a steersman advances, they might be assigned to steer under supervision as their full-time job.

Pilot/Relief Captain/Captain

The next step up is pilot, then relief captain, and then captain—with the same duties found in the dry cargo operations, with the addition of supervising the tankermen as they load and discharge the barges under tow.

Educational requirements

A college degree or advanced certification is not required. A prospective employee has to possess a Transportation Worker Identification Credential or be eligible to acquire one. As the deckhand works, they can acquire additional credentials and certifications

that allow them to move into higher paying positions. Advancement is based on merit and a good worker can expect to advance quickly.

Demand

Overall employment of water transportation workers is projected to grow 3 percent from 2023 to 2033, which is close to the average for all occupations.[1]

Industry executives often point out that these jobs will not be replaced by autonomous vessels or artificial intelligence (AI), as too many variables and factors come into play that only an experienced crew member could address.

As with most transportation industries, the workforce is aging, although there are no published analyses of aging. Employers are actively seeking recruits to fill positions that are open due to retirement.

Schedule

Crews on towboats working along the coasts and on inland waterways are typically away for 2 to 3 weeks at a time. Most people in towboat positions live aboard towboats with a work "hitch" of anywhere from 14 to 30 days aboard the boat. Depending on the company (and in some companies, employee preference), the employee will then have either one day off for each two days worked (a "2 for 1" schedule) or a "day for day" schedule with equal amounts of time at home as on the boat. For example, on a 2-for-1 schedule, a worker may be on the boat 14 days and off 7, or 28 days on and 14 off, while on a day for day schedule, the worker might work 14 or 28 days on the boat and then get 14 or 28 days off. While on the towboat, a watch system of 6 hours on and 6 hours off applies. Towboats work 365/24/7.

Schedules are reliable and pay is not affected by circumstances beyond the employee's control. While truckers and rail employees find themselves working harder for the same, or even less pay, this is not the case for towboat crews.

Pay

In May 2024, the median annual wages for inland water transportation employees were $73,530.[1]

Safety

The rate of injury and fatalities per ton-mile (tons times miles) is far less for inland waterways than for trucks and rail. The rate of injuries per ton-mile for rails is 96 times higher than for inland waterways; the rate of fatalities is 25 times higher. The injury rate for trucks is over 1000 times higher than for inland waterways; the fatality rate is 120 times higher.[2]

Employment in the Trucking Industry

Demand

Truck drivers will always be needed, and with increases in e-commerce and consumer demand, the need for trucking labor is increasing. Employment of heavy and tractor-trailer truck drivers is projected to grow 5 percent from 2023 to 2033, about as fast as the average for all occupations.[3]

There are approximately 3.5 million truck drivers in the U.S. with an average age of 46. Of this figure, 1.98 million employee truck drivers operate heavy and tractor-trailer vehicles. (This figure does not include self-employed truck drivers, only employee drivers). According to the Texas Comptroller of Public Accounts, by 2030, more than half of current truck drivers will have passed retirement age.[4]

Highlights for Trucking

- Extremely high turnover
- Aging workforce
- Drivers typically pay for their training and licensing
- Long hours away from home, company size, and lack of benefits, often contribute to drivers leaving a company
- One of the highest rates of injuries, fatalities, and illnesses of all occupations
- Wage rate competitive, but 45% of truck drivers express lack of confidence in carrier's ability to provide sufficient miles to earn the pay they need

Skills

Two-fifths of the individuals entering truck driving in the for-hire segment moved from another occupation within transportation and warehousing. The most common of these original occupations are laborers and freight, stock, and material movers; transportation managers or supervisors; dispatchers; and truck and bus mechanics. Private carriage (company employee positions) attracts many drivers from the wholesale trade, retail trade, manufacturing, and construction industries. One-third of the entries for private carriage positions come from the construction and manufacturing industries; one-fifth of for-hire carriage entries are from these two industries.[5]

Trucks are becoming high tech machines. Truck drivers have in-cab technology for keeping track of driving hours, dispatching instructions and directions, lane keeping and vehicle detection sensors and cameras, as well as cloud-based technology monitoring the condition of the engine, brakes, and tires as well as cargo tracking.

Drivers are becoming increasingly dependent on technology. Probably the most important technology currently is electronic logging devices (ELD), which are congressionally mandated. ELD devices greatly simplify the time and effort drivers must

devote to tracking required information. They also guarantee that the information is collected electronically and reported according to federal mandates, Additionally, many safety features are now found on trucks that were not available just a few years ago.

There is much discussion in the industry about the potential for driverless trucks. However, driverless trucks are some time away, potentially 10-to-15-years in the future. The literature indicates that it is unlikely technology will entirely replace drivers at any point.[10]

Educational requirements and training

There is a variety of positions and organizational structures (e.g., company drivers, owner-operators, truckload, less-than-truckload, etc.) in the trucking industry, that impact training, pay, and other factors.

Heavy and tractor-trailer truck drivers usually have a high school diploma and most attend a professional truck driving school. They must have a valid commercial driver's license (CDL).[3] Truck driving schools can be private or affiliated with community colleges. Drivers normally receive several weeks of on-the-job training when first hired. This usually means that they drive a truck with an experienced mentor-driver in the passenger seat.

Drivers often pay the cost of their training and licensing. The cost for 4 to 8 weeks of driving school is typically around $3,000.[6]

Early in 2018, American Trucking Associations pledged to enroll 10,000 people a year for each of the next five years in enhanced career programs, supported by Georgia Tech and JPMorgan Chase. Knight-Swift has aggressive training efforts through 11 academies. Transplace has suggested a training program for recent high school graduates. Its concept would employ them to work on the docks. Once they reach 19 years of age, they could become part of a driving team, pairing up with one or more experienced drivers until they are 21 and eligible for their own CDL.[10]

Walmart appears to be a leader in this area. Walmart offers an internal training program to offer CDL training to employees in stores and distribution centers, a 12-week program which offers driving jobs in Walmart's private fleet operations with annual salaries up to $110,000.[7]

Longevity

Trucking associations say fleets struggle to hire drivers and many sources claim that there is a shortage of truckers as high as 80,000. However, according to an article in *FreightWaves*, researchers have repeatedly concluded that there is no evidence for a long-term labor shortage in trucking. The foundational issue is extremely high turnover rates. The annual turnover rate for large truckload fleets was around 94 percent from

1995 to 2017.[8] This means that a trucking company that employs 100 drivers would have to hire 94 new drivers over the course of a year.

Over half of those leaving for-hire truck driving leave for another occupation in transportation and warehousing.[5] Research has shown that the main issues causing these departures are health conditions, differences in job expectations, and work demands. Workplace policies and the company culture, such as lack of supervisor support, long hours away from home, company size, and lack of benefits, also come into play.[9] Vison Magazine reported that its review of ATA surveys revealed that the average truck driver age is significantly higher than that of the broader workforce; about 57 percent of drivers are over 45, and 23 percent are over 55. This indicates that nearly a quarter of truckers could retire within the next decade. Driver recruitment will need to happen in order to fill the void that will occur as drivers retire.[10]

Driver retention is further impacted by demographics, lifestyle choices of drivers, truck parking concerns, waiting times at shippers and receivers, and other factors.[11]

Pay

A 2022 study from the ATA said that truckdriver compensation jumped by 19 percent from 2019 to 2021. According to the National Transportation Institute, truck driver wages have consistently grown each year since 2010.[8] However, in the post-COVID era, as freight rates dropped and costs increased, pressure on wages increased, and there has been a noticeable drop in wages.[12]

Industry groups representing drivers highlight retention as the major labor problem in trucking. Pay and working conditions are the main causes. [13] Drivers of heavy trucks and tractor-trailers (vehicles weighing over 26,000 pounds) take home a median annual wage of $57,440 compared with about $49,500 across all trucking occupations, according to the Bureau of Labor Statistics.[3] However, according to the Spring 2023 Driver Survey conducted by Conversion Interactive Agency and Professional Driver Agency (PDA), nearly 45 percent of truck drivers expressed uncertainty or lack of confidence in their carrier's ability to provide sufficient miles for them to earn the pay they need.[14] (Drivers of heavy trucks and tractor-trailers usually are paid by how many miles they have driven. The per-mile rate varies from employer to employer and often depends on the type of cargo and the experience of the driver.)[3]

For-hire truckload carriers are often driving long distances and are dependent on the loads available in the market. These drivers face challenges with scheduling, as they are irregular and difficult to predict. Compensation is often lower for these types of drivers, and the annual turnover rate is considered to be around 97.5 percent each year. Yet these are often the easier entry point to the industry for new drivers.

In the minds of many drivers, pay is not sufficient to offset the sacrifice. Furthermore, increases in driver income have increased very slowly since 2007. Signing bonuses are now catching on as a way to address this issue. The range for such bonuses, according to NTI, is from $2,000 to $10,000. Benefits are also an important part of the compensation package. Health care and paid vacation days are the highest concerns. ATA says a recent survey of the association shows that "some" carriers also offer paid leave and 401K retirement savings," but the survey did not indicate that this is a widespread practice.[10]

Types of jobs and duties

There are three commonly accepted basic types of drivers: heavy and tractor-trailer truck drivers (or "heavy truck drivers"), light truck or delivery services drivers, and driver/sales workers.

The following table provides a slightly different categorization with a brief description of each category.

Table 9. Common Types of Truck Drivers.

Segment	Description	Characteristics
Private Truckload	Driver who works for a firm whose main function is not transportation	Regular schedule, frequently return home, high pay, low turnover (15%)
Less Than Truckload	Driver who works for a less-than-truckload firm	Regular schedule, frequently return home, high pay, low turnover (9%)
For Hire Truckload	Driver who works for a for-hire truckload firm	Irregular schedule, long trips away from home, high turnover (97.5%)
Local	Driver who makes local deliveries	Regular schedule, home every night, less time behind the wheel, low turnover (25%)
Long-haul	Driver who makes deliveries over large geographic regions	Long trips away from home, high turnover (100%)
Small carrier	Driver who works for a relatively small firm	Firms with few trucks, low revenue, high turnover (94.6%)
Large carrier	Driver who works for a relatively large firm	Firms with hundreds or thousands of trucks, high revenue, high turnover (99.1%)

According to the Bureau of Labor Statistics heavy and tractor-trailer truck drivers typically do the following:[3]

- Drive long distances.
- Report any incidents encountered on the road to a dispatcher.
- Follow all applicable traffic laws.
- Secure cargo for transport, using ropes, blocks, chains, or covers.
- Inspect their trailers before and after the trip and record any defects they find.
- Maintain a log of their working hours, following all federal and state regulations.
- Report serious mechanical problems to the appropriate people.

- Keep their trucks and associated equipment clean and in good working order.

The Bureau of Labor Statistics states, "Working as a long-haul truck driver is a lifestyle choice because these drivers can be away from home for days or weeks at a time." Much of this time is spent alone, and the work can be physically demanding, driving for many consecutive hours. Additionally, some drivers must load and unload cargo.[3]

Safety

The U.S. Bureau of Labor Statistics (BLS) has reported that because of the potential for traffic accidents heavy and tractor-trailer truck drivers have one of the highest rates of injuries and illnesses of all occupations. Even though fatalities are uncommon, these drivers experience one of the highest rates of fatalities of all occupations.[3]

Long-haul drivers can experience higher levels of factors that can negatively impact their physical and psychological health. Long-haul drivers are more likely to experience obesity, sleep apnea, diabetes, hypertension, and back and shoulder pain.[15] Truck drivers sit for extended periods of time and tend to have poor access to healthcare, physical activity, and healthy food options.

Schedules

The Federal Motor Carrier Safety Administration (FMCSA) regulates the hours that a long-haul truck driver may work. Drivers are not allowed to work more than 14 consecutive hours—consisting of 11 hours driving and the remaining time doing other work, such as unloading cargo. Drivers must have at least 10 hours off duty between two working periods. FMCSA also limits driving to no more than 60 hours within 7 days or 70 hours within 8 days. There must be a break of 34 hours off before starting another 7- or 8-day run. Truck drivers often work nights, weekends, and holidays.[3]

Employment in the railroad industry

Educational requirements

The railroad industry overall attracts employees from a wide range of backgrounds and educational levels.[16] A high school diploma or equivalent is typically required for locomotive engineers and conductors. Several months of on-the-job training is customary. Locomotive engineers generally receive 2 to 3 months of on-the-job training before operating a train on their own. During the training period, they typically will ride with an experienced engineer.[17]

Railroad Highlights

- Significant on-the-job training
- Most rail injuries and fatalities involve crashes at highway-rail grade crossings and pedestrians
- Long shifts and extensive travel
- Little schedule predictability
- High attrition rate among new hires
- Flat or declining demand for employees
- Competitive pay and benefits

Types of jobs

Because freight railroads also own their own infrastructure, in addition to rail workers who operate the trains, jobs include repairs of rail cars and locomotives, track and bridge maintenance, maintenance of rail right of way, and signal and train control systems.

The following are examples of types of railroad workers related to on-board train operations:[18]

Conductors: travel on both freight and passenger trains and coordinate activities of the train crew. On passenger trains, they ensure travelers' safety and comfort. They also check passengers' tickets and make announcements to keep passengers informed. On freight trains, they oversee the secure loading and unloading of cargo. Conductors can work in yards and switching operations primarily located in the same site or region, or they can work on locomotives in rail operations between yards. Conductors with seniority can become trained and certified as engineers or they can become dispatchers in train control centers, guiding train crews in operations on certain corridors and rail lines.

Locomotive engineers: operate freight or passenger trains between stations. They monitor systems that measure the train's operation, such as speed, air brake pressure, fuel consumption, and signal indications. Locomotive engineers use a variety of controls, such as throttles and airbrakes, to operate the train and ensure that the locomotive runs smoothly. During each train movement, the engineer carefully reviews his/her manifest of railcars to understand the likely in-train forces of the mix of loaded and unloaded cars of different weights and sizes

as the train proceeds across curves and grades of the territory ahead. They observe the track for obstructions to ensure safety and watch for signal indications via wayside signal lights and on-board positive train control monitors.[19]

Employees who start as rail yard engineers, switch operators, or signal operators can advance to become conductors or yardmasters or even locomotive engineers.[17]

There is a trend in the industry to use automation and sensors. Manual track inspections are being replaced by sensors. Car inspections may be entirely done by a machine. With the use of monitors and sensors, locomotive engineers may go from two on a train, to just one—or even no personnel at all. With the technology used to power locomotives, engineering skills are not as important as they have been historically. All of this could lead to fewer people, and the skill set required of employees, especially blue-collar employees, could suffer degradation.

Safety

The Association of American Railroads claims the Class I railroad employee injury rate per hour worked is lower than the rate for grocery and department stores.[16] It is unclear which job categories that includes. Most rail injuries and fatalities reported by the Federal Railroad Administration involve occupants of vehicles in crashes at highway-rail grade crossings and pedestrians in private rail rights of way (trespassers) struck by trains. Given the size and weight of rail rolling stock—a covered hopper car carries up to 286,000 lbs. and can be between 42 to 60 feet long and nearly 16 feet high, and a diesel-electric locomotive is almost 100 feet long and up to 545,000 lbs in weight—the forces involved in even low speed movements or derailments can be devastating to the human body.

Unionization

Nearly 84 percent of the employees performing trade and craft job functions are represented by one of 13 labor unions.[22] Approximately 85 percent of Class I rail employees are unionized.[16]

Pay

The median annual wage for railroad workers was $75,680 in May 2024.[18] Benefits for railroad employees are generally considered to be major attractions. Such benefits include health insurance, retirement, and salary, Freight railroad workers have extensive health care provided at little cost to the employee, either in premiums or co-pays. Further, freight railroad workers have an independent retirement system wholly separate from Social Security or other pensions administered by the Railroad Retirement Board.[22]

Schedules

Because of major staffing cuts made by the major railroads for years, employees have faced increasing workloads, which translate into longer shifts. One Union Pacific conductor told the publication *FreightWaves* that shifts used to be eight or nine hours but now can be as long as 19 hours.[20] However, such claims must be considered with caution. Although the hours-of-service rules promulgated by the federal government can be difficult to understand, in basic terms, locomotive engineers and conductors cannot work more than 12 consecutive hours. An employee who works the full 12 hours must have 10 consecutive hours off duty. In addition, when they work 12 hours consecutively, with some hours on an active train movement and some hours on administrative tasks, they must get 8 hours off duty within a 24-hour period before returning to work.[21]

Long shifts and extensive travel are two of the most important factors that cause employees to leave the industry. Conductors and engineers are subject to being called for work with little predictability and they must be transported to meet a train whose crew has timed out of available time. Once off a train, train crews will be transported to a hotel or back to the origination crew station. Many Class I stakeholders have stated that the work-life balance problem is their top workforce development-related issue.[22]

The Federal Railroad Administration reported that in discussions with industry stakeholders, that their major barriers to recruiting were the lack of work-life balance, which was due to demanding work schedules, the incremental pay rate system for particular craft positions, and the availability of a steady pipeline to train and develop qualified talent. The study also determined that "relocation, furloughs, misperceptions of job functions, and demanding work schedules made it difficult for the industry to retain talent."[22] The most recent collective bargaining between railroads and rail labor after the strike in 2022 has resulted in new agreements that extend sick leave and more flexible work schedules for most railroad workers.

Demand

According to Congressional testimony by Surface Transportation Board Chairman Martin Oberman in 2022, over the prior six years, Class 1 railroads cut their workforce of 45,000 employees by 29 percent (13,000).[20] The Bureau of Labor Statistics suggests that advances in productivity may negatively impact the workforce as fewer workers will be needed to address the same or an even larger amount of work.[22]

Overall employment of railroad workers is expected to grow 2 percent from 2023 to 2033. Most openings are expected to result from the need to replace workers rather than the creation of new positions.[18]

Traditionally, rail companies have relied on employee referrals, which boosted employee loyalty but limited the pool of potential employees. The railroad industry's image is still a concern.[22]

Longevity

Attrition among new hires is still high, although statistics are not readily available. Some analysts claim that half of an incoming class of employees may resign shortly after initial training is completed. Many Class I stakeholders have stated that work-life balance is their top workforce development-related issue.[22]

Recruitment Challenges

The Federal Railroad Administration lists the following major workforce challenges experienced by the railroad industry:[22]

- Adjusting work schedules to achieve an attractive work–life balance.
- Overcoming an incremental pay scale for some crafts.
- Finding individuals with the right skill sets for the job. For example, railroads prefer to hire carmen with welding experience and signalmen with technical (electronics) backgrounds. Further complicating this problem are certain rural areas where a railroad operates and where the working-age population is relatively small.

Warehousing--Hand Laborers and Material Movers

Note: This entire section comes from BLS' Occupational Outlook Handbook.[23]

Schedule

Most hand laborers and material movers work full time. Because materials are shipped around the clock, some workers, especially those in warehousing, work overnight shifts.

Demand

Overall employment of hand laborers and material movers is projected to grow 4 percent from 2023 to 2033, faster than the average for all occupations.

Type of jobs and duties

Hand laborers and material movers typically do the following:

- Manually move material from one place to another.
- Pack or wrap products by hand.
- Keep a record of the material they move.
- Signal machine operators help move material.
- Clean cars, equipment, and workplaces.

Hand Laborers and Material Movers Highlights

- Frequent overnight shifts
- Demand for employees growing faster than national average
- Some of the highest rates of injuries and illnesses of all occupations
- Pay lower than national average

Positions included

Cleaners of vehicles and equipment wash automobiles and other vehicles, as well as storage tanks, pipelines, and related machinery.

Hand laborers and freight, stock, and material movers move materials to and from storage and production areas, loading docks, delivery trucks, ships, and containers. Most of these movers, often called pickers, work in warehouses. Some workers retrieve products from storage and move them to loading areas. Other workers load and unload cargo from a truck. When moving a package, pickers keep track of the package number, sometimes with a hand-held scanner, to ensure proper delivery. Sometimes they open containers and sort the material.

Hand packers and packagers package a variety of materials by hand. They may label cartons, inspect items for defects, and keep records of items packed. Some of these workers pack materials for shipment and move them to a loading dock.

Machine feeders and offbearers process materials by feeding them into equipment or by removing them from equipment. The equipment is generally operated by other workers, such as material moving machine operators. Machine feeders and

offbearers help the operator if the machine becomes jammed or needs minor repairs. Machine feeders also track the amount of material they process during a shift.

Refuse and recyclable material collectors gather garbage and recyclables from homes and businesses to transport to a dump, landfill, or recycling center. Many collectors lift garbage cans by hand and empty them into their truck. Some collectors drive the garbage or recycling truck along a scheduled route and may use a hydraulic lift to empty the contents of a dumpster into the truck.

Stockers and order fillers receive, unpack, and track merchandise. Stock clerks move products from a warehouse to store shelves. They keep a record of items that enter or leave the stockroom and inspect for damaged goods. These clerks also use handheld radio frequency identification (RFID) scanners to keep track of merchandise. Order fillers retrieve customer orders and prepare them to be shipped.

Pay

In May 2024, the median annual wages for hand laborers and material movers Transportation and warehousing were $37,680.

Safety

Hand laborers and freight, stock, and material movers and refuse and recyclable material collectors have some of the highest rates of injuries and illnesses of all occupations.

Warehousing-- Material Moving Machine Operators

Note: This entire section comes from BLS' Occupational Outlook Handbook.[24]

Schedule

Most material moving machine operators work full time, and some work more than 40 hours per week. Because materials are shipped around the clock, some operators work overnight shifts.

Educational/Skill Requirements

Education requirements vary by occupation. Crane and tower operators typically need work experience in a related occupation.

Pay

The median annual wage for material moving machine operators was $46,620 in May 2024.

Demand

Overall employment of material moving machine operators is projected to grow 3 percent from 2023 to 2033, about as fast as the average for all occupations.

Material Moving Machine Operators Highlights

- Frequent overnight shifts
- Experience required to obtain certain positions
- Demand for employees growing slightly faster than national average
- Some of the highest rates of injuries and illnesses of all occupations
- Pay lower than national average

Types of jobs and duties

Material moving machine operators typically do the following:

- Set up and inspect material moving equipment.
- Control equipment with levers, wheels, or foot pedals.
- Move material according to a plan or schedule.
- Signal and direct workers to load and unload materials.
- Keep a record of the material they move and where they move it to.
- Make minor repairs to their equipment.

In warehouses and factories, most material moving machine operators use forklifts and conveyor belts. Wireless sensors and tags keep track of merchandise, allowing operators to locate it faster. Some operators also check goods for damage. These operators usually work closely with hand laborers and material movers.
Positions (in warehousing) include:

Conveyor operators and tenders control conveyor systems that move materials on an automatic belt. They monitor sensors to regulate the speed with which the system's conveyor belt moves. They move materials to and from places such as

storage areas, vehicles, and building sites. Operators also may check the shipping order and determine the route that materials take along a conveyor.

Industrial truck and tractor operators drive trucks and tractors (typically forklifts) that move materials around storage yards, warehouses, or other worksites. Forklifts have a lifting mechanism and forks, which make them useful for moving heavy and large objects. Some industrial truck and tractor operators drive tractors that pull trailers loaded with material around factories or storage areas.

Safety

Previous editions of the Occupational Outlook Handbook stated that hoist and winch operators have one of the highest rates of injuries and illnesses of all occupations. Many workers wear personal protective equipment—including gloves, hardhats, and harnesses—to guard against injury. The latest edition (2025) does not mention safety at all.

Educational and Skill Requirements

Although no formal educational credential is typically required, companies may prefer to hire material moving machine operators who have a high school diploma or equivalent.

TASK 4: DEVELOP ECONOMIC IMPACT ANALYSIS OF INLAND WATERWAYS EMPLOYMENT

TTI assessed the economic impact of employment in the inland waterways industry. Using the IMPLAN model, the research team calculated direct impacts, indirect impacts, and induced impacts. IMPLAN incorporates multipliers that estimate the effects of employment as dollars circulate throughout the economy.

The methodology used in this analysis uses Bureau of Labor Statistics (BLS) employment data as input into the Impact Analysis for Planning (IMPLAN) input output tool. IMPLAN was used to generate an estimate of the economic impact of inland waterway employment.

The IMPLAN Model

To estimate the economic impact of inland waterway employment, TTI research staff used the IMPLAN model, which is an economic impact assessment model using the standard input-out (IO) modeling technique with 528 different industry-sector multipliers. This model uses a database with a variety of economic factors, established sector multipliers, and area demographics. These data, in combination with user inputs, are used to measure the initial change (**direct impact**) in a local economy.

Figure 9 provides an overview of the research team's process conducting the analysis for inland waterway employment in the U.S. The multi-step process begins with defining the study region, requires the collection of input data, and then refining the data and matching to the appropriate industry depending on the analysis. IMPLAN industry codes are based on Bureau of Economic Analysis (BEA) data and can be compared to the North American Industry Classification System (NAICS) codes. Finally, economic multipliers are applied in IMPLAN to determine the overall economic impact.

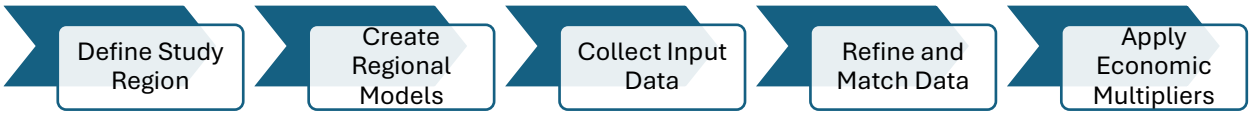


Figure 9. Process

From these direct impacts, the model also generates estimated indirect and induced impacts. **Indirect impacts** are the effects of purchasing goods and materials used in the

production of the direct impacts. These represent money exchanging hands between producers both in the local economy and outside the region. These typically represent the raw materials and goods needed in a specific sector's production. Companies producing goods make purchases that indirectly support another business. **Induced impacts** are the impacts in a local economy from employees spending their wages. This supports local services and stores. For example, an employee at the local shipping company purchases a television for personal use from the local electronics store. This supports employment and wages at local businesses, which creates additional induced impacts. See Figure 10 for an overview of the modeling process.

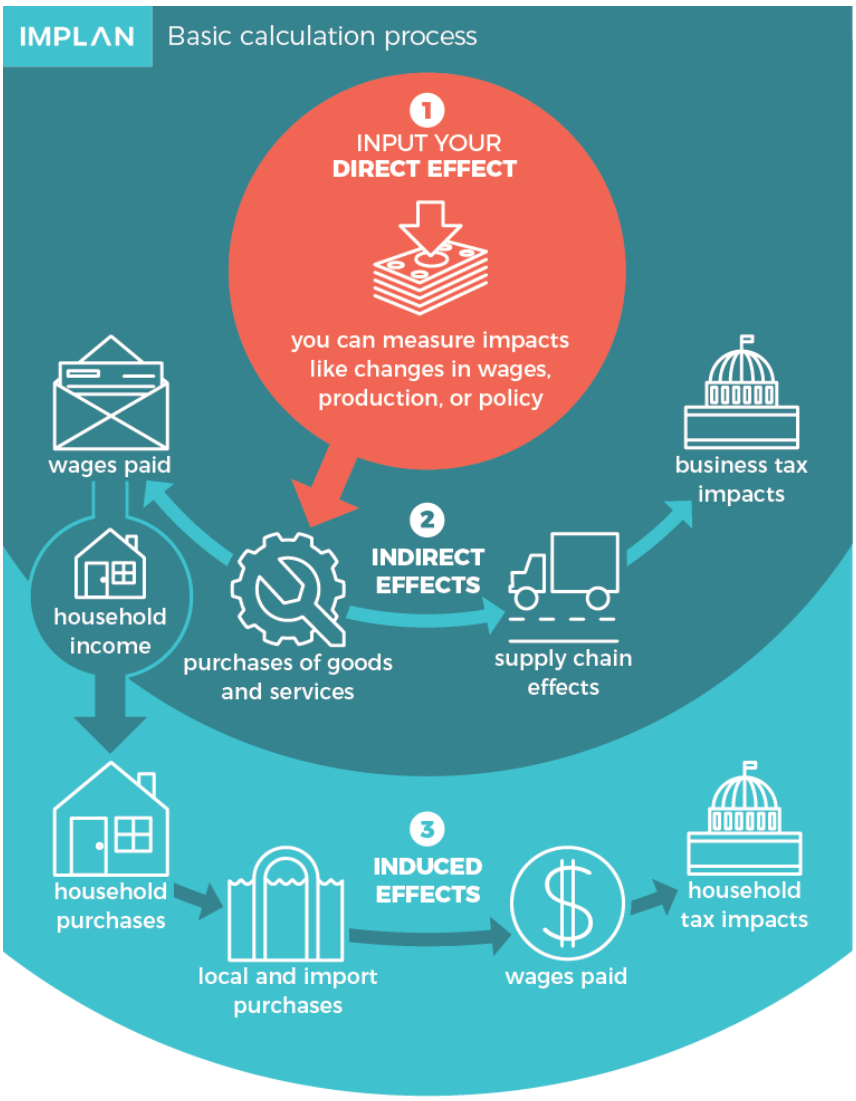


Figure 10. IMPLAN Process

Inputs

The IMPLAN model requires a set of inputs to determine the direct, indirect, and induced impacts of a set of economic activities. For this analysis, the inputs used were employment and average wage, which were obtained from the BLS. This analysis estimates the impact only from direct inland waterways jobs. This includes jobs from the Inland Water Transportation sector, the Deep Sea, Coastal, and Great Lakes sector, and the Support Activities for Water Transportation Sector. For the first analysis all Inland Water Transportation jobs in all states were included. For the remaining two sectors, Water Transportation Support Services jobs and Deep Sea, Coastal, and Great Lakes jobs were included only in inland states, as these categories include many other non-inland waterways jobs. Excluding coastal states, for these two sectors, restricts the analysis to only inland waterways related jobs in the data; however, this may slightly undercount the total jobs. Coastal states along the US Gulf Coast may have a number of jobs in these categories related to inland waterways, however most will be captured in the Inland Water Transportation Sector, which includes all states. The employment data utilized does not include jobs from industries that rely on inland waterways to operate, but rather only the jobs directly associated with inland waterways operations.

The second analysis includes only jobs from the Water Transportation Workers subsector of the Inland Water Transportation sector. This includes only jobs directly working on waterways vessels, such as sailors, engineers, and captains.

The economic impact of the inland waterways system as a whole will be much larger than the impact presented here, as there are many industries which rely on the waterway to move products and would be much worse off without access to the waterways.

Multipliers

Multipliers in the IMPLAN model are used to determine the output of the analysis. Multipliers in economic IO models are factors applied to an initial value. These multipliers are used to derive a total output, employment, labor income, and value-added. For each category, the multiplier seeks to identify the multiplier effect based on one unit of the corresponding direct impact. For example, if the employment multiplier in an economic sector within a region is 2.6, then for every 1 direct job in that sector, an additional 1.6 jobs are added within the region.

For tax impacts, the IMPLAN model provides an extensive breakdown of each type of tax paid within the analyzed region type. Tax amounts are calculated using publicly available data from government data sources, including the Bureau of Economic Analysis and Census of Government Finances.

Further details on the IMPLAN model, its capabilities, multiplier data, and assumptions can be found through the extensive online knowledge base at https://support.implan.com/hc/en-us/community/topics.

Output Definitions

Using the inputs and the various multipliers, IMPLAN produces a series of results that comprise the total economic impact of a market change. These include both summary impacts and tax impacts.

Summary Impacts

Summary impacts are the typical impacts associated with production in an economic impact analysis. These represent the jobs and dollars that are produced and/or supported in some way by production. The results include direct, indirect, and induced impacts and are reported in terms of the following impact types:

- **Employment** numbers represent the total annual average number of jobs, which is not the same as a full-time equivalent job. Instead, IMPLAN reports jobs as job-years, which includes self-employed and wage and salary employees. Full-time, part-time, and seasonal job estimates are based on a count of full-time/part-time averages over 12 months.[25]
- **Labor income** is the amount paid to workers or take-home pay. This includes both employee and proprietor income. Labor income provides the basis for induced impact calculations, which are the impacts of workers spending their wages inside and outside the local economy.
- **Value added** is the summation of labor income, property income, and indirect business taxes. Value added demonstrates the difference in the value of produced goods over the costs to produce that good. These costs include purchasing services and input materials used during production.
- **The output** represents the total value added, plus the value of the intermediate expenditures, such as purchases that go into production. Because there is a value generated on business-to-business transactions, the IMPLAN model accounts for these in addition to the value of production for a specific industry.

Results

Results from this analysis are presented as national impacts for the US at large. Two analyses were run; the first included the Inland Water Transportation sector and relevant jobs from the Water Transportation Support Services and Deep Sea, Coastal and Great Lakes sectors, while the second examined only Water Transportation Worker jobs. The

first analysis provides overall economic impacts for all jobs directly related to inland waterways, while the second analysis focuses specifically on the water transportation worker jobs. The results are reported in terms of employment, labor income, value-added, and total output. In addition, local, state, and federal tax impacts are provided.

The Inland Water Transportation and Water Transportation Support Services sectors have an estimated economic output of $36.1 billion nationally. Direct employment is estimated at 35,950 jobs, with $2.9 billion in labor income, $6.2 billion in value added, and a total direct output of $14.3 billion. These sectors also generate indirect and induced impacts which support an additional 91,583 jobs, $7.3 billion in labor income, $12.4 billion and an output of $21.8 billion. Combined, the total impacts of these sectors nationally are estimated at $36.1 billion in output, supporting 127,500 jobs with a total labor income of $10.2 billion.

Table 10. Estimated National Impacts

Impact Type	Employment	Labor Income (in $Billions)	Total Value Added (in $Billions)	Output (in $Billions)
Direct effect	35,950	$2.89	$6.23	$14.30
Indirect effect	47,730	$4.29	$6.81	$12.39
Induced effect	43,853	$3.02	$5.60	$9.41
Total effect	127,534	$10.20	$18.64	$36.11

In addition to employment and output, the analysis estimated local, state, and federal tax impacts from the Inland Water Transportation and Water Transportation Support Services sectors. Total direct tax impacts were estimated at $1.3 billion. This number includes sub-county, county, state, and federal tax impacts. Total county level tax impacts, including indirect and induced impacts, were estimated at $189 million, while state level impacts were estimated at $957 million. Federal impacts were estimated at $2.5 billion, for a total combined tax impact of $4.2 billion.

Table 11. Estimated Tax Impacts ($ Millions)

Impact Type	County	State	Federal	Total[1]
Direct effect	$49.0	$274.0	$785.9	$1,255.5
Indirect effect	$77.7	$380.0	$1,005	$1,691.1
Induced effect	$62.2	$303.3	$742.5	$1,291.4
Total effect	$189.0	$957.3	$2,533.0	$4,238.0

[1] Includes sub-county general and special tax district revenues

The analysis was also conducted looking only at the Water Transportation Workers sub-sector. This is a subset of the Inland Water Transportation sector but includes only jobs directly associated with workers on vessels in inland waterways transportation. This directly accounts for 18,300 jobs, $1.6 billion in labor income, $3.6 billion in value added, and a direct economic output of $8.5 billion nationally. Indirect and induced effects support another 57,248 jobs, resulting in 75,548 total jobs, $5.9 billion in labor income, $11.0 billion in value added and $21.5 billion in total output.

Table 12. Water Transportation Workers Estimated Impact

Impact Type	Employment	Labor Income (in $Billions)	Total Value Added (in $Billions)	Output (in $Billions)
Direct effect	18,300	$1.56	$3.64	$8.54
Indirect effect	28,865	$2.60	$4.13	$7.52
Induced effect	25,383	$1.75	$3.24	$5.45
Total effect	75,548	$5.91	$11.01	$21.50

In addition to employment and output, the analysis estimated local, state, and federal tax impacts for the Water Transportation Workers sector. Total direct tax impacts were estimated at $718 million. Again, this number includes sub-county, county, state, and federal tax impacts. Total county level tax impacts, including indirect and induced impacts, were estimated at $113 million, while state level impacts were estimated at $569 million. Federal impacts were estimated at $1.5 billion, for a total combined tax impact of $2.5 billion.

Table 13. Water Transportation Worker Estimated Tax Impact

Impact Type	County	State	Federal	Total
Direct effect	$29.5	$162.2	$438.5	$718.4
Indirect effect	$47.3	$231.1	$608.7	$1,026.4
Induced effect	$36.0	$175.6	$429.8	$747.5
Total effect	$112.9	$568.9	$1,477.0	$2,492.4

TASK 5: PREPARE "TOOLKIT" FOR EDUCATORS/ COUNSELORS/ PARENTS

TTI developed an inland waterways career brochure that would be appropriate for middle school and high school guidance counselors and parents. A copy of the brochure can be found in Appendix B.

Additionally, under this task TTI produced a 5-minute video that highlighted the advantages of working in the inland waterway industry. The video included two interviews, one with a barge company executive and one with a towboat captain.

The video can be accessed on the NWF website nationalwaterwaysfoundation.org.

APPENDIX A: SURVEY INSTRUMENT

NWF SURVEY ELEMENTS

Operator: _____

(1) FLEET PROFILE

Please use your customary ranges for horsepower groups

HP Group	**# of Vessels Operated**	**Normal Areas of Operation (LMR, UMR, IR, OH, TN, CUM, AR, GIWW,GIWE)**
Example: *1600 HP to 2900 HP*	*50*	*GIWW, AR*
_____	___	_____
_____	___	_____
_____	___	_____
_____	___	_____
_____	___	_____

(2) EMPLOYEE DEMOGRAPHICS (Listing of all Employees as of 12/31/2024)

Please provide a separate file (Excel or similar) that contains a line for each employee with columns containing the following information. Employee name or ID should NOT be included.

- Current Position
- Years with Company
- Education (for example*, high school graduate or equivalent, some college, associate degree, bachelor's degree, master's degree, doctorate, or professional degree*)
- Zip Code of Primary Residence

(3) WORKFORCE PROFILE

Please enter the data for the lowest HP class and the highest HP class at your company. Where there are grades within a job category, please aggregate them for this table.

Job Category	# of Employees	Required Experience	Typical Duty Cycle
Lowest HP Class:			
Captain			
Pilot			
Deckhand			
Mate			
Tankerman			
Engineer			
Highest HP Class:			
Captain			
Pilot			
Deckhand			
Mate			
Tankerman			
Engineer			

(4) EMPLOYMENT FEATURES

Are Employees Typically Assigned to a Home Port? YES/NO _____

How is Transportation to/from Vessel
Compensated?_____

What in House Training is
Offered?_____

_____
_
_____
_
_____
_
_____
_

APPENDIX B: PROMOTIONAL BROCHURE

EMPLOYMENT IN THE INLAND WATERWAYS INDUSTRY

NATIONAL WATERWAYS FOUNDATION

WHAT ARE THE INLAND WATERWAYS?

Inland waterways are the 25,000 miles of rivers, lakes, bays, and manmade channels that wind their way through 38 states. Within these waterways, powerful vessels called towboats push barges that transport essential energy, agricultural, and other critical commodities for delivery across the nation and around the world.

The people that work on these vessels are essential to the nation's supply chain and make a difference every day by transporting more than $73 billion of products every year.

WHAT KIND OF JOBS ARE THERE IN THE INLAND WATERWAYS INDUSTRY?

Inland waterways workers typically work on towboats that move either dry or liquid cargo. There are a variety of jobs that are required to keep a towboat operating efficiently and safely, including working with the cargo, ensuring the boat is maintained and clean, and of course, navigating and piloting the vessel.

Dedicated and hard-working employees can experience rapid advancement based on merit and training, which many companies pay for. Industry experts often point out that jobs in the inland waterways will not be replaced with artificial intelligence, since experienced crewmembers are needed to handle the wide range of factors and variables that occur while working on boats.

The entry-level position on a boat is a deckhand. Deckhands help dock the vessel, connect the vessel to barges of cargo, maintain and repair machinery, and stand watch to keep the boat and your crewmates safe.

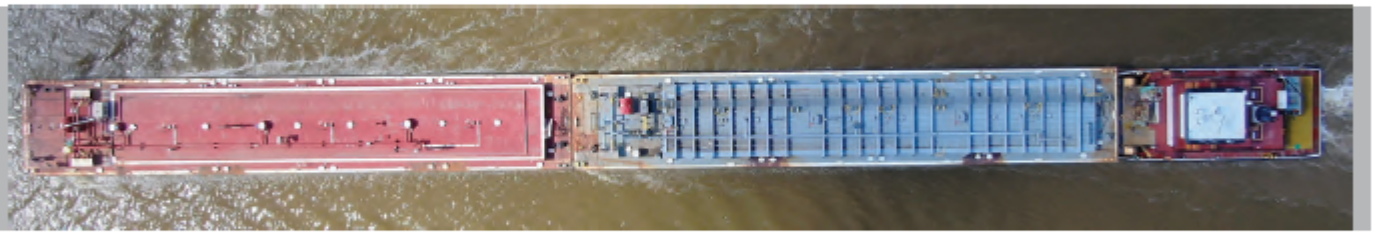
Once you master being a deckhand, you may move up to become a mate. Mates oversee the deckhands and all activities and equipment on the boat. Deckhands can also move up to become a tankerman responsible for transferring cargoes like diesel and gasoline, chemicals, and liquified petroleum gas.

A mate or tankerman can move on to become either an engineer, responsible for maintaining mechanical systems on the boat; or they can become a steersman, which is an apprentice to become the pilot of the boat. The pilot, who is second in command, steers the boat and supervises the crew in alternating shifts with the captain.

Finally, the highest position on a towboat is the captain, who is responsible for managing the crew and piloting the boat. Along the way, there are opportunities to transition to shore- based employment. Opportunities ashore include jobs as a shore tankerman, port engineer, port captain, fleet dispatcher, and other roles supporting a large fleet of vessels.

WHAT IS THE SCHEDULE LIKE?

Some vessels operate in local harbor areas where crews often work 12-hour shifts and live close by. But on many vessels, the crew live aboard and work for 14 to 30 days and then have 7 to 30 days off. In those positions, many crewmembers live just about anywhere in the country since travel to and from the boat often happens just once per month and these costs are often paid for by the company. Unlike many other freight rail and trucking jobs, schedules are very reliable and most importantly, pay is not affected when work is impacted by circumstances outside of the control of workers—like how many miles a trucker drives each day. A job in the inland waterways provides a career with the freedom to live anywhere and offers ample personal time—an exceptional work/life balance you won't find in any other job!

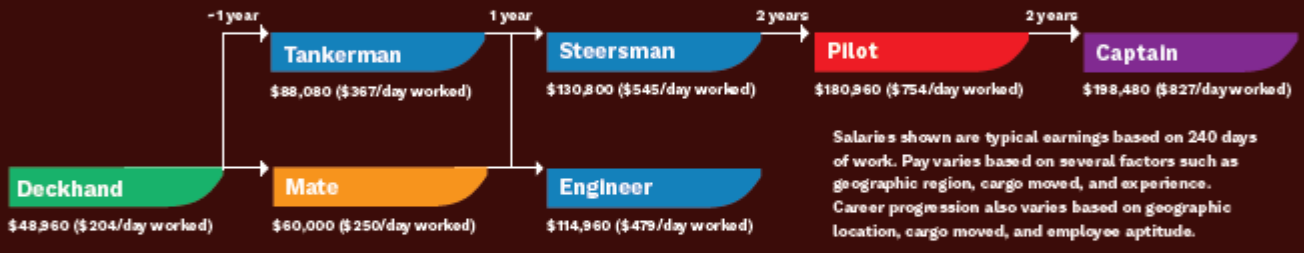


WHAT IS THE PAY LIKE?

Compensation on inland waterways boats is often described as a day rate for each day worked. Annual wages vary based on the number of days worked, with some workers choosing schedules that allow them to work 180 days on and 180 days off in a year, while others choose schedules that have them working 240 days a year with 120 days off. Wages vary based on the area of the river operated and the individual company, as well as on seniority within each position. To give you an idea of what you could earn in a year, these are the earnings of each role based on a daily rate that is about the midpoint of wages offered across the country:

- Deckhand midpoint annual earnings—$37,000-$48,960 ($204/day worked).
- Mate midpoint annual earnings—$45,000-$60,000 ($250/day worked).
- Tankerman midpoint annual earnings—$66,000-$88,080 ($367/day worked).
- Engineer midpoint annual earnings—$86,000–$114,960 ($479/day worked).
- Steersman midpoint annual earnings—$100,000-$130,800 ($545/day worked).
- Pilot midpoint annual earnings—$136,000-$180,960 ($754/day worked).
- Captain midpoint annual earnings—$150,000-$198,480 ($827/day worked).

Typical Career Ladder for Inland Waterways Employees



HOW DO I START MY CAREER?

Starting a career in the inland waterways does not require a college degree. You'll just need to obtain a Transportation Worker Identification Credential. Once employed, you'll have the opportunity to acquire additional credentials and certifications that provide opportunities for career advancement. Use online job boards and postings to find companies and positions you're interested in applying for and start your future today!

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