



# RHODE ISLAND COMMODITY FLOWS AND FORECASTS

November 7, 2022

*Prepared for:* Rhode Island Division of Statewide Planning



*Prepared by:*



# Contents

<b>1</b>	<b>Introduction.....</b>	<b>1</b>
1.1	DESCRIPTION OF TRANSEARCH DATABASE.....	1
1.1.1	<i>United States Domestic and Sea Trade Truck Movements</i> .....	2
1.1.2	<i>GEOTAB</i> .....	3
1.1.3	<i>Cross-Border Freight Movements</i> .....	5
1.1.4	<i>Air Cargo Activities</i> .....	6
1.1.5	<i>STB Confidential Carload Waybill Sample</i> .....	7
1.1.6	<i>Demand Driven Unconstrained Forecasts</i> .....	7
<b>2</b>	<b>Freight Demand and Commodity Group Overview .....</b>	<b>8</b>
2.1	TRUCK, RAIL, WATER, AND AIR SUMMARY .....	8
2.2	TOP FREIGHT-FLOW LANES .....	12
2.3	COVID-19 IMPACTS .....	13
<b>3</b>	<b>Truck Freight Flows .....</b>	<b>15</b>
3.1	TRUCK FREIGHT FLOWS OVERVIEW .....	15
3.2	THROUGH TRUCK FREIGHT FLOWS .....	16
3.3	OUTBOUND TRUCK FREIGHT FLOWS .....	20
3.4	INBOUND TRUCK FREIGHT FLOWS.....	23
<b>4</b>	<b>Rail Freight Flows.....</b>	<b>27</b>
4.1	RAIL FREIGHT FLOWS OVERVIEW.....	27
4.2	THROUGH RAIL FREIGHT FLOW .....	27
4.3	OUTBOUND RAIL FREIGHT FLOWS.....	29
4.4	INBOUND RAIL FREIGHT FLOWS .....	30
<b>5</b>	<b>Air Freight Flows .....</b>	<b>33</b>
5.1	AIR FREIGHT FLOWS OVERVIEW .....	33
5.2	OUTBOUND AIR FREIGHT FLOWS.....	33
5.3	INBOUND AIR FREIGHT FLOWS .....	36
<b>6</b>	<b>Water Freight Flows.....</b>	<b>39</b>
6.1	WATER FREIGHT FLOWS OVERVIEW .....	39
6.2	OUTBOUND WATER FREIGHT FLOWS .....	39
6.3	INBOUND WATER FREIGHT FLOWS.....	41

## Tables

Table 1: Freight Flows by Mode, 2021-2050 .....	8
Table 2: Top Freight-Flow Lanes by Tons 2021 and 2050.....	12
Table 3: Top Freight-Flow Lanes by Value 2021 and 2050 .....	13
Table 4: Rhode Island Truck Flows, 2021 and 2050.....	16
Table 5: Through Truck Traffic by Origin-Destination, 2021.....	17
Table 6: Through Truck Traffic by Origin-Destination, 2050.....	18
Table 7: Through Truck Flows by Origin, Destination and Commodity (Tons), 2021 .....	18
Table 8: Through Truck Flows by Origin, Destination and Commodity (Tons), 2050 .....	19
Table 9: Through Truck Flows by Origin, Destination and Commodity (Value), 2021 .....	19
Table 10: Through Truck Flows by Origin, Destination and Commodity (Value), 2050 .....	20
Table 11: Outbound Truck Traffic by Destination, 2021.....	22
Table 12: Outbound Truck Flows by Commodity (Tonnage), 2021 and 2050 .....	22
Table 13: Outbound Truck Flows by Commodity (Value), 2021 and 2050 .....	23
Table 14: Inbound Truck Traffic by Origin, 2021 and 2050.....	24
Table 15: Inbound Truck Flows by Commodity (Tonnage), 2021 and 2050 .....	25
Table 16: Inbound Truck Flows by Commodity (Value), 2021 and 2050 .....	26
Table 17: Rhode Island Rail Flows, Tons and Units 2021 and 2050 .....	27
Table 18: All Through Rail Traffic by Origin-Destination, 2021.....	27
Table 19: All Through Rail Traffic by Origin-Destination, 2050.....	27
Table 20: Outbound Rail Traffic by Destination, 2021 and 2050.....	29
Table 21: Inbound Rail Traffic by Origin, 2021 and 2050.....	31
Table 22: Inbound Rail Flows by Commodity (Tonnage), 2021 and 2050 .....	31
Table 23: Inbound Rail Flows by Commodity (Value), 2021 and 2050 .....	32
Table 24: Air Flows, 2021 and 2050.....	33
Table 25: Outbound Air Flows by Commodity, 2021 and 2050 .....	33
Table 26: Outbound Air Flows by Commodity (Value), 2021 and 2050 .....	34
Table 27: Outbound Air Traffic by Destination, 2021 and 2050 .....	35
Table 28: Inbound Air Flows by Commodity (Tonnage), 2021 and 2050.....	36
Table 29: Inbound Air Flows by Commodity (Value), 2021 and 2050 .....	36
Table 30: Inbound Air Traffic by Origin, 2021 and 2050.....	38
Table 31: Water Flows, 2021 and 2050 .....	39
Table 32: Outbound Water Flows by Commodity, 2029 and 2050 .....	39
Table 33: Outbound Water Flows by Commodity (Value), 2021 and 2050 .....	40
Table 34: Outbound Water Traffic by Destination, 2021 and 2050.....	41
Table 35: Inbound Water Flows by Commodity (Tonnage), 2021 and 2050 .....	41
Table 36: Inbound Water Flows by Commodity (Value), 2021 and 2050 .....	41
Table 37: Inbound Water Traffic by Origin, 2021 and 2050 .....	43

# Figures

Figure 1: Top Ten 4-digit Commodities by Tons Share, 2021 .....	9
Figure 2: Top Ten 4-digit Commodities by Tons Share, 2050 .....	10
Figure 3: Top Ten 4-digit Commodities by Value Share, 2021.....	11
Figure 4: Top Ten 4-digit Commodities by Value Share, 2050.....	11
Figure 5: Through Truck Traffic Flows, 2021.....	17
Figure 6: Outbound U.S. Truck Traffic Flows, 2021 .....	21
Figure 7: Inbound Truck Traffic Flows, 2021.....	24
Figure 8: Through Rail Traffic Flows, 2021.....	28
Figure 9: Outbound Rail Traffic Flows, 2021.....	29
Figure 10: Inbound Rail Traffic Flows, 2021.....	30
Figure 11: Destinations of Outbound Air Freight by State and Tonnage, 2021.....	35
Figure 12: Origins of Inbound Air Freight by State and Tonnage, 2021.....	37
Figure 13: Destinations of Outbound Water Freight by State and Tonnage, 2021 .....	40
Figure 14: Origins of Inbound Water Freight by State and Tonnage, 2021 .....	42

# 1 INTRODUCTION

---

This report provides an overview of the freight demand for truck, water, air, and rail mode and freight forecasts for major commodities shipped in, out, within, and through the state. Forecasts and overall commodity flow information are provided through a hybrid freight flow data set drawn from S&P Global's Transearch database and Geotab's Altitude Intelligent Transportation System (ITS) platform.

## 1.1 DESCRIPTION OF TRANSEARCH DATABASE

S&P Global develops the Transearch database each year and it is used for transportation planning, freight modeling, market analysis and forecasting. The database utilizes data from dozens of public, private, and proprietary industry sources, and includes market-to-market flow data at the county level for more than 450 individual commodities and seven modal categories of freight transportation. Flows are identified as international or domestic, and by equipment type (for the truck modes). Volumes measures are annual short tons, estimated unit counts, and dollar value of commodities moved.

The data can be characterized as long-term market tested and proven, having been first created over 40 years ago. The annual processing cycle, however, includes validation quality control measures through comparisons with alternate sources of information, such as the Bureau of Transportation Statistic's Commodity Flow Survey (CFS) and the Federal Highway Administration's Freight Analysis Framework (FAF). Additional validation is through comparison with the prior-year version. Where significant changes are seen from earlier data, or when compared to the CFS or FAF, the development stream for the records in question are carefully reviewed and traced back to the specific input factors that serve as the basis for the generation of the result. Where possible, alternate information sources will be reviewed and compared to help substantiate or adjust the activity level.

Production of each annual version of the Transearch database begins by establishing region-specific output volumes by industry or commodity. For most commodities, including most manufactured goods, this information is drawn from S&P Global's Economics and Country Risk Business Markets Insights (BMI) database, supplemented by trade association and industry reports and U.S. government-collected data:

- BMI contains a consistent set of historical statistical estimates and forecasts by industry sector at the county level of geographic detail.
- The statistics include the number of business establishments, employees, and output (as sales) by industry at the 6-digit NAICS (North American Industrial Classification System) code level.

Information from the U.S. industry Input/Output (I/O) tables reported by the Bureau of Economic Analysis (BEA) is another key input to the process. The I/O tables contain information on the amount of raw materials and other inputs that are needed to produce each industry's output. These tables provide simultaneous information on the number and value of commodities that are demanded by each industry, as well as the amount of output generated by each industry.

Commodities for which production volumes are not derived from BMI include the following:

- Agricultural products and livestock (sourced from the U.S. Department of Agriculture).
- Coal and petroleum products (sourced from the U.S. Energy Information Administration).
- Motor Vehicles (sourced from other S&P Global industry in-house databases).
- Selected chemicals (sourced from S&P Global Chemicals industry group).
- Minerals (sourced from the U.S. Geological Survey).

Using port-level U.S. Census Bureau merchandise trade data, Transearch identifies the volume of commodities that are domestically produced and exported along with quantities of commodities that are imported and used for domestic production and consumption. Therefore, final county-level production and consumption numbers in Transearch include imports and exports.

Additional sources of demand include the public sector, households, and the financial sector. This demand is accounted for in Transearch by using factors that take state and local tax revenues, wages, salary disbursements (as a proxy for household disposable income), and investments into account.

At this point in the Transearch production process, total production and consumption volumes are defined at the county level, as well as paired origin-destination commodity flows for freight movements by air, rail, water, and pipeline. S&P Global then subtracts the known modal pairings from total production and consumption by county: origin volumes are subtracted from production (sales) totals; destination volumes are subtracted from consumption (purchases) totals. These modal volumes are well defined and reported by government agency data sources. The remainder is the production and consumption volume that is allocated into origin-destination flows paired as moving by truck.

### 1.1.1 United States Domestic and Sea Trade Truck Movements

For truck movements within the United States, the next step in the production of the Transearch database is to allocate the aggregate level O-D truck flows to discrete sectors of truck traffic (i.e., truckload, less-than-truckload [LTL], and private trucking). The tonnage for each Standard Transportation Commodity Code (STCC) category is allocated between the for-hire and private sectors of the industry based on relative volumes reported in the U.S. Census Bureau CFS. The for-hire segment is then split between truckload and LTL components using the actual freight carrier industry data on the level of LTL shipments, as well as prior Transearch patterns.

S&P Global gathers information on the typical distances each commodity is hauled (e.g., less than 100 miles, 100 to 200 miles). The distribution by distance for each commodity is used in a gravity modeling approach to determine origin-destination paired flows. S&P Global verifies the origin-destination pairings through a comparison with actual commodity flow data collected from major freight carriers in the proprietary Data Exchange program.

Motor carriers that participate in the exchange of their actual flow pattern data submit a summary of their annual volumes that includes identification of origin and destination markets, plus tonnage or

truckloads. Commodity indications are captured through equipment types where available or imputed using the available production and consumption data.

There is some variation in the sample achieved each year through this program, but in recent years it has included about 70 million individual truck shipments, covering both the truckload and LTL segments of the industry. As a point of comparison, the 2017 CFS sampled approximately 6 million shipments and the 2002 CFS sampled 3 million shipments; in both cases, these samples were addressed to all the modes, not just to truck. Participating carriers are primarily large truckload and LTL operators with average lengths of haul over 500 miles. However, the sample also includes owner-operator business, portions of private carriage and dray activity, and significant amounts of regional (under 500-mile) traffic. The sampling rate is about 6 percent overall, 5 percent under 500 miles, and 4 percent under 100 miles. (As another point of comparison, the STB Waybill Sample runs 2.8 percent of shipments, but it is a stratified random sample and thus includes 22.5 percent of tonnage.)

To supplement the information obtained through the Data Exchange, IHS draws on proprietary data sets providing information on the specific locations of manufacturing and distribution facilities, along with profiles of their industrial output, employment, and sales level. This information, in conjunction with that gathered through the Motor Carrier Data Exchange, guides the establishment of origination volumes at the county level, and is particularly useful in markets where the Data Exchange sample is small.

Just as business establishment information is used to supplement origination data, it is used similarly in conjunction with the BEA Industrial I/O tables to enhance the destination or consumption volumes by county. Based on the production volumes by industry derived from such data, the I/O relationships are analyzed to develop necessary input commodities and volumes that would be needed to satisfy production demands.

### 1.1.2 GEOTAB

For the Rhode Island data set, information from the Geotab Altitude ITS Platform was added to the Transearch development stream. Geotab aggregates data from millions of connected vehicles using sophisticated sensors and telematic systems installed in commercial vehicles. This information source is in partially analogous to the Motor Carrier Data Exchange as it captures origin-destination truck movements by various categories of trucking activity. In particular, as compared to the Motor Carrier Data Exchange information, the Geotab's data has a much more robust capture of local and short haul activity, making it an excellent complement to the other trucking industry information.

The Geotab data covers approximately 20 percent of all the commercial vehicles registered in Rhode Island. Not all commercial vehicles are involved in the freight industry, but the key attributes in the data of NAICS, Gross Vehicle Weight Class, and Vocation allows accurate identification of these vehicles that move goods. Also, of note, there are many vehicles registered outside of the state that contribute to the state's freight traffic, and some vehicles registered within the state may not operate there. Fortunately, the Geotab data was accessed based on the locational travel patterns of the vehicles for a very robust capture of the pertinent freight activity.

Despite having a NAICS code identification of the vehicle's owner, this is not sufficient to identify the commodity types being moved. For example, the NAICS code for a for-hire trucking company provides no information about the type of products they move. The Transearch data does, however, capture over 400 distinctly identified commodities.

In order to effectively utilize the Geotab and Transearch data sets together there is a correlation between pertinent data attributes and scope of coverage; most significantly a subset of the Geotab information only covering freight activity needs to be prepared. This is accomplished using a combination of the three key attributes of NAICS, Gross Vehicle Weight, and Vocation.

There are potentially 99 NAICS (two-digit level) codes, 8 Gross Vehicle Weight categories, and 15 Vocations. For each combination of these three attributes, a determination is made classifying the record into one of three groupings:

- Activity Captured by Both Geotab and Transearch.
- Activity Captured only by Geotab and involving freight activity that can be used to expand the Transearch scope of coverage.
- Activity Captured only by Geotab, but not freight-related, which can be eliminated from the study.

Extensive cross-tabulations from both data sets were analyzed to identify areas where the basic Transearch data could be adjusted. The net results of this work led to two significant adjustments to the Rhode Island Freight data set:

- Since the Geotab data identifies trucks by Gross Vehicle Weight (GVW) category, adjustments were made to the payload conversion factors (tons per truck) used to translate tonnages into truck trips. The standard Transearch factors are based on a sample of industry activity that is heavily biased towards heavy-duty 18-wheel tractor trailers. Consequently, lower payload factors were calculated based on the proportion of heavy- and medium-duty trucks, reflecting the different payload capacities of the vehicles.
- The Geotab data showed much higher volumes of local traffic activity, which is incorporated into the freight data set. This traffic is identified in the data by a unique commodity identification code, STCC 5019. This traffic primarily represents the local delivery leg of warehouse, distribution, retail, and e-commerce activity. While these trips are an addition to the those in Transearch, much of this tonnage is duplicative as it has been captured in Transearch under commodity STCC 5010 (Warehouse and Distribution traffic).
- A corresponding adjustment has also been made to the empty movements in the freight data set. The Geotab information does not yet distinguish between loaded and empty truck movements, so an estimation was interpolated based on the proportion of empty-to-loaded movements in the Transearch data.



### 1.1.3 Cross-Border Freight Movements

The Transearch United States-Mexico cross-border data derives from transborder statistics produced by the U.S. Census Bureau directly, and through the U.S. Department of Transportation Bureau of Transportation Statistics. This source provides information on cross-border shipments by truck, rail, and pipeline, in terms of declared value (in U.S. dollars) at customs inspection points on the border. Information on southbound shipments includes U.S. state of origin, crossing point, and Mexican state of destination and (separately) U.S. origin, commodity, and Mexican destination. For northbound shipments, U.S. state of destination and the crossing point are shown, but origins are displayed simply as Mexico; however, physical volume (tons) is reported for these shipments, along with their value. Commodities are classified based on the international Harmonized Commodity Coding and Classification System, as set by the United States International Trade Commission and the World Customs Organization.

For southbound movements, the origin-crossing-destination and origin-commodity-destination datasets are combined with the crossing-level commodity data from U.S. Customs to estimate the complete flow. Note that in a small number of cases, the source data contains crossings that do not correspond to physical border crossings but are the point where the movement cleared customs. In those cases, Transearch retains the crossing from the source data for the sake of consistency.

For northbound movements, processing the data also involves allocating the northbound traffic to Mexican state of origin. This is done primarily using the latest Mexico Economic Census as conducted by the Instituto Nacional de Estadística y Geografía, which is made current using internal market intelligence and cross-border Data Exchange information.

The database includes U.S.-Mexico water movements across the Gulf of Mexico and along the Pacific coast. Once again, the source for the U.S. port of entry/departure is the transborder data produced by the U.S. Census Bureau.

Transearch for U.S.-Mexico is further allocated down to the BEA or county level. This procedure uses domestic U.S. production and consumption levels within counties, by specific commodity types. The relative weighting of each county's inbound and outbound volumes, as a percent of a state's total volumes by specific commodity type, are used to create disaggregation factors, which are then applied to Mexican traffic flows. Primary source information from the Transearch Data Exchange, which includes material volumes of United States-Mexico truck traffic, is further employed as a check against flow patterns at the state and the county level.

Similar to the U.S.-Mexico data, the Transearch United States-Canada data draws primarily from customs data obtained from the U.S. Department of Transportation Bureau of Transportation Statistics. As with the Bureau of Transportation Statistics (BTS) data for Mexico, data are separately provided as origin-crossing-destination totals by value and origin-commodity-destination totals by value. In this source, however, all origins and destinations are defined as U.S. states or Canadian provinces in both directions of trade. Commodities are coded in accordance with the Harmonized Commodity Description

and Coding System—generally referred to as Harmonized System (HS)—which, for the purpose of Transearch, are translated into equivalent four-digit STCC definitions.

Five separate modes are reported: truck, rail, water, air, and pipeline. In addition, where the mode of transport is unknown or not clearly specified on the customs documents, the shipment is included in an “other” grouping. Note that the Canadian and Mexican cross-border data is the only part of Transearch that contains pipeline data, which are flows overwhelmingly dominated by shipments of crude petroleum and natural gas. Canadian cross-border flows data is processed in a similar manner to Mexican data, where origin-crossing-destination totals and origin-commodity-destination totals provided by BTS are combined with crossing-level commodity totals from U.S. Customs to generate a complete flow: from origin province, to border crossing, to destination state by commodity, and vice versa.

For U.S. origins and destinations, domestic traffic volumes at the county level are used to allocate the international origins and destinations. This step is unnecessary for rail traffic based on the Surface Transportation Board (STB) Waybill, since granular geographic information is available in the sample. This process uses the same U.S. domestic data and processing techniques that are used with the Mexican data, although the greater dispersion of Canadian shipping activity renders the resulting patterns more robust. Canadian origins and destinations are disaggregated to the metropolitan market level based on patterns of Canadian domestic truck traffic, reported by Statistics Canada. Reports identify commodities and Canadian Metropolitan Areas (CMAs); still, significant portions of traffic appear in non-CMA, “remainder of Province” territories, and these residual geographic classifications are also carried forward into the international data set.

#### 1.1.4 Air Cargo Activities

Air cargo represents by far the smallest portion of the Transearch database in terms of tonnage. Air activity is constructed using Airport Activity Statistics available through the BTS. The BTS T-100 data set reports airport-to-airport flow volumes. The data are then translated from airports to counties, based on airport location information maintained by the Federal Aviation Administration (FAA). Because the data is meant to portray domestic freight flowing between origin and destination markets, only cargo that is drayed to or from the airport is quantified. Enplaned or deplaned volumes that are attributable to a transloading at an airport are not included in the database.

Major transloading hubs are identified for each air carrier, based on airline and airport information, plus a review of reported enplanement and deplanement volumes in the FAA and BTS T100 data. Adjustments for transloading volumes are made specific to each carrier based on individual monthly enplanement and deplanement statistics. Originating volumes moving into the hub are linked with destination volumes moving out.

For FedEx and UPS, the split between overnight letter-type packages and traditional freight-specific commodities is derived from volume information in their annual reports. The air cargo data do not specify the commodities moved between airports; therefore, information from the FAF is used to introduce broad commodity identification for air cargo. Using IHS expertise and knowledge of

production and consumption by county, we assign specific commodity codes to the air cargo data. In some cases, the air commodity data will be presented at a two- or three-digit STCC level where more detailed commodity information cannot be determined.

### 1.1.5 STB Confidential Carload Waybill Sample

Rail traffic information is from the STB Confidential Carload Waybill Sample. The Waybill Sample is a statistically based stratified sample of shipments terminated by U.S. rail carriers. The full Waybill Sample file contains detailed information on the origin, destination, commodity, and volume of each sampled movement. All carriers terminating 4,500 or more carloads per year are required to report, resulting in data capture from all Class I and II railroads, plus the more prominent short lines. Carriers moving fewer than 4,500 annual loads may be sampled when they act as haulage agents for larger railroads, and the latter appears as the carrier of record on a shipment.

### 1.1.6 Demand Driven Unconstrained Forecasts

S&P Global uses its comprehensive economic modeling expertise to forecast the flows for future years by commodity, mode, and the geography of the transportation. The economic forecasting of freight flows uses a hybrid modeling approach that relies on S&P Global's commercial economic modeling framework of consistently linked macroeconomic, regional, interindustry, and international trade forecast modeling systems. The detailed freight flow forecasts are modeled in a manner that is consistent with the most likely overall path of the economy at a national, regional, and sub-state level. For use in the plan, forecasts are provided out to 2050 with 2021 as the base year with the most recent Transearch historic data.

The significant impacts on the U.S. and world economies from the COVID-19 pandemic are captured in the data, including the characteristics of the 2020 recession and the economic recovery in the United States and in other countries which followed. The assumptions regarding the recovery in economic activity have necessarily included best estimates of 2021 and 2022 pandemic conditions, which include the assumption that subsequent waves of coronavirus are more muted in their economic impacts. There remain significant unknowns in these forecasts as the pandemic is not yet over at the time these forecasts were produced for the plan. Consumer behavior is assumed to reflect a permanence to the pandemic-driven shift in retail purchasing behavior towards e-commerce and away from traditional in-store purchases.

Within the United States, the Mid-South Region is especially impacted in the forecasts with an increase in e-commerce; due to the proximity of intermodal rail and warehouses and the availability of workforce and infrastructure, the region handled goods that overwhelmed capacities in coastal states. Warehousing, distribution center, and fulfillment center demand has increased in the Mid-South Region as supply chain managers adjust to the shifts in consumer spending patterns and retail goods distribution. And because of overseas supply chain disruptions, especially affecting U.S. trade from Asia during the pandemic, companies are revising longer-term sourcing strategies. This includes the further use of near-shoring strategies for imports from locations in Mexico.

## 2 FREIGHT DEMAND AND COMMODITY GROUP OVERVIEW

### 2.1 TRUCK, RAIL, WATER, AND AIR SUMMARY

Rhode Island's freight transportation network carried 52.5 million tons in 2021, with a value of \$64.6 billion. The total weight of freight transported in the state is expected to reach 85.6 million tons in 2050, which represents long-term growth of 1.7 percent CAGR (Compound Annual Growth Rate). The total value of freight is expected to reach \$134 billion by 2050, which, at a growth rate of 2.5 percent annually, is higher than growth in weight terms, due to faster growth forecasted for consumer goods that have a higher average value. Table 1 shows the forecasts for the four major freight transportation modes in Rhode Island. Truck is the dominant mode by both weight and value, carrying 86 percent of 2021 total tonnage, and 87 percent of value. Water handles 13 percent of tonnage and 9 percent of the total value. Air has a 3 percent share of total value, twice that of rail, despite moving a fraction of the tonnage. Truck is forecasted to continue being the predominant mode of transport through 2050, by far.

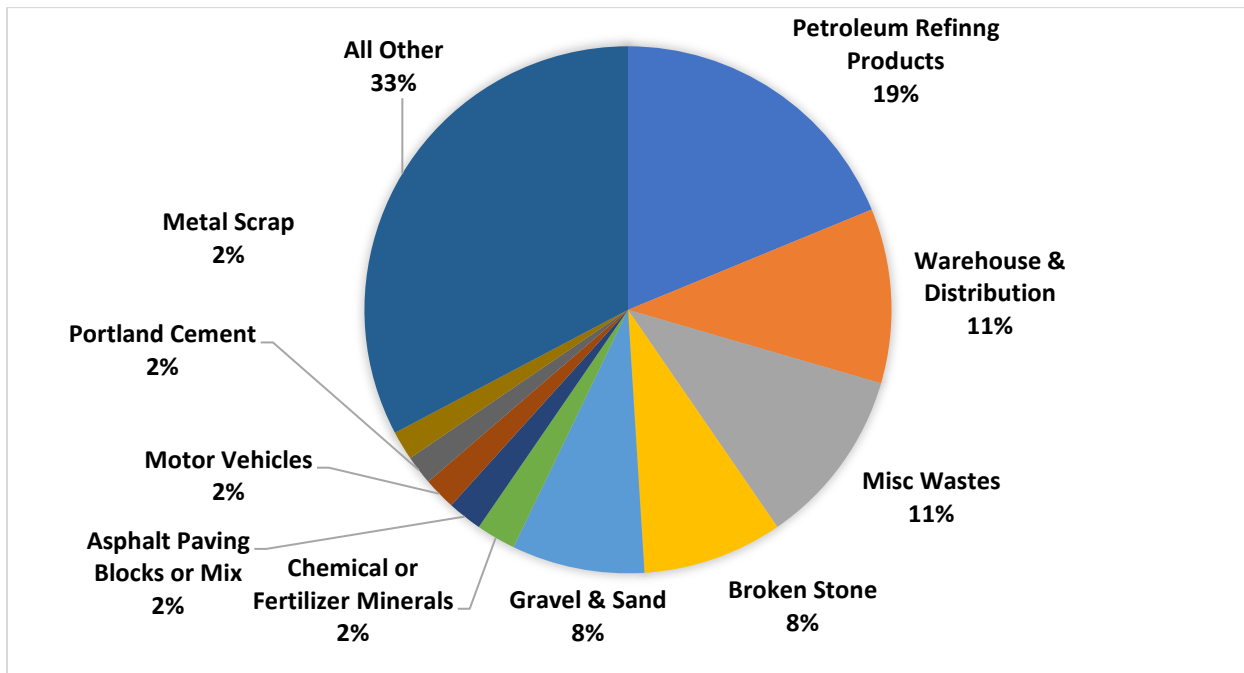
**Table 1: Freight Flows by Mode, 2021-2050**

MODE	2021 THOUSAND TONS	2050 THOUSAND TONS	2021 SHARE OF TOTAL TONS	CAGR 2021-2050	2021 MILLION USD	2050 MILLION USD	2021 SHARE OF TOTAL VALUE	CAGR 2021-2050
Truck	45,171	77,381	86%	1.9%	56,411	111,909	87%	2.4%
Rail	668	1,078	1%	1.7%	848	1,270	1%	1.4%
Water	6,642	7,144	13%	0.3%	5,651	15,245	9%	3.5%
Air	19	54	<1%	3.7%	1,725	5,488	3%	4.1%
<b>Total</b>	<b>52,502</b>	<b>85,657</b>		<b>1.7%</b>	<b>64,636</b>	<b>133,914</b>		<b>2.5%</b>

Source: IHS Transearch & Geotab

The 2021 top 10 commodities by weight in Rhode Island across all modes account for 73 percent of the total freight volume. This volume includes inbound, outbound, local and through traffic, with the traffic passing through the state accounting for 30 percent of the value, and 26 percent of the tonnage. Petroleum Refining Products amount to 18.8 percent of the total, and Warehouse and Distribution traffic volumes are 16.3 percent, which includes the additional traffic identified with the Geotab data. There is a total of 8.5 million tons of this secondary traffic, with 0.5 million tons representing new activity not previously captured by the Transearch data, and 4 million tons representing the additional trip segmentation of traffic, primarily local delivery activity. Miscellaneous Wastes are 10.9 percent of the total volume. There are large volumes of nonmetallic minerals, with Broken Stone and Sand & Gravel each accounting for 8 percent to 9 percent of volume, and Fertilizer at 2.4 percent. The remaining top products each capture about 2 percent of the total volume: Asphalt Paving Blocks or Mix, Motor Vehicles, Portland Cement, and Scrap Metal.

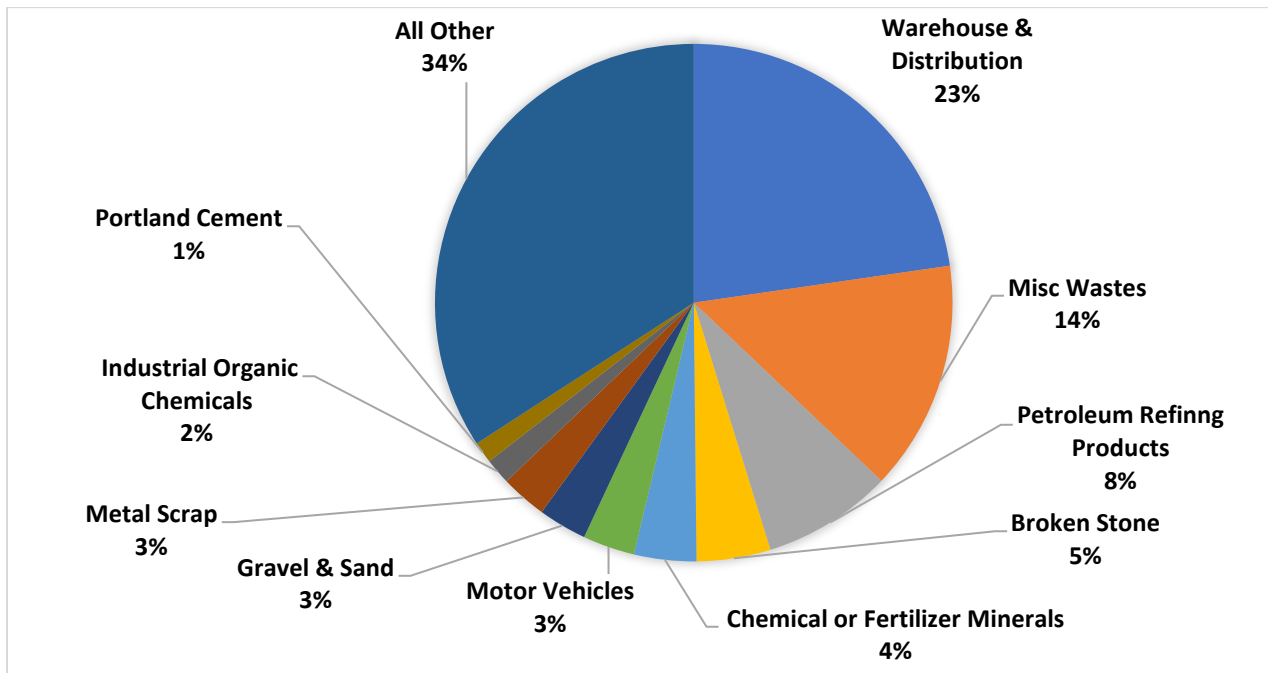
Figure 1: Top Ten 4-digit Commodities by Tons Share, 2021



Source: IHS Transearch & Geotab

The shares of the Rhode Island top 10 commodities forecasted by weight in 2050 across all modes of transport are led by the Warehouse and Distribution category with 22.7 percent of the volume. This growth reflects continued expected strength in e-commerce, and trends towards shorter supply chains with sourcing located closer to end users. The remaining commodities are quite similar to those in 2021, but the volumes exhibit some significant changes. Miscellaneous Wastes account for 14.4 percent, and Petroleum Refining Products show a lower volume than in 2021, with an 8.1 percent share of the total based on expectations of significantly increased vehicle electrification. The same three nonmetallic mineral products have had their share increase by 3 percent to 3.5 percent. Motor Vehicles increase to 3.2 percent of total volume, while Portland Cement maintains just over a 1 percent share. Industrial Organic Chemicals account for 1.6 percent of the tonnage.

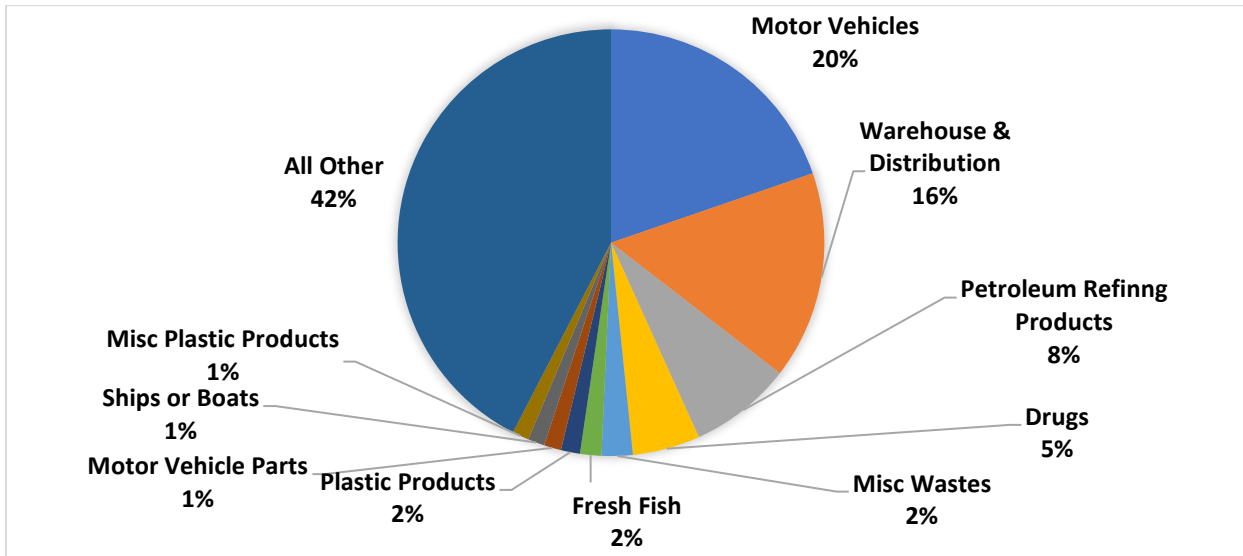
Figure 2: Top Ten 4-digit Commodities by Tons Share, 2050



Source: IHS Transearch & Geotab

On a value basis the mix of top commodities in Rhode Island reflect a somewhat different mix of products. Motor Vehicles, valued at \$12.768 billion, represent 19.7 percent of the total value of \$64.6 billion moving on Rhode Island’s transportation network. Warehouse and Distribution traffic amounts to 15.7 percent. Petroleum Refining Products are 7.8 percent of the total value, and Pharmaceuticals are 5.1 percent. From the state’s growing aquaculture industry, Fresh Fish is valued at just over \$1 billion, or 1.6 percent of the total value. The remaining top 10 valued goods each have just under a 1.5 percent share of the total value: Plastic Products, Motor Vehicle Parts, Marine Equipment, Soap & Detergent and Miscellaneous Chemicals.

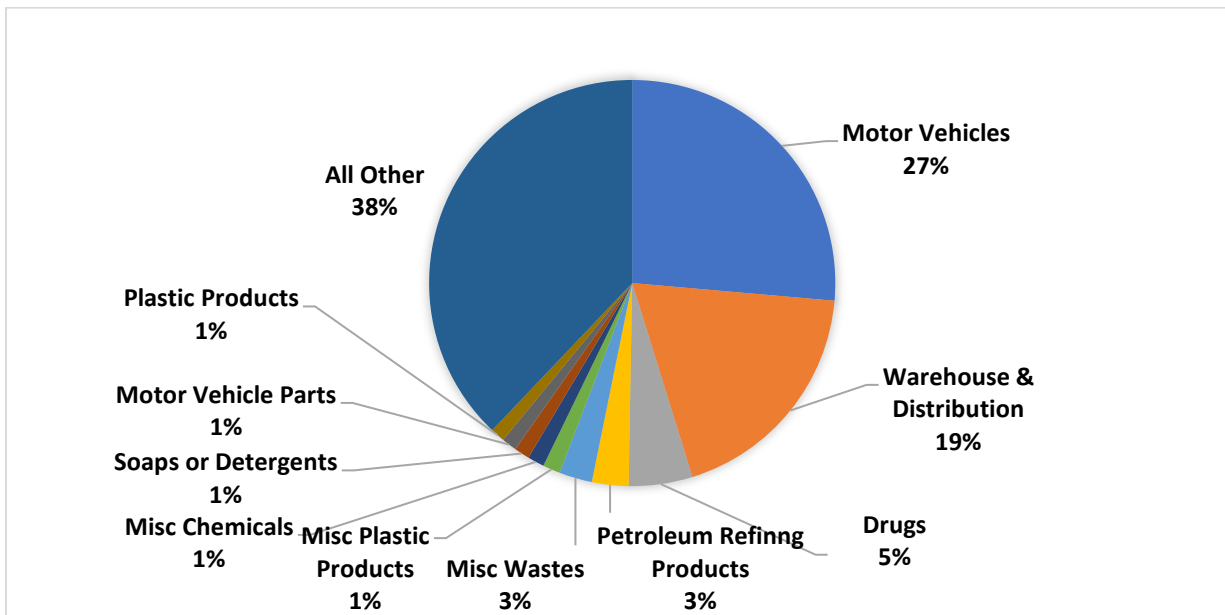
Figure 3: Top Ten 4-digit Commodities by Value Share, 2021



Source: IHS Transearch & Geotab

A similar group of products accounts for the top 10 commodities by value in Rhode Island for 2050, but the relative values reflect some change. Motor Vehicles and Warehouse and Secondary traffic remain the top commodities, but their shares of the total increase to 26.4 percent and 18.8 percent. These two are followed by Pharmaceuticals and Petroleum Refining Products, with shares of 5.1 percent and 2.9 percent. In descending order, the remaining commodities with shares in the 1 percent to 1.5 percent range are: Plastic Products, Miscellaneous Chemicals, Soap & Detergent, Motor Vehicle Parts, Medical Supplies, and Fresh Fish.

Figure 4: Top Ten 4-digit Commodities by Value Share, 2050



Source: IHS Transearch & Geotab

## 2.2 TOP FREIGHT-FLOW LANES

Rhode Island's freight movements show a preponderance of relative short-haul and local traffic. The following tables provide an overview of the top trading partners with Rhode Island at the state level, as well as indirect trading partners that utilize the region's freight network to reach their final destination.

Table 2 illustrates the top 10 direct/indirect trading partners ranked by 2021 tonnage volumes in terms of tonnage, including all modes (truck, rail, air, water) and all directions of flow (outbound, inbound, and through traffic).

**Table 2: Top Freight-Flow Lanes by Tons 2021 and 2050**

ORIGIN STATE	DESTINATION STATE	2021 THOUSAND TONS	2050 THOUSAND TONS	SHARE 2021	SHARE 2050	CAGR
Rhode Island	Rhode Island	8,728	17,283	17%	20%	2.4%
Massachusetts	Rhode Island	5,656	9,937	11%	12%	2.0%
Rhode Island	Massachusetts	4,668	6,481	9%	8%	1.1%
New Jersey	Rhode Island	3,962	4,094	8%	5%	0.1%
Rhode Island	Connecticut	2,102	2,379	4%	3%	0.4%
New York	Rhode Island	1,959	3,106	4%	3%	1.6%
New Brunswick	Rhode Island	1,694	1,195	3%	1%	-1.2%
Connecticut	Rhode Island	1,687	2,697	3%	3%	1.6%
Connecticut	Massachusetts	1,524	2,489	3%	3%	1.7%
Massachusetts	Connecticut	1,278	1,765	2%	2%	1.1%

Source: IHS Transearch & Geotab

Intrastate trade in Rhode Island ranks as the top lane by volume, and these flows are forecasted to increase by 2.4 percent from 2021 to 2050, outpacing the growth of all other major trading partners and mostly due to growth in Warehouse & Distribution Center commodities. Massachusetts is the next most significant freight lane, both for inbound and outbound activity. There is substantial trade in both directions with Connecticut, and on an inbound basis with both New Jersey and New York. New Brunswick is the only freight lane with a projected long-term decline in volume. Flows in both directions between Massachusetts and Connecticut are also a major use of the Rhode Island freight network.

Table 3 shows the top 10 direct/indirect freight-flow lanes ranked by their 2021 forecasted total value, including all modes (truck, rail, air, water) and all directions of flow (outbound, inbound, and through traffic).



**Table 3: Top Freight-Flow Lanes by Value 2021 and 2050**

ORIGIN STATE	DESTINATION STATE	2021 MILLION USD	2050 MILLION USD	SHARE 2021	SHARE 2050	CAGR
Rhode Island	Rhode Island	9,417	20,416	15%	15%	2.7%
Rhode Island	Massachusetts	5,447	10,846	8%	8%	2.4%
Massachusetts	Rhode Island	4,338	8,348	7%	6%	2.2%
New Jersey	Rhode Island	2,970	4,178	5%	3%	1.2%
Rhode Island	Connecticut	2,471	5,169	4%	4%	2.6%
Rhode Island	New York	2,385	5,413	4%	4%	2.9%
New Jersey	Massachusetts	2,123	4,616	3%	3%	2.7%
Veracruz, MX	Rhode Island	1,902	8,143	3%	6%	5.1%
New York	Rhode Island	1,873	3,144	3%	2%	1.8%
New York	Massachusetts	1,353	2,445	2%	2%	2.1%

Source: IHS Transearch & Geotab

When top freight-flow lanes are derived based on the value of freight shipments the patterns are very similar. Intra-Rhode Island traffic outpaces all other lanes with \$9.4 billion in 2021 and \$20.4 billion in 2050, a CAGR of 2.7 percent. Massachusetts is the clear number two freight lane, in both directions, with total value of \$9.8 billion in 2021, slightly higher than the intrastate total. The 2050 forecast is not quite as optimistic, with 2.4 percent outbound growth, and 2.2 percent growth coming into the state. New Jersey, New York, and Connecticut remain as top flows by value. Imported automobiles from Veracruz, Mexico appear to be a significant high-growth commodity. Through traffic from New Jersey and New York to Massachusetts rounds out the top 10 lanes.

### 2.3 COVID-19 IMPACTS

Domestic and international freight transportation and logistics systems have been affected by the COVID-19 pandemic since 2020. In 2020, there were dramatic short-term impacts from pattern changes in consumer-goods purchasing behavior and from reduced consumption of socially dense services, such as meals away from the home. Those changes in freight activity were observed broadly throughout the country.

Pandemic-related changes with more long-lasting impacts include changes in U.S. retail supply chains, with more of total goods consumption in the form of e-commerce, to which wholesalers and retailers are still adjusting their supply chain networks. The freight forecasts by mode of transport reflect these changes. The long-term forecast for trucking and air cargo tonnage are the highest among the modes of transport. This growth includes modal shipping patterns resulting from the use of service providers handling e-commerce.

The pandemic brought unprecedented disruptions to commodity-specific supply chains, starting with personal protective equipment and sanitary and cleaning supplies; and increased time-sensitivity of some shipping activity in the market resulted in shippers switching to higher-service quality providers (faster, more reliable, and perhaps more expensive). And while Amazon is developing their own high-

service freight network, collectively more businesses still rely on FedEx and UPS to handle their high-service shipping needs.

COVID-19 restrictions on travel and business in 2020 led to a permanent increase in the share of overall retail goods shipping activity for e-commerce fulfillment networks. These networks require a different allocation of warehousing and distribution center space to store goods delivered: not one truckload at a time to a brick-and-mortar store in a mall, but through a network of fulfillment centers supplying fleets of last-mile delivery vehicles making drop-offs at individual homes and places of work.

At the time of this plan update the pandemic is not over, but likely long-term post-pandemic patterns of retail and wholesale distribution of manufactured goods are already becoming evident. Shippers will consume more high-service trucking and make use of more domestic and international intermodal rail where they can arrange capacity. Within trucking, as a greater proportion of deliveries are made by e-commerce parcel delivery networks instead of traditional truckload-to-store models, express-service and LTL providers will continue to carry a greater share of manufactured goods.

## 3 TRUCK FREIGHT FLOWS

---

### 3.1 TRUCK FREIGHT FLOWS OVERVIEW

Most of the freight in the United States is moved on trucks. According to the American Trucking Association, the trucking industry generated \$791.7 billion in revenue in 2019, which accounts for 80.4 percent of the nation's freight bill. Truck revenue also accounts for 67.7 percent of U.S. and Canada freight and 83.1 percent of cross-border freight to Mexico.<sup>1</sup> The high share of truck-generated revenue is explained by the high accessibility of the road network, which results in the use of trucks for last-mile deliveries, even for flows where the rail or air network is utilized for the longest portion of the shipments. Other key factors in the high share of total freight handled by trucks include its speed—only air provides faster service—and the composition of the commodities most commonly moved by truck. Because rail is slower and the air is often too expensive, higher-value consumer goods typically ship on trucks.

In Rhode Island, 45.2 million tons of freight valued at \$56.4 billion were carried by truck in 2021. Inbound truck movements from out of state account for the highest share at 30.9 percent, and this volume is expected to grow to a 31.2 percent share in 2050. Through truck traffic accounts for 26.5 percent of the tonnage, and this is forecasted to rise to 27.6 percent in 2050. Outbound shipments from Rhode Island are 23.3 percent of the truck volume in 2021, and local traffic within the state is 19.3 percent. These shares will decline in 2050 to offset the increases in inbound and through movements. On a value basis the through and outbound movements show a higher share than their tonnage, while the inbound and local movement's value are lower on a share basis than their tonnage.

Total truck traffic is forecasted to grow an average of 1.8 percent annually through 2050 when measured in tons, with value growing a faster 2.3 percent. Tonnage is expected to reach 76.2 million, while the value will be \$110.5 billion in 2050. Local tonnage will grow 2.9 percent per year, with its value rising a stronger 2.5 percent. Through traffic will exhibit nearly similar growth at 2.0 percent by tonnage and 2.2 percent by value. Inbound traffic tonnage will grow at a 1.9 percent yearly average, and 2.1 percent by value. Outbound tonnage lags behind the other segments at 1.3 percent average annual growth, but its value will increase at a more robust 2.6 percent, reflecting a mix of higher-value goods being shipped from the state.

Outbound truck flows from Rhode Island average \$1,468 per ton, and through traffic is \$1,419 per ton, significantly higher than \$1,079 per ton for local traffic and \$1,044 per ton for inbound traffic. In 2050, this pattern will continue, but outbound will jump significantly to \$2,117 per ton. Through traffic increases to \$1,536 per ton, local to \$1,181 per ton, and inbound to \$1,128 per ton.

---

<sup>1</sup> ATA American Trucking Trends 2020

**Table 4: Rhode Island Truck Flows, 2021 and 2050**

DIRECTION	2021		2050		CAGR 2021-2050 (TONS)	CAGR 2021-2050 (VALUE)
	THOUSAND TONS	MILLION USD	THOUSAND TONS	MILLION USD		
Outbound	10,521	15,443	15,300	32,385	1.3%	2.6%
Inbound	13,961	14,580	23,783	26,820	1.9%	2.1%
Local	8,728	9,417	16,122	19,040	2.1%	2.5%
Through	11,961	16,971	21,015	32,288	2.0%	2.2%
<b>Total</b>	<b>45,171</b>	<b>56,411</b>	<b>76,220</b>	<b>110,533</b>	<b>1.8%</b>	<b>2.3%</b>

Source: IHS Transearch & Geotab

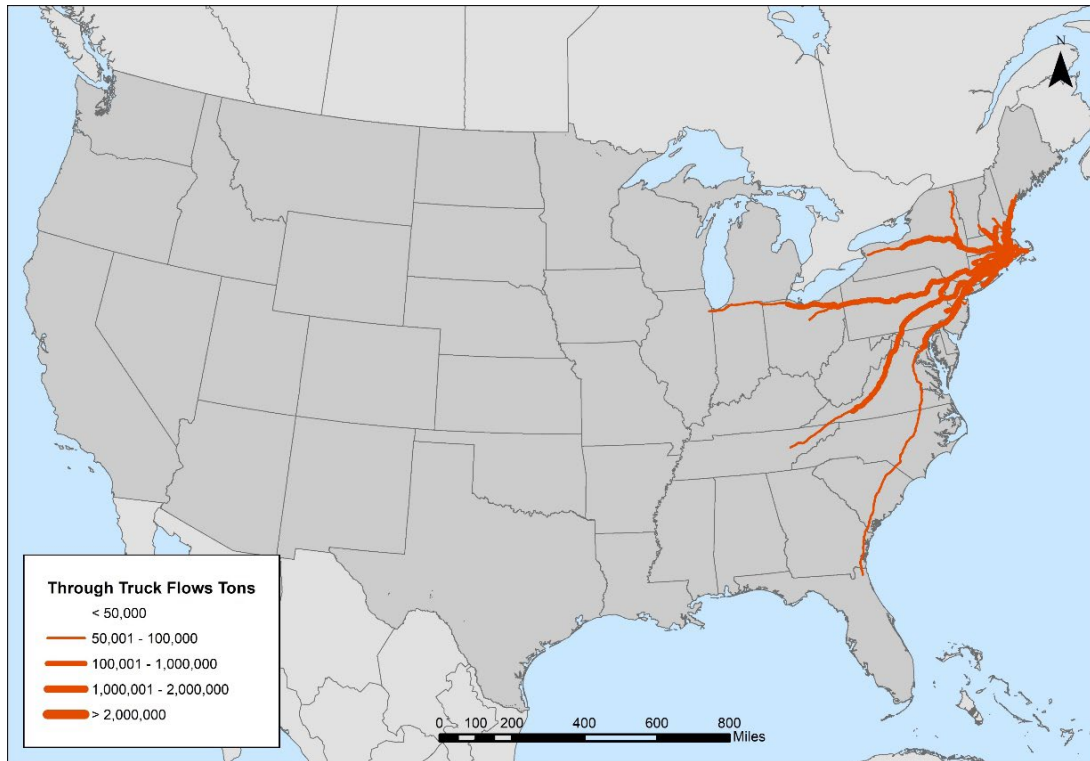
Local traffic accounts for just under 20 percent of the total truck tonnage in Rhode Island in 2021. The intrastate traffic, however, accounts for nearly 25 percent of all truck trips, or units. Warehouse and Distribution shipments constitute nearly two-thirds of this local traffic. This segment is forecasted to grow 3.0 percent annually through 2050. This traffic includes local delivery and distribution movements, including e-commerce.

The other significant component of local traffic is empty truck movements, representing 16 percent of the intrastate activity. These are trucks returning to warehouses and distribution centers or relocating from a delivery point to their next shipment.

### 3.2 THROUGH TRUCK FREIGHT FLOWS

Through truck traffic accounts for 26.5 percent of total truck traffic by tonnage or 12 million tons in 2021. In terms of value, through truck traffic is valued at \$21 billion. Two-thirds of this traffic is moving into Massachusetts, and one-third is moving out of Massachusetts. Through 2050 the CAGR will be 2.0 percent by tonnage, and 2.2 percent by value. Almost 25 percent of this traffic moves between Massachusetts and Connecticut with a fairly even directional split. Activity Between New York and Massachusetts is 20 percent of the volume, New Jersey is 14 percent, and Pennsylvania is just over 10 percent. This through traffic captures virtually every type of commodity that moves by truck. The largest groups are Warehouse and Distribution traffic at 14.3 percent of the total, Broken Stone with 11.3 percent, and Miscellaneous Wastes at 11 percent, each of which weighs in at over one million tons. Asphalt and Gravel & Sand are 5 percent and 4 percent of the total, and Petroleum Refining Products and Concrete are each around 3 percent. The strongest growth amongst these commodities is expected from the Warehouse and Distribution traffic, which will capture 23 percent of the volume by 2050, and Waste, which will amount to 16 percent.

Figure 5: Through Truck Traffic Flows, 2021



Source: IHS Transearch &amp; Geotab

Table 5: Through Truck Traffic by Origin-Destination, 2021

ORIGIN STATE	DESTINATION STATE	THOUSAND TONS	UNITS	MILLION USD
Connecticut	Massachusetts	1,524	126,782	1,061
Massachusetts	Connecticut	1,278	136,137	1,182
New York	Massachusetts	1,237	91,622	1,353
New Jersey	Massachusetts	1,090	57,572	2,126
Massachusetts	New York	1,081	83,024	1,241
Pennsylvania	Massachusetts	871	43,511	1,145
Massachusetts	New Jersey	542	42,989	492
Massachusetts	Massachusetts	456	28,680	507
Massachusetts	Pennsylvania	408	22,162	355
North Carolina	Massachusetts	273	13,317	790
All Other		3,202	167,079	6,721
Top 10 Share of Total		73.2%	79.4%	60.4%

Source: IHS Transearch &amp; Geotab

Truck through traffic is forecasted to increase from 12 million tons in 2021 to 21 million tons in 2050, which represents a compound average annual rate of 2.0 percent (Table 6). Flows into Massachusetts from Connecticut, New York, and New Jersey will be the three largest and account for one-third of the total through tonnage. On a commodity basis in 2050, 40 percent of the tonnage will consist of

Warehouse & Distribution traffic and Wastes. Each of these products will show a CAGR of over 3 percent. growth of Motor Vehicles and Motor Vehicle Parts or Accessories, similarly to Mexico to Kentucky pair.

**Table 6: Through Truck Traffic by Origin-Destination, 2050**

ORIGIN STATE	DESTINATION STATE	THOUSAND TONS	UNITS	MILLION USD
Connecticut	Massachusetts	2,489	229,000	2,085
New Jersey	Massachusetts	2,218	118,762	4,616
New York	Massachusetts	2,139	171,968	2,445
Massachusetts	Connecticut	1,765	231,262	2,112
Pennsylvania	Massachusetts	1,484	73,689	1,991
Massachusetts	New York	1,470	139,119	2,218
Massachusetts	Massachusetts	1,173	70,585	1,407
Massachusetts	New Jersey	1,010	84,276	889
Massachusetts	Pennsylvania	905	47,011	667
North Carolina	Massachusetts	479	23,376	1,329
All Others		5,883	308,222	12,528
Top 10 Share of Total		72.0%	79.4%	61.2%

Source: IHS Transearch & Geotab

The combination of the top 10 origin-destinations and commodities by tonnage shows the impact of a few commodities moving through Rhode Island (Table 7), with the top 10 share of the total through truck traffic composed of only four different commodities, but accounting for over 20 percent of the through tonnage. Broken Stone shipments from Connecticut to Massachusetts amount to over one-half million tons. The other large volume commodities are Warehouse & Distribution, Wastes, and Petroleum Refining Products.

**Table 7: Through Truck Flows by Origin, Destination and Commodity (Tons), 2021**

ORIGIN STATE	DESTINATION STATE	COMMODITY	THOUSAND TONS
Connecticut	Massachusetts	Broken Stone	546
Massachusetts	Massachusetts	Warehouse & Distribution Center	288
Massachusetts	New York	Broken Stone	283
Massachusetts	Connecticut	Warehouse & Distribution Center	271
New Jersey	Massachusetts	Warehouse & Distribution Center	249
Massachusetts	Pennsylvania	Wastes	248
Massachusetts	New Jersey	Wastes	215
Massachusetts	Connecticut	Petroleum Refining Products	214
New York	Massachusetts	Broken Stone	211
New York	Massachusetts	Wastes	207
All Others			9,230
Top 10 Share of Total			22.8%

Source: IHS Transearch & Geotab

The combination of the truck through traffic tonnage totals for the top 10 origin-destination pairs and commodities will show some consolidation and concentration by 2050 (Table 8). The top 10 share of the total through truck tons is forecasted to rise to 27.7 percent. Broken Stone, Warehouse & Distribution, and Wastes will be the only commodities in the top 10 flows. Warehouse & Distribution traffic from Massachusetts and New Jersey will top the list. The CAGR will be 2.6 percent for the top 10.

**Table 8: Through Truck Flows by Origin, Destination and Commodity (Tons), 2050**

ORIGIN STATE	DESTINATION STATE	COMMODITY	THOUSAND TONS
Massachusetts	Massachusetts	Warehouse & Distribution Center	962
New Jersey	Massachusetts	Warehouse & Distribution Center	754
Massachusetts	Pennsylvania	Wastes	647
Massachusetts	New Jersey	Wastes	590
Connecticut	Massachusetts	Broken Stone	587
Massachusetts	Connecticut	Warehouse & Distribution Center	554
New York	Massachusetts	Warehouse & Distribution Center	498
Connecticut	Massachusetts	Wastes	451
New York	Massachusetts	Wastes	429
Pennsylvania	Massachusetts	Warehouse & Distribution Center	349
All Others			15,192
Top 10 Share of Total			27.7%

Source: IHS Transearch & Geotab

Table 9 and Table 10 illustrate the 10 highest-ranked origin-destination pairs and commodities in 2021 and 2050, respectively, and their importance when ranked by value. When analyzed in terms of value, there is even greater concentration by commodity than tons, with half of the top 10 flows consisting of Warehouse & Distribution traffic. This concentration is similar in 2050.

**Table 9: Through Truck Flows by Origin, Destination and Commodity (Value), 2021**

ORIGIN STATE	DESTINATION STATE	COMMODITY	MILLION USD
Massachusetts	Massachusetts	Warehouse & Distribution Center	341
Massachusetts	Connecticut	Warehouse & Distribution Center	322
New Jersey	Massachusetts	Warehouse & Distribution Center	295
New York	Massachusetts	Drugs	277
New Jersey	Massachusetts	Drugs	192
Michigan	Massachusetts	Motor Vehicle Parts	167
Pennsylvania	Massachusetts	Warehouse & Distribution Center	166
Maryland	Massachusetts	Motor Vehicles	162
New York	Massachusetts	Warehouse & Distribution Center	139
Michigan	Massachusetts	Motor Vehicles	127
All Others			14,784
Top 10 Share of Total			12.9%

Source: IHS Transearch & Geotab

**Table 10: Through Truck Flows by Origin, Destination and Commodity (Value), 2020**

ORIGIN STATE	DESTINATION STATE	COMMODITY	MILLION USD
Massachusetts	Massachusetts	Warehouse & Distribution Center	1,140
New Jersey	Massachusetts	Warehouse & Distribution Center	894
Massachusetts	Connecticut	Warehouse & Distribution Center	657
New York	Massachusetts	Warehouse & Distribution Center	591
New York	Massachusetts	Drugs	565
New Jersey	Massachusetts	Drugs	447
Pennsylvania	Massachusetts	Warehouse & Distribution Center	414
Maryland	Massachusetts	Motor Vehicles	402
Massachusetts	New York	Motor Vehicles	346
Ohio	Massachusetts	Medical Equipment	269
All Others			26,563
Top 10 Share of Total			17.7%

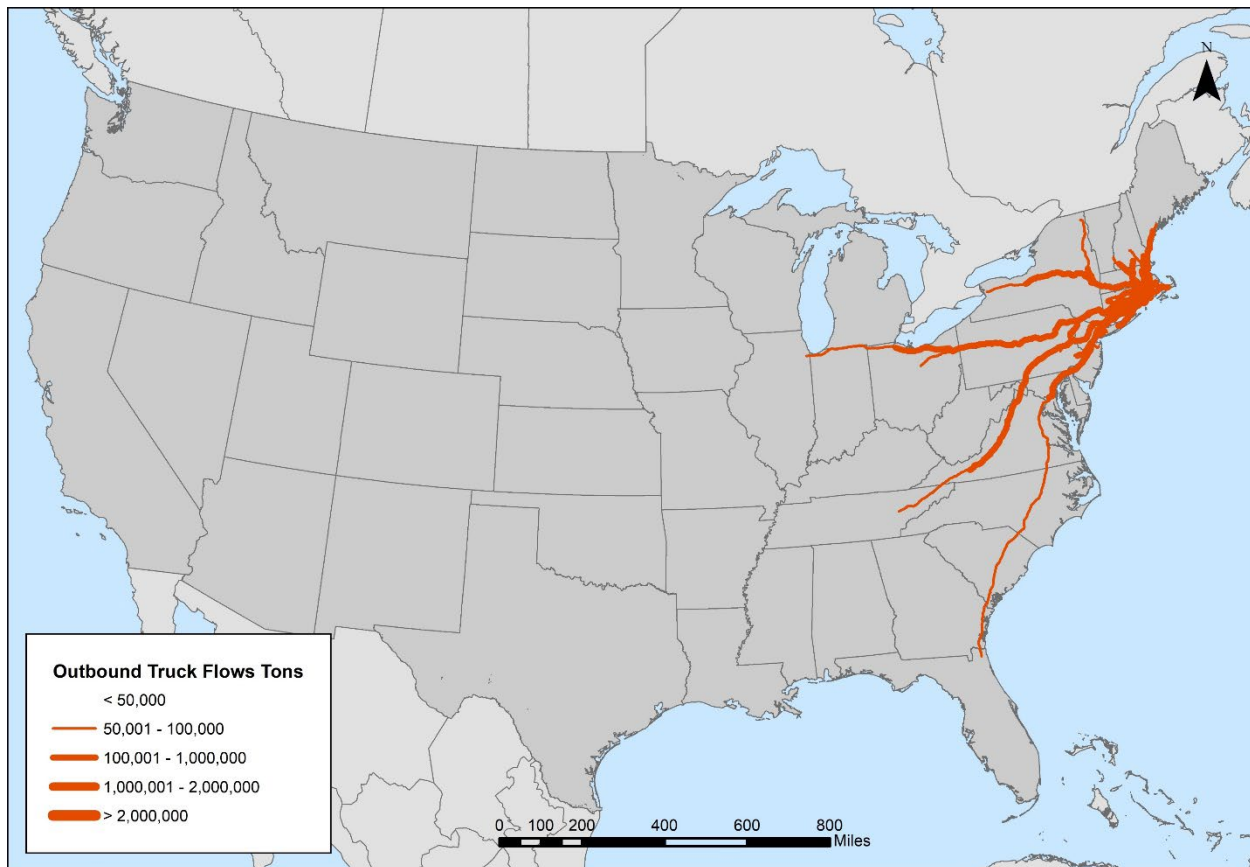
Source: IHS Transearch & Geotab

### 3.3 OUTBOUND TRUCK FREIGHT FLOWS

In 2021, outbound truck traffic from Rhode Island accounts for 23 percent of total truck freight traffic by tonnage at 10.5 million tons, and 27 percent of total truck freight traffic in terms of value at \$15.4 billion. Massachusetts is the number one destination for outbound truck flows, with more than twice the tonnage that moves to Connecticut (Figure 6). Leading destinations after these two neighbors are New York, New Jersey, Pennsylvania, New Hampshire, and Maine. In 2021, Sand & Gravel constitute just over 20 percent of outbound truck flows on a tonnage basis at 2.2 million tons and \$21 million, but Motor Vehicle shipments account for over 40 percent of the total value shipped from the state.



Figure 6: Outbound U.S. Truck Traffic Flows, 2021



Source: IHS Transearch & Geotab

Massachusetts is by far the most significant destination for Rhode Island shipments, with 44 percent of all the outbound tonnage and over one-third of the total value (Table 11). Connecticut received 20 percent of tonnage, and 15 percent of value, with New York and New Jersey combining for 18 percent of tonnage and 20 percent of value. The overall average value of all the outbound cargoes is \$1,468 per ton. The value for shipments to the two adjacent state is over \$300 lower per ton, reflecting the larger volumes of Sand & Gravel and Broken Stone.

Overall outbound truck traffic is expected to grow an annual average of 1.3 percent from 2019 to 2050 in terms of tons and 2.6 percent in terms of value. The local traffic to the adjacent states will lag behind this overall growth rate, with all of the other top destinations growing slightly above the average. The relative rankings of the top destination states will remain fairly constant in 2050, with the only change being shipments to New York exhibiting a higher value than shipments to Connecticut. Amongst the top commodities, Refined Petroleum Products are expecting to decline in volume and value. Motor Vehicles and a variety of Chemical products will have the most robust growth.

**Table 11: Outbound Truck Traffic by Destination, 2021**

DESTINATION STATE	2021		2050		CAGR 2021-2050	
	THOUSAND TONS	MILLION USD	THOUSAND TONS	MILLION USD	THOUSAND TONS	MILLION USD
Massachusetts	4,667	5,398	6,479	10,729	1.1%	2.4%
Connecticut	2,100	2,364	2,375	4,801	0.4%	2.5%
New York	1,256	2,365	2,061	5,341	1.7%	2.8%
New Jersey	662	830	1,032	1,829	1.5%	2.8%
Pennsylvania	495	673	923	1,421	2.2%	2.6%
New Hampshire	362	579	505	1,189	1.1%	2.5%
Maine	206	396	347	840	1.8%	2.6%
Maryland	99	247	194	535	2.4%	2.7%
Vermont	78	131	118	277	1.4%	2.6%
Florida	61	243	96	454	1.5%	2.2%
All Others	534	2,217	1,169	4,968	2.7%	2.8%
Top 10 Share of Total	94.9%	85.6%	92.4%	84.7%		
<b>Total</b>	<b>10,521</b>	<b>15,443</b>	<b>15,300</b>	<b>32,385</b>	<b>1.3%</b>	<b>2.6%</b>

Source: IHS Transearch &amp; Geotab

Table 12 summarizes the top 10 outbound commodities by weight in 2021 and 2050. The top 10 ranked commodities account for 77 percent of total Rhode Island outbound truck flows. Sand & Gravel account for 20.7 percent of outbound truck flows in 2021, but the tonnage will decline from 2.2 million to just under one million in 2050. Other top commodities in 2021 include Petroleum Refining Products, Broken Stone, Wastes, Fertilizer Minerals, and Motor Vehicles. While these are anticipated to remain the major commodities in 2050, these growth rates and volume rankings will show significant variation.

**Table 12: Outbound Truck Flows by Commodity (Tonnage), 2021 and 2050**

STCC4	COMMODITY	2021 THOUSAND TONS	2050 THOUSAND TONS	CAGR 2021-2050
14 41	Gravel or Sand	2,174	958	-2.8%
29 11	Petroleum Refining Products	1,459	1,265	-0.5%
14 21	Broken Stone	1,161	1,273	0.3%
40 29	Misc. Waste or Scrap	975	1,856	2.2%
14 71	Chemical or Fertilizer Mineral	697	2,107	3.9%
37 11	Motor Vehicles	532	1,316	3.2%
32 41	Portland Cement	487	480	0.0%
14 91	Misc. Nonmetallic Minerals	263	325	0.7%
28 41	Soap or Detergents	195	506	3.3%
50 1	Potassium or Sodium Compound	191	206	0.3%
	All Others	2,387	5,007	2.9%

Source: IHS Transearch &amp; Geotab

Top outbound commodities in terms of value in 2021 and 2050 are outlined in Table 13. The top 10 commodities by value make up 74 percent of total outbound truck cargo in 2021, growing to 78 percent in 2050. Motor Vehicles account for a 44 percent share of total value in 2021 and are expected to increase at an annual average of 3.2 percent to reach a majority share (52 percent) of the total value in 2050. Drugs and Petroleum Refining Products are the two next most valuable commodities, but while Drugs will grow at 2.4 percent through 2050, the Petroleum value will decline along with its volume. The strongest growth will come from Soaps & Detergents, Misc. Chemicals, and Misc. Plastic Products, all with over 3 percent CAGR.

**Table 13: Outbound Truck Flows by Commodity (Value), 2021 and 2050**

STCC4	COMMODITY	2021 MILLION USD	2050 MILLION USD	CAGR 2021-2050
37 11	Motor Vehicles	6,771	16,773	3.2%
28 31	Drugs	1,185	2,390	2.4%
29 11	Petroleum Refining Products	844	731	-0.5%
37 32	Ships, Boats and Parts	482	749	1.5%
09 12	Fresh Fish	437	583	1.0%
28 41	Soaps & Detergents	378	981	3.3%
39 11	Jewelry & Precious Metals	357	338	-0.2%
40 29	Misc. Wastes	352	674	2.3%
28 99	Misc. Chemicals	340	1,075	4.0%
30 71	Misc. Plastic Products	330	907	3.5%
All Others		3,967	7,184	2.1%

Source: IHS Transearch & Geotab

### 3.4 INBOUND TRUCK FREIGHT FLOWS

Inbound truck traffic accounts for 31 percent of total truck traffic tonnage, at 14.0 million tons, and 26 percent of total truck freight value, at \$56.4 billion in 2021. Inbound freight traffic originates primarily in the New England and Northeastern states, similar to outbound destinations (Figure 7). Inbound flows from Massachusetts amount to 40 percent of the tonnage, with Connecticut sending in 12 percent, and New York 11 percent.

Wastes goods represent 20 percent of the total inbound truck flow in terms of tons in 2021. Table 14 shows that the top 10 inbound truck flows account for 68 percent of all 2021 inbound truck traffic in terms of tonnage. Overall inbound truck traffic is forecasted to grow at an annual average of 1.9 percent from 2021 to 2050 in terms of tons and 2.1 percent in terms of value. The highest growth from the top volume states is projected to occur for flows originating from New Jersey and Maine (2.3 percent and 2.7 percent by weight, respectively). In terms of value these two states will also lead the growth, with value growing slightly faster than tonnage.

Figure 7: Inbound Truck Traffic Flows, 2021



Source: IHS Transearch & Geotab

Table 14: Inbound Truck Traffic by Origin, 2021 and 2050

ORIGIN STATE	2021		2050		CAGR 2021-2050	
	THOUSAND TONS	MILLION USD	THOUSAND TONS	MILLION USD	THOUSAND TONS	MILLION USD
Massachusetts	5,575	4,333	9,775	8,234	2.0%	2.2%
Connecticut	1,663	1,052	2,658	1,965	1.6%	2.2%
New York	1,484	1,589	2,133	2,614	1.3%	1.7%
New Hampshire	882	433	1,173	661	1.0%	1.5%
New Jersey	719	1,244	1,401	2,767	2.3%	2.8%
Maine	697	288	1,487	592	2.7%	2.5%
Pennsylvania	585	882	978	1,458	1.8%	1.8%
Vermont	336	103	530	202	1.6%	2.4%
Ohio	209	453	324	814	1.5%	2.0%
Michigan	152	508	266	756	1.9%	1.4%
All Others	1,659	3,694	5,281	9,787	2.7%	2.9%
Top 10 Share of Total	88%	75%	87%	75%		
<b>Total</b>	<b>13,961</b>	<b>14,580</b>	<b>23,783</b>	<b>26,820</b>	<b>1.9%</b>	<b>2.1%</b>

Source: IHS Transearch & Geotab

A breakdown by top commodity groups by tonnage in 2021 and 2050 is summarized in Table 15. Wastes represent the highest share of total inbound flows in both 2021 and 2050, at 20 percent in 2021 and 29 percent in 2050 of total inbound flows, with just over 3 percent growth annually. Broken Stone and Petroleum Refining Products combined amount to 25 percent of the 2021 volume but are expected to decline in tonnage terms by 2050. Commodities are projected to have the highest growth of 3.2 percent from 2021 to 2050 driven by the growth in e-commerce and retail distribution. Warehouse & Distribution traffic is 8 percent of the 2021 volume, but will grow at over 3.7 percent per year, nearly doubling its share of inbound traffic.

**Table 15: Inbound Truck Flows by Commodity (Tonnage), 2021 and 2050**

STCC4	COMMODITY	2021 THOUSAND TONS	2050 THOUSAND TONS	CAGR 2021-2050
40 29	Misc. Waste or Scrap	2,807	6,939	3.2%
14 21	Broken Stone or Riprap	1,809	1,654	-0.3%
29 11	Petroleum Refining Products	1,474	1,116	-1.0%
14 41	Gravel or Sand	1,269	1,418	0.4%
50 1	Warehouse & Distribution Center	1,112	3,220	3.7%
40 21	Metal Scrap	375	1,261	4.3%
29 51	Asphalt Paving Blocks or Mix	320	168	-2.2%
14 71	Chemical or Fertilizer Mineral	206	538	3.4%
32 73	Ready-Mix Concrete	182	300	1.7%
28 13	Industrial Gases	178	334	2.2%
All Others		4,230	6,837	1.7%

Source: IHS Transearch & Geotab

When inbound commodities are ranked by dollar value instead of tons, some different commodity categories are observed in the top 10. Table 16 shows that Warehouse & Distribution had the top value in 2021 and is forecasted to maintain that spot in 2050, accounting for 9 percent of all inbound truck flows in 2021 and rising to 14 percent in 2050. Drugs are the next highest-ranked commodity in terms of value in 2021 and 2050 and are expected to increase 2.5 percent annually through 2050. Petroleum Refinery Products will drop in value by 1 percent per year, but all other top commodities will grow, with most of them matching or exceeding the overall CAGR of 2.1 percent.

**Table 16: Inbound Truck Flows by Commodity (Value), 2021 and 2050**

STCC4	COMMODITY	2021 MILLION USD	2050 MILLION USD	CAGR 2021-2050
50 1	Warehouse & Distribution Center	1,316	3,817	3.7%
28 31	Drugs	1,014	2,094	2.5%
37 11	Motor Vehicles	896	1,597	2.0%
29 11	Petroleum Refining Products	854	647	-1.0%
40 29	Misc. Waste	694	1,713	3.2%
37 14	Motor Vehicle Parts	413	811	2.4%
37 12	Motor Vehicle Bodies	320	458	1.4%
30 72	Misc. Plastic Products	304	527	1.9%
20 51	Bread or Other Bakery Prod	212	380	2.0%
36 29	Misc. Electrical Industrial Equip	201	438	2.7%
All Others		8,354	14,338	1.9%

Source: IHS Transearch &amp; Geotab

## 4 RAIL FREIGHT FLOWS

### 4.1 RAIL FREIGHT FLOWS OVERVIEW

Rail moved 668,482 tons in Rhode Island in 2021, compared to over 45 million tons moved by truck. The vast majority (89 percent) of this tonnage is shipped into the state as illustrated in Table 17. The forecast for 2050 shows total tonnage increasing to just over 1 million, a 1.7 percent CAGR, with a slightly higher 91 percent share for inbound activity. On a value basis, the picture is very similar. All rail traffic is carload service.

**Table 17: Rhode Island Rail Flows, Tons and Units 2021 and 2050**

DIRECTION	2021		2050		TONS CAGR 2021-2050	VALUE CAGR 2021-2050
	TONS	MILLION USD	TONS	MILLION USD		
Through	46,132	58.5	44,183	56.1	-0.2%	-0.2%
Outbound	28,996	8.8	48,764	14.9	1.8%	1.8%
Inbound	593,354	780.8	984,740	1,199.6	1.8%	1.5%
Local	0	0	0	0	-	-
<b>Total</b>	<b>668,482</b>	<b>848.1</b>	<b>1,077,686</b>	<b>1,270.6</b>	<b>1.7%</b>	<b>1.4%</b>

Source: IHS Transearch & STB Confidential Waybill

### 4.2 THROUGH RAIL FREIGHT FLOW

Through rail traffic makes up 7 percent of Rhode Island's rail freight flows. All of this traffic is steel (STCC 33 12) being moved from Indiana and Virginia into Connecticut or Massachusetts. Overall, the volume of this traffic is expected to show a slight decline by 2050.

**Table 18: All Through Rail Traffic by Origin-Destination, 2021**

ORIGIN STATE	DESTINATION STATE	TONS	UNITS	MILLION USD
Indiana	Connecticut	38,934	440	49.4
Virginia	Massachusetts	3,610	41	4.6
Indiana	Massachusetts	3,588	45	4.6

Source: IHS Transearch & STB Confidential Waybill

**Table 19: All Through Rail Traffic by Origin-Destination, 2050**

ORIGIN STATE	DESTINATION STATE	TONS	UNITS	MILLION USD
Indiana	Connecticut	29,604	334	37.6
Virginia	Massachusetts	5,508	63	7.0
Indiana	Massachusetts	9,071	113	11.5

Source: IHS Transearch & STB Confidential Waybill

Figure 8: Through Rail Traffic Flows, 2021



Source: IHS Transearch & Geotab



### 4.3 OUTBOUND RAIL FREIGHT FLOWS

Outbound rail shipments originating in Rhode Island represent 4.3 percent of total state rail tons and only 1.0 percent of the total state rail shipments value. Originating outbound rail traffic is all comprised of Waste products. This traffic moves to Indiana, New York, South Carolina, and Mississippi. This traffic is forecasted to grow 1.8 percent through 2050.

**Figure 9: Outbound Rail Traffic Flows, 2021**



Source: IHS Transearch & STB Confidential Waybill

**Table 20: Outbound Rail Traffic by Destination, 2021 and 2050**

DESTINATION STATE	2021		2050		CAGR 2021-2050	
	TONS	MILLION USD	TONS	MILLION USD	TONS	MILLION USD
Indiana	9,234	4.2	15,892	7.2	1.9%	1.9%
New York	8,317	2.0	13,677	3.3	1.7%	1.7%
South Carolina	7,022	1.6	11,776	2.7	1.8%	1.8%
Mississippi	4,423	1.0	7,419	1.7	1.8%	1.8%

Source: IHS Transearch & STB Confidential Waybill

#### 4.4 INBOUND RAIL FREIGHT FLOWS

Inbound rail into Rhode Island represents 89 percent of all rail flows in terms of tons and 92 percent in terms of value. Inbound rail traffic is comprised of Lumber, Cement, Chemicals, Petroleum, Steel, Motor Vehicles and Wastes.

**Figure 10: Inbound Rail Traffic Flows, 2021**



Source: IHS Transearch & STB Confidential Waybill

Nearly two-thirds of inbound rail traffic comes from five states: Illinois (142,043 tons), Maryland (99,305 tons), Massachusetts (60,942 tons), Louisiana (52,981 tons), and Ontario (34,708 tons). Rail flows and Freight of All Kinds is again the top commodity. The largest flow by commodity is Cement from Maryland, accounting for all of that state's shipments. There are large flows of Chemicals and Petroleum from Illinois, and Chemicals from Louisiana and Massachusetts.

Overall inbound rail traffic is forecasted to increase at an annual average rate of 1.8 percent from 2021 to 2050 in terms of total tons, with value at 1.5 percent. The largest tonnage increase is forecasted for Misc. Industrial Organic Chemicals at 3 percent CAGR. Plastics volume will grow 2.5 percent.

**Table 21: Inbound Rail Traffic by Origin, 2021 and 2050**

DESTINATION STATE	2021		2050		CAGR 2021-2050	
	TONS	MILLION USD	TONS	MILLION USD	TONS	MILLION USD
Illinois	142,043	153.2	286,129	245.9	2.4%	1.6%
Maryland	99,305	11.8	142,779	17.0	1.3%	1.3%
Massachusetts	60,942	35.1	129,325	74.6	2.6%	2.6%
Louisiana	52,981	123.9	90,408	211.5	1.9%	1.9%
Ontario	34,708	30.7	28,327	30.8	-0.7%	0.0%
Indiana	28,536	292.7	43,062	441.7	1.4%	1.4%
Ohio	25,615	10.1	27,844	13.2	0.3%	0.9%
Pennsylvania	25,242	6.1	24,939	6.0	0.0%	0.0%
Alabama	20,143	10.8	46,182	13.5	2.9%	0.8%
New York	18,921	21.8	23,202	35.2	0.7%	1.7%
All Others	84,918	84.5	142,542	110.3	1.8%	0.9%
Top 10 Share of Total	85.7%	89.2%	85.5%	90.8%		
<b>Total</b>	<b>593,354</b>	<b>780.8</b>	<b>984,740</b>	<b>1,200.0</b>	<b>1.8%</b>	<b>1.5%</b>

Source: IHS Transearch &amp; STB Confidential Waybill

Table 22 summarizes the top 10 inbound rail commodities by weight for 2021 and 2050. These 10 commodities account for 95 percent of the inbound tonnage.

**Table 22: Inbound Rail Flows by Commodity (Tonnage), 2021 and 2050**

STCC4	COMMODITY	2021 TONS	2050 TONS	CAGR 2021-2050
28 18	Misc. Industrial Organic Chemicals	118,161	283,956	3.1%
32 41	Portland Cement	99,305	142,779	1.3%
28 21	Plastic Material	95,657	147,694	1.5%
29 12	Liquefied Gases, Coal or Petroleum	94,606	96,588	0.7%
24 21	Lumber	37,218	107,404	3.7%
37 11	Motor Vehicles	35,748	54,446	1.5%
40 21	Metal Scrap or Tailings	26,953	52,921	2.4%
33 12	Primary Iron & Steel Products	21,867	29,655	1.1%
28 19	Misc. Industrial Inorganic Chemicals	17,065	18,384	0.3%
28 12	Potassium or Sodium Compounds	16,074	16,499	0.1%
All Others		30,700	34,414	0.4%

Source: IHS Transearch &amp; STB Confidential Waybill

Top rail commodities shipped to Rhode Island in terms of value in 2021 and 2050 are outlined in Table 23. The commodities account for 97 percent of the total value.

**Table 23: Inbound Rail Flows by Commodity (Value), 2021 and 2050**

STCC4	COMMODITY	2021 MILLION USD	2050 MILLION USD	CAGR 2021-2050
37 11	Motor Vehicles	366.7	558.5	1.5%
28 21	Plastic Mater or Synth Fibers	223.8	345.5	1.5%
28 18	Misc. Industrial Organic Chemicals	40.6	97.5	3.1%
28 19	Misc. Indus Inorganic Chemicals	30.9	33.3	0.3%
33 12	Primary Iron & Steel Products	27.7	37.6	1.1%
29 12	Liquefied Gases, Coal or Petroleum	22.7	23.2	0.1%
30 71	Misc. Plastic Products	16.0	32.9	2.5%
32 41	Portland Cement	11.8	17.0	1.3%
24 91	Treated Wood Products	7.5	12.1	1.7%
26 31	Fiber, Paper or Pulp Board	7.2	5.3	-1.1%
All Others		25.9	36.7	2.5%

Source: IHS Transearch &amp; STB Confidential Waybill

## 5 AIR FREIGHT FLOWS

### 5.1 AIR FREIGHT FLOWS OVERVIEW

In total, Rhode Island air freight tonnage in 2021 was 18,725 tons, including inbound and outbound cargo flows (Table 24). In 2021 inbound tonnage represented approximately 60 percent of total air cargo flows and outbound represented 40 percent of the total. The inbound/outbound balance will be material unchanged by 2050. Air freight tonnage is forecasted to nearly triple and grows 3.7 percent from 2021 to 2050. In terms of value, inbound and outbound flows are expected to increase at an average annual rate of 4.1 percent to 2050.

**Table 24: Air Flows, 2021 and 2050**

DIRECTION	2021		2050		TONS CAGR 2021-2050	VALUE CAGR 2021-2050
	TONS	MILLION USD	TONS	MILLION USD		
Inbound	11,305	1,096	32,171	3,243	3.7%	3.8%
Outbound	7,420	630	22,149	2,245	3.8%	4.5%
<b>Total</b>	<b>18,725</b>	<b>1,726</b>	<b>54,311</b>	<b>5,488</b>	<b>3.7%</b>	<b>4.8%</b>

Source: IHS Transearch

### 5.2 OUTBOUND AIR FREIGHT FLOWS

Table 25 summarizes the top 10 air cargo commodities by weight in 2021 and 2050. Small, packaged freight shipments account for the highest share of all outbound air tons (47 percent in 2021 and 38 percent in 2050) and are forecasted to increase at an average annual rate of 13.0 percent from 2021 to 2050. The total value of this commodity group is unknown as the contents of private mail are not publicly available. Machinery accounts for 17 percent of the outbound tonnage, growing to 21 percent in 2050. The top 10 commodity groups account for 92 percent of the outbound air volume.

**Table 25: Outbound Air Flows by Commodity, 2021 and 2050**

STCC4/STCC2	COMMODITY	2021 TONS	2050 TONS	CAGR 2021-2050
47 11	Small Packaged Freight Shipments	3,502	8,279	3.0%
35	Machinery	1,262	4,689	4.6%
38	Instruments, Photo & Optical Eqpt	442	1,641	4.6%
46 11	Fak Shipments	406	959	3.0%
36	Electrical Equipment	311	1,157	4.6%
28 1	Industrial Chemicals	261	1,500	6.2%
25	Furniture	237	881	4.6%
30	Rubber or Misc. Plastics	228	481	2.6%
37	Transportation Equipment	100	373	4.6%
34	Fabricated Metal Products	95	351	4.6%
All Others		576	1,603	3.6%

Source: IHS Transearch

On a value basis most of the same commodities make the top 10, and they account for 95 percent of the total value. Their values are by and large growing at a comparable rate to their volumes. Total outbound air value is projected to grow at an average annual growth rate of 4.4 percent (Table 26 and Figure 11).

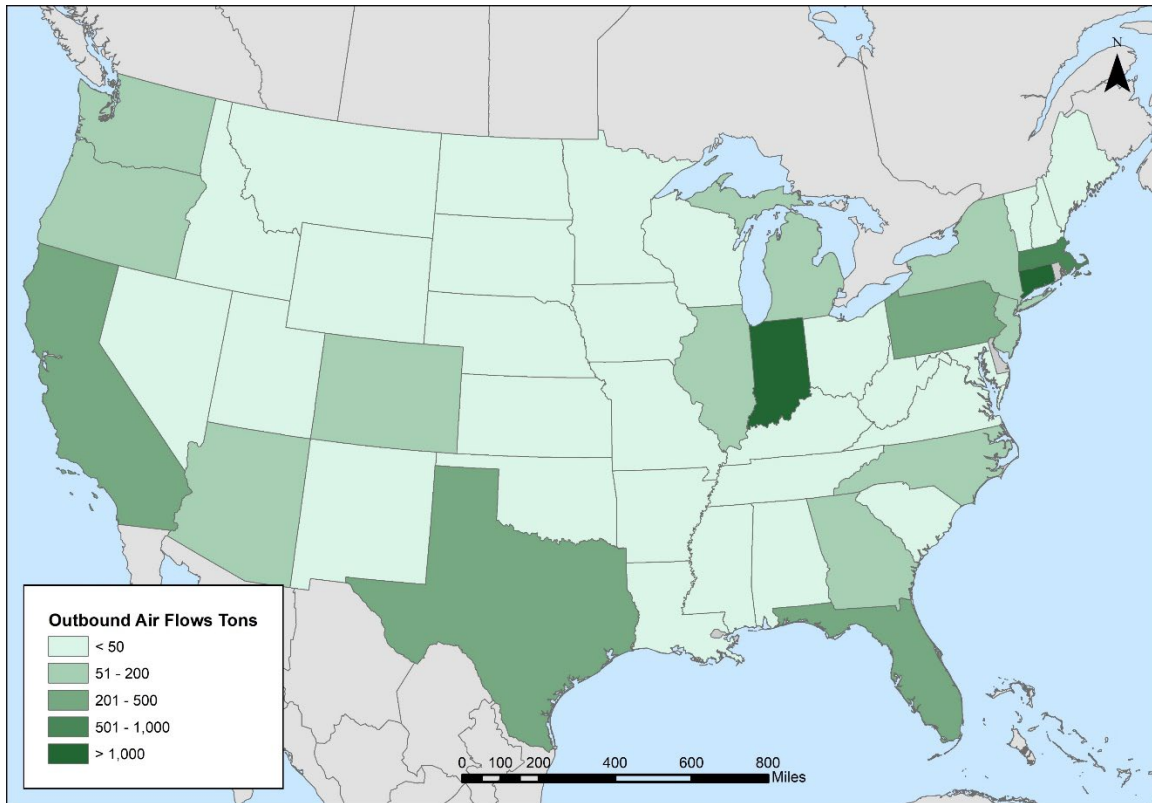
**Table 26: Outbound Air Flows by Commodity (Value), 2021 and 2050**

STCC4/STCC2	COMMODITY	2021 MILLION USD	2050 MILLION USD	CAGR 2021-2050
35	Machinery	184.1	683.9	4.6%
38	Instrum, Photo Equipment, Optical Eq	106.2	394.4	4.6%
36	Electrical Equipment	96.9	360.1	4.6%
46 11	Fak Shipments	61.1	144.3	3.0%
37	Transportation Equipment	43.5	161.7	4.6%
39	Misc. Manufactured Products	36.4	135.1	4.6%
25	Furniture	21.4	79.7	4.6%
28 1	Industrial Chemicals	19.2	110.6	6.2%
28 31	Drugs	16.6	31.0	2.2%
30	Rubber or Misc. Plastic	9.8	20.7	2.6%
All Others		34.3	100.0	3.8%

Source: IHS Transearch

Air freight originating in Rhode Island is destined for 48 states with especially high volumes to Indiana (35 percent). The top 10 destination states capture 81 percent of the volume.

**Figure 11: Destinations of Outbound Air Freight by State and Tonnage, 2021**



Source: IHS Transearch

Forecasts of outbound flows by the top states also show robust growth, with all of them expanding by at least 35 percent per year through (Table 27).

**Table 27: Outbound Air Traffic by Destination, 2021 and 2050**

DESTINATION STATES	2021		2050		CAGR 2021-2050	
	TONS	MILLION USD	TONS	MILLION USD	TONS	MILLION USD
Indiana	2,616	169.6	7,784	620.4	3.8%	4.6%
Connecticut	1,131	106.4	3,265	368.2	3.7%	4.4%
Massachusetts	651	49.4	1,539	116.7	3.0%	3.0%
California	370	35.9	1,157	133.5	4.0%	4.6%
Pennsylvania	369	34.8	1,195	132.5	4.1%	4.7%
Texas	275	24.2	864	89.6	4.0%	4.6%
Florida	252	29.5	749	105.4	3.8%	4.5%
New York	141	19.5	430	71.5	3.9%	4.6%
Alaska	116	13.7	314	45.3	3.5%	4.2%
New Jersey	100	9.4	289	32.6	3.7%	4.4%
All Others	1,400	137.4	4,328	505.9	4.0%	4.6%
Top 10 Share of Total	81.1%	78.2%	80.3%	77.2%		
<b>Total</b>	<b>7,420</b>	<b>629.7</b>	<b>21,914</b>	<b>2,221.6</b>	<b>3.8%</b>	<b>4.4%</b>

Source: IHS Transearch

### 5.3 INBOUND AIR FREIGHT FLOWS

Table 28 summarizes the top 10 commodities for inbound air cargo by weight in 2021 and 2050. Small Packaged Freight Shipments are at the top of inbound air flows with 46 percent of all inbound air freight in the region in 2021 and with a 50 percent share in 2050. They are forecasted to increase at an annual average rate of 4.0 percent to 2050. The top 10 commodities account for 89 percent of the total tonnage

**Table 28: Inbound Air Flows by Commodity (Tonnage), 2021 and 2050**

STCC4/ STCC2	COMMODITY	2021 TONS	2050 TONS	CAGR 2021-2050
47 11	Small Packaged Freight Shipments	5,200	16,171	4.0%
20 1	Meat and Meat Products	880	1,625	2.1%
46 11	Fak Shipments	796	1,700	2.7%
36	Machinery	721	2,358	4.2%
37	Transportation Equipment	600	1,973	4.2%
38	Instrum, Photo Equipment, Optical Eq	573	1,764	4.0%
35	Machinery	430	1,343	4.0%
22	Textile Mill Products	427	987	2.9%
34	Fabricated Metal Products	207	714	4.4%
30	Rubber or Misc. Plastic	200	368	2.1%
All Others		1,272	3,394	3.4%

Source: IHS Transearch

Table 29 summarizes the top 10 commodities of inbound air cargo by value in 2021 and 2050. Transportation and Electrical equipment commodities are the top two commodities by value in 2021 and in 2050, capturing 44 percent of the total. The top 10 commodities represent 95 percent of the total.

**Table 29: Inbound Air Flows by Commodity (Value), 2021 and 2050**

STCC4/ STCC2	COMMODITY	2021 MILLION USD	2050 MILLION USD	CAGR 2021-2050
37	Transportation Equipment	260.1	856.2	4.2%
36	Electrical Equipment	224.3	733.9	4.2%
38	Instrum, Photo Equipment, Optical Eq	137.7	424.0	4.0%
46 11	Fak Shipments	119.8	255.9	2.7%
39	Misc. Manufacturing Products	104.4	337.1	4.1%
28 31	Drugs	82.5	187.0	2.9%
35	Machinery	62.8	195.9	4.0%
28	Chemicals	19.3	44.2	2.9%
20 1	Meat and Meat Products	13.5	24.9	2.1%
33	Primary Metal Products	13.1	43.0	4.2%

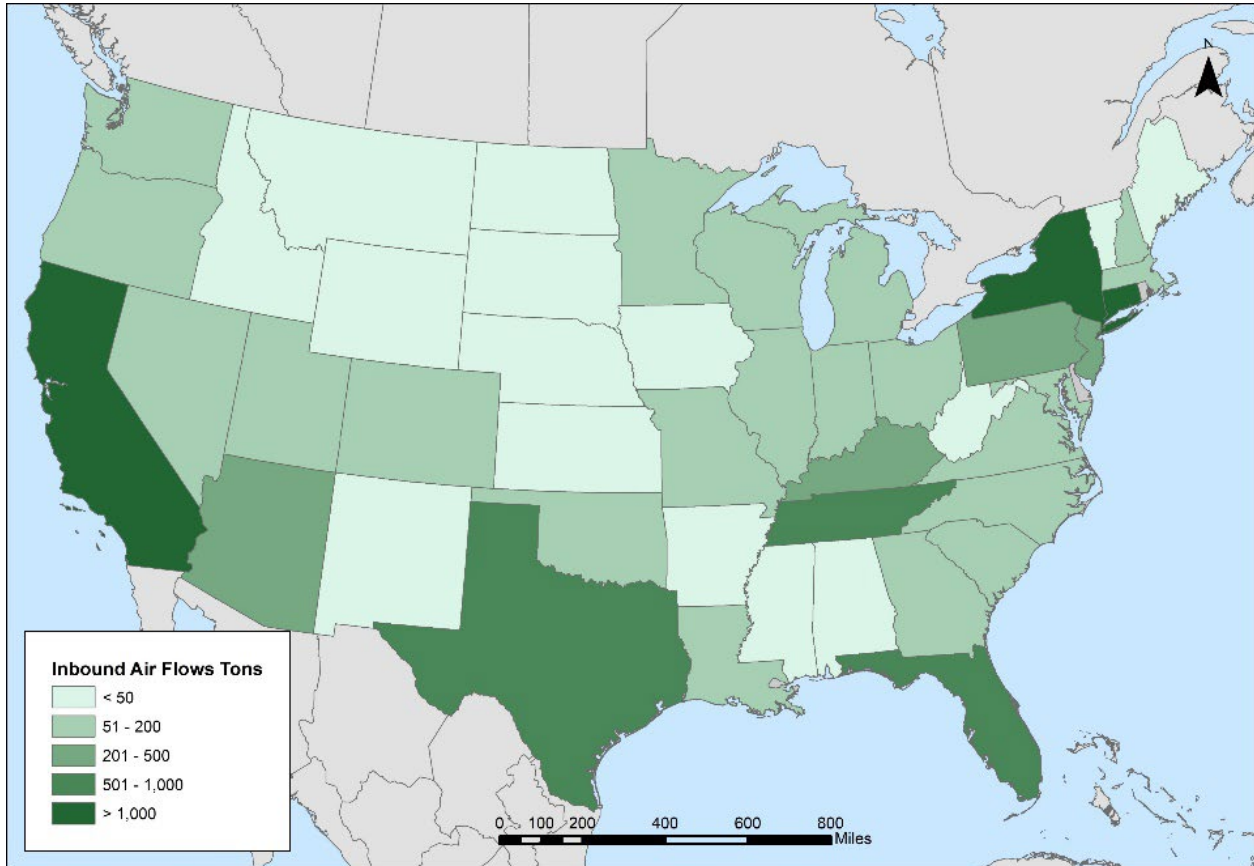


STCC4/ STCC2	COMMODITY	2021 MILLION USD	2050 MILLION USD	CAGR 2021-2050
All Others		58.5	164.7	3.8%

Source: IHS Transearch

Figure 12 illustrates the origin states for air cargo shipped to Rhode Island. California, New York, and Connecticut represent the top inbound states originations for air cargo.

**Figure 12: Origins of Inbound Air Freight by State and Tonnage, 2021**



Source: IHS Transearch

Forecasts of inbound air cargo flows by the state of origin show the top 10 markets are growing at just about the same rate as the whole market, but there is notable state-to-state variation (Table 30). The top 10 account for 70 percent of the tonnage and 66 percent of the value.

**Table 30: Inbound Air Traffic by Origin, 2021 and 2050**

DESTINATION STATE	2021		2050		CAGR 2021-2050	
	TONS	MILLION USD	TONS	MILLION USD	TONS	MILLION USD
California	1,428	139.2	3,548	374.5	3.2%	3.5%
New York	1,372	116.5	2,571	236.9	2.2%	2.5%
Connecticut	1,215	153.3	6,504	615.2	6.0%	4.9%
Alaska	877	12.0	1,577	20.9	2.0%	1.9%
Texas	681	91.0	2,088	304.8	3.9%	4.3%
Florida	632	74.3	1,824	261.3	3.7%	4.4%
Tennessee	588	60.4	1,363	165.5	2.9%	3.5%
Kentucky	536	9.8	801	26.1	1.4%	3.4%
Pennsylvania	309	34.0	570	89.2	2.1%	3.4%
New Jersey	288	38.1	975	87.2	4.3%	2.9%
All Others	3,378	367.5	10,576	1,085.1	4.0%	3.8%
Top 10 Share of Total	70.1%	66.5%	67.4%	66.8%		
<b>Total</b>	<b>11,305</b>	<b>1,095.9</b>	<b>32,397</b>	<b>3,266.8</b>	<b>3.7%</b>	<b>3.8%</b>

## 6 WATER FREIGHT FLOWS

### 6.1 WATER FREIGHT FLOWS OVERVIEW

In 2021 there are 6.6 million tons of freight worth over \$5.7 billion moving in and out of the region (Table 31). Less than 100,000 tons are shipped out of the state. In 2021 inbound tonnage represented 99 percent of total water freight flows. This picture is not expected to show much change by 2050, as inbound will have very modest annual growth of .25 percent per year.

**Table 31: Water Flows, 2021 and 2050**

DIRECTION	2021		2050		TONS CAGR 2021-2050	VALUE CAGR 2021-2050
	THOUSAND TONS	MILLION USD	THOUSAND TONS	MILLION USD		
Outbound	82	47	142	94	1.9%	2.4%
Inbound	6,562	5,605	7,002	15,151	0.2%	3.5%
<b>Total</b>	<b>6,644</b>	<b>5,652</b>	<b>7,144</b>	<b>15,246</b>	<b>0.3%</b>	<b>3.5%</b>

Source: IHS Transearch

### 6.2 OUTBOUND WATER FREIGHT FLOWS

Table 32 summarizes the top 10 water cargo commodities by weight in 2021 and 2050. The top 10 account for over 99 percent of the total tonnage. Metal Scrap amounts to 89 percent of the total.

**Table 32: Outbound Water Flows by Commodity, 2021 and 2050**

STCC4	COMMODITY	2021 THOUSAND TONS	2050 THOUSAND TONS	CAGR 2021-2050
40 21	Metal Scrap	73	128	1.9%
32 71	Concrete Products	2.5	3.5	1.4%
32 41	Portland Cement	2.5	2.7	0.3%
37 11	Motor Vehicles	1.9	4.7	3.2%
37 91	Trailer Coaches	.8	1.1	1.2%
37 14	Motor Vehicle Parts	.5	.9	1.9%
37 15	Truck Trailers	.3	.5	1.4%
37 32	Ships or Boats	.1	.1	1.2%
20 14	Animal By-Products	.1	.3	5.8%
35 31	Construction Machinery	.1	.1	-0.6%

Source: IHS Transearch

When analyzed in terms of value (Table 33), the top 10 outbound commodities account for 99 percent of total outbound freight moved on the water in both 2021 and 2050 (99.4 percent in 2050).

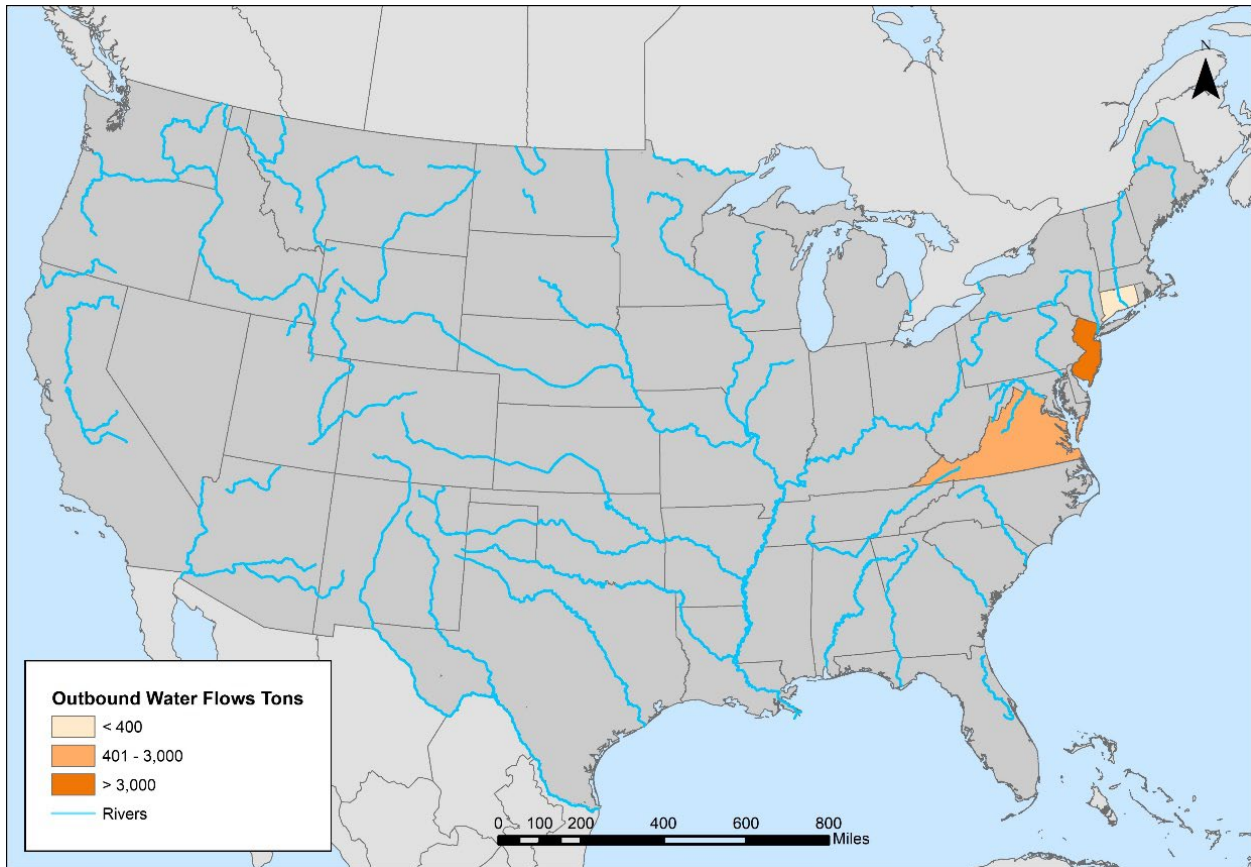
**Table 33: Outbound Water Flows by Commodity (Value), 2021 and 2050**

STCC4	COMMODITY	2021 MILLION USD	2050 MILLION USD	CAGR 2021-2050
37 11	Motor Vehicles	18.9	46.7	3.2%
40 21	Metal Scrap	17.3	30.1	1.9%
37 14	Motor Vehicle Parts	4.6	7.9	1.9%
37 91	Trailer Coaches	2.9	4.1	1.2%
37 15	Truck Trailers	1.5	2.3	1.4%
37 32	Ships or Boats	.6	.8	1.2%
32 71	Concrete Products	.5	.6	1.1%
20 14	Animal By-Products	.1	.6	5.8%
32 41	Portland Cement	.1	.1	0.3%
25 31	Public Building Furniture	.1	.1	2.6%

Source: IHS Transearch

Water freight originating in Rhode Island is destined primarily to Mexico (89 percent of tonnage). Other destinations are New Jersey, Virginia, and Connecticut (Figure 11).

**Figure 13: Destinations of Outbound Water Freight by State and Tonnage, 2021**



Source: IHS Transearch

The forecast of outbound flows is dominated by the traffic to Mexico, projected to grow at 1.9 percent per year (Table 34).

**Table 34: Outbound Water Traffic by Destination, 2021 and 2050**

DESTINATION STATES	2021		2050		CAGR 2021-2050	
	THOUSAND TONS	MILLION USD	THOUSAND TONS	MILLION USD	THOUSAND TONS	MILLION USD
Mexico	73.3	18.1	128.2	31.7	1.9%	2.0%
New Jersey	5.3	28.4	9.1	61.8	1.9%	2.7%
Virginia	3.0	.3	4.1	.5	1.1%	1.5%
Connecticut	.4	.1	.3	.1	-0.3%	-0.5%

Source: IHS Transearch

### 6.3 INBOUND WATER FREIGHT FLOWS

Table 35 summarizes the commodities by weight in 2021 and their expected growth to 2050. Petroleum Refining Products are the dominant volume, with 83 percent of the total. The share will fall to 56 percent by 2050, and it will remain the largest volume commodity despite a 1.1 percent decline in average annual growth.

**Table 35: Inbound Water Flows by Commodity (Tonnage), 2021 and 2050**

STCC4	COMMODITY	2021 THOUSAND TONS	2050 THOUSAND TONS	CAGR 2 2021-2050
29 11	Petroleum Refining Products	5,446	3,930	-1.1%
32 41	Portland Cement	375	505	1.0%
28 18	Misc. Industrial Organic Chemicals	324	1,115	4.4%
37 11	Motor Vehicles	288	1,231	5.1%
32 71	Concrete Products	102	154	1.5%
14 71	Chemical or Fertilizer Mineral	17	39	3.0%
28 12	Potassium or Sodium Compound	7	22	3.9%
33 11	Blast Furnace or Coke	2	4	1.3%

Source: IHS Transearch

Table 36 summarizes the commodities by value in 2021 and 2050.

**Table 36: Inbound Water Flows by Commodity (Value), 2021 and 2050**

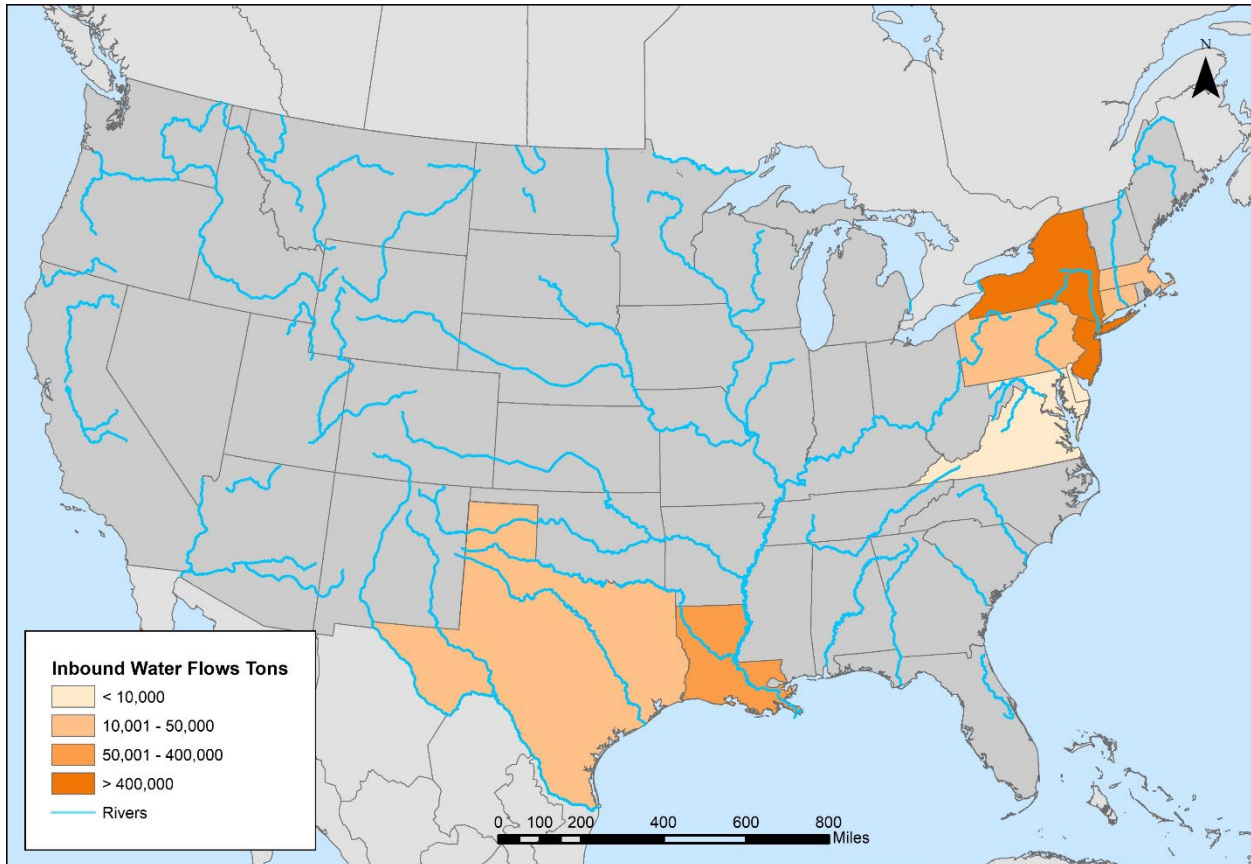
STCC4	MOTOR VEHICLES	2021 MILLION USD	2050 MILLION USD	CAGR 2021-2050
37 11	Motor Vehicles	3,045	13,037	5.1%
29 11	Petroleum Refining Products	2,446	1,771	-1.1%
28 18	Misc. Industrial Organic Chemicals	87	297	4.3%
32 71	Concrete Products	19	28	1.5%
32 41	Portland Cement	3	5	2.1%
33 11	Blast Furnace or Coke	3	4	1.3%

STCC4	MOTOR VEHICLES	2021 MILLION USD	2050 MILLION USD	CAGR 2021-2050
28 12	Potassium or Sodium Compound	3	8	3.9%

Source: IHS Transearch

Figure 14 illustrates the origin states of inland water shipments to Rhode Island. New Jersey generates 50 percent of the tonnage, with 25 percent coming from New Brunswick. By value, New Jersey has a 38 percent share of the total, followed by Mexico at 21 percent and New Brunswick at 17 percent.

**Figure 14: Origins of Inbound Water Freight by State and Tonnage, 2021**



Source: IHS Transearch

Forecasts of inbound water freight flows by state of origin show traffic from Mexico growing fastest, at 3 percent by tons and 5 percent by value (Table 37). The largest volume states of New Jersey and New Brunswick will show declines in volume.

**Table 37: Inbound Water Traffic by Origin, 2021 and 2050**

ORIGIN STATE	2021		2050		CAGR 2021-2050	
	THOUSAND TONS	MILLION USD	THOUSAND TONS	MILLION USD	THOUSAND TONS	MILLION USD
New Jersey	3,235	1,669	2,686	1,308	-0.6%	-0.8%
New Brunswick	1,678	513	1,175	359	-1.2%	-1.2%
New York	454	146	947	259	2.6%	2.6%
Quebec	395	9	517	6	0.9%	-1.2%
Mexico	621	3,190	1,465	13,139	3.0%	5.0%
Louisiana	84	40	108	45	0.9%	0.4%
Texas	22	14	17	11	-0.9%	-0.9%
Massachusetts	20	5	33	7	1.7%	1.5%
Connecticut	20	8	29	10	1.4%	0.8%
Pennsylvania	17	8	13	19	-1.0%	-1.1%
All Others	22	8	20	5	-0.3%	0.6%
Top 10 Share of Total	99.8%	98.9%	99.8%	99.9%		
<b>Total</b>	<b>6,562</b>	<b>5,605</b>	<b>7,002</b>	<b>15,151</b>	<b>0.2%</b>	<b>3.5%</b>

Source: IHS Transearch