TECHNICAL MEMO

NYMTC Regional Freight Plan Update 2015-2040 Interim Plan

Task 2.2.1
Commodity Flow Analysis

NYMTC
NEW YORK METROPOLITAN TRANSPORTATION COUNCIL

REVISED, JANUARY 2014

technical memorandum

Task 2.2.1 Technical Memorandum

Commodity Flow Analysis

Revised, January 30, 2014

Table of Contents

List of Tables

List of Figures

1.0 Introduction

1.1 DATA AND METHODOLOGY

The study area is comprised of ten counties in the State of New York. This area includes Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Rockland, Suffolk and Westchester counties. Throughout the remainder of this report the words "region" or "regional" will refer to this ten-county study area unless specified otherwise.

The data source for the analysis in this report is the IHS Global Insight's TRANSEARCH D database[1] provided by NYMTC for truck, air, water, rail[2] and other freight movements. TRANSEARCH is a database that estimates domestic flows of freight into, out of, and within the 10-county NYMTC Region by annual tonnage, annual value, commodity, trade type (domestic, Canadian or Mexican trade, or other international import or export), origin, and destination. Flows reported in TRANSEARCH are unlinked, which means each portion of a shipment's journey is reported as a separate trip, with no distinguishing indicator to link the trips together.

For example, a shipment of a apparel that is transported from Asia to Port Newark Container Terminal (in Essex County, NJ) by sea, from Port Newark Container Terminal to a distribution center in Hudson County, NJ by truck, and then to a retail store in Nassau County by truck would appear in two lines of the TRANSEARCH database. The international water move from Asia to Essex County, NJ would not be reported (TRANSEARCH includes domestic moves only). The trip from Port Newark Container Terminal to the distribution center would appear as a portion of the annual tonnage and value of international cargo (apparel) moving from Essex County to Hudson County by truck. The trip from the distribution center to the store would appear as a portion of the annual tonnage and value of domestic apparel from Hudson County to Nassau County by truck.

---

[1] NYMTC negotiated a data purchase agreement with IHS Global Insight to acquire the same 2007-2035 TRANSEARCH database package that the Port Authority of New York and New Jersey is using for its planning efforts. Between 2009 and 2011, IHS Global Insight delivered four versions of the TRANSEARCH database to the Port Authority. The ultimate acceptable TRANSEARCH database delivery is referred to as TRANSEARCH D. The TRANSEARCH D package contains data for 54 counties in parts of New York, New Jersey, Connecticut, and Pennsylvania. For the purpose of this study, data for the 10 NYMTC counties have been extracted from the TRANSEARCH D database for analysis.

[2] Surface Transportation Board (STB) Full Carload Waybill Sample was processed by IHS Global Insight for the rail flows.

The base year for this database was 2007 and the forecast year was 2035. Cambridge Systematics proceeded to adjust the base year truck data to better reflect results obtained from other data sources and Origin – Destination surveys done in the region and to extend the forecast year to 2040, to be consistent with the Regional Transportation Plan planning horizon.

The data enhancement process consisted of these six steps:

1. Freight Analysis Framework 3 Adjustment: The TRANSEARCH D database, when compared to previous versions of TRANSEARCH, U.S. Department of Transportation's Freight Analysis Framework Version 3.4 (FAF3.4), and volume data on Hudson River bridges and tunnels, appeared to significantly overestimate eastbound tonnage flows destined to east-of-Hudson counties in New York. To correct this outlier, the Project Team applied a data enhancement process, first developed and tested for the Port Authority of New York and New Jersey's Cross Harbor Freight Program Environmental Impact Statement (EIS). Replicating this process, the Team used FAF3.4 total tonnage to the New York, NY BEA Region[3] as a control total, and TRANSEARCH county-level proportions to disaggregate the FAF3.4 total tonnage to the east-of-Hudson counties. The resulting county-to-county truck trip table was then assigned to the highway network models, and modeled flows on the bridges and tunnels were checked against traffic count data on those facilities in order to confirm that the resulting database produced an eastbound flow that was on the same order of magnitude that FAF3.4 and traffic data suggest.
2. Bronx County Adjustment: One of the most significant geographic distribution discrepancies between TRANSEARCH D and previous versions of TRANSEARCH, as well as the FAF3.4 database, is the 2007 inbound truck tonnage for Bronx County. The other data sources suggest that Bronx County should be the destination for about 10 percent of the inbound truck tonnage destined for counties east of the Hudson River, yet about 2.6 percent of inbound east-of-Hudson tonnage was destined for Bronx County in TRANSEARCH D. The shares of inbound truck tonnage to Fairfield, Kings, and Westchester counties were significantly higher than in previous TRANSEARCH databases and the Port Authority Origin-Destination surveys. This discrepancy was corrected by removing 50 percent of the TRANSEARCH D inbound truck tonnage from Fairfield County, 9 percent from Kings County, and 25 percent from Westchester County, and applying those commodity flows to Bronx County. Shifting

[3] The FAF database does not provide county-level detail. The unit of geography is the U.S. Department of Commerce's Bureau of Economic Analysis (BEA) Metropolitan Areas. The New York, NY BEA area includes the counties of Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Ulster, and Westchester in the State of New York.

flows by these proportions resulted in a geographic and commodity distribution that corresponded reasonably well with the other data sources.

3. FAF3 2035-2040 Forecast Growth Rates: FHWA's FAF3.4 is based in 2007, includes 2011 provisional data, and forecasts through 2040 in five-year increments. In order to obtain 2040 flows, 2035-2040 growth rates by Origin – Destination and Commodity Type were estimated from the FAF3.4 and applied to the 2035 TRANSEARCH data. Adjustments were made to the forecast when the annual projected growth was higher than five percent. In order to lower expectations of Gross Domestic Product (GDP), a five percent cap was set as an upper bound, when calculating the FAF3 Compound Annual Growth Rates (CAGR).

4. The TRANSEARCH database does not include municipal solid waste (MSW) truck flows. To estimate the volume and distribution of MSW trucked from the East-of-Hudson region, an MSW truck trip table was prepared using publicly-available waste generation and disposal information. The New York State Department of Environmental Conservation (NYSDEC) report, "Beyond Waste: A Sustainable Materials Management Strategy for New York State"[4] contains waste generation, transfer station throughput, and disposal location data from 2008 for all of the solid waste planning units in the state, including the 17 planning units covering Nassau, Suffolk and Westchester counties and New York City. These data were used to develop a 2007 county-level trip table for outbound MSW materials that are transported from municipal collections and transfer stations East-of-Hudson to landfills and resource recovery facilities on either side of the Hudson. MSW generation and disposal data published by the New York State Department of Environmental Conservation provided the basis for the development of the 2035 MSW trip table as well. The report established a goal of reducing per capita MSW generation by more than 85 percent (a reduction from 4.1 pounds per person per day to 0.6 pounds per person per day by 2030). The reduced per capita generation rate was applied to the 2040 county level population forecasts from NYMTC to estimate the 2040 MSW generation by county. The distribution of tonnage among destination counties was unchanged from the 2007 trip table. MSW flows from the New York City counties were shifted from truck to rail to account for the New York City Department of Sanitation's (DSNY) goal to shift all outbound MSW to rail

[4] "Beyond Waste: A Sustainable Materials Management Strategy for New York State," New York State Department of Environmental Conservation, 2010, available from http://www.dec.ny.gov/chemical/41831.html (accessed 05/01/2012).

or a combination of barge and rail.[5] Based on the existing mode split and trends, the 2040 MSW trip table assumes outbound flows of MSW from Nassau, Suffolk, Westchester, Rockland and Putnam counties will continue to travel primarily by truck.

5. Rest of New York Adjustment: There was a large discrepancy between the truck volumes in TRANSEARCH and the FAF3.4 for the inbound and outbound truck volumes between the NYMTC region and the rest of the New York State. TRANSEARCH suggested that 52 million tons moved by truck in 2007 and the FAF3.4 showed 18 million tons for the trade between the New York FAF Zone[6] and the rest of the State. After comparing these volumes to truck counts on the major truck routes that connect the NYMTC region and upstate New York (e.g., Tappan Zee Bridge, the George Washington Bridge, NY-17, I-81, and I-87) the TRANSEARCH 2007-2040 was adjusted to match a value equivalent to the FAF3 truck volumes plus 27 percent, which is the relative difference between the tonnage grand total in both datasets.
6. Vermont Adjustment: The inbound and outbound truck volumes between the NYMTC region and Vermont were found to be very high in the TRANSEARCH data (about 11 million tons in 2007). FAF3.4 suggests that truck volumes to/from Vermont in 2007 should be 95 percent lower than what TRANSEARCH showed. The TRANSEARCH 2007-2040 was adjusted to reduce the truck volumes from/to Vermont and the NYMTC region and match a value equivalent to the FAF3 truck volumes plus 27 percent, which is the relative difference between the tonnage grand total in both datasets.
7. Refined Petroleum Products Adjustment: Analysis of the flows of refined petroleum products in the TRANSEARCH database led to the discovery of an unrealistically-high reported volume of refined petroleum products moving outbound from the NYMTC region to other parts of the United States (84 percent of the 33 million tons of refined petroleum products were said to be moving outbound), primarily by water (94 percent water mode share). Unable to reconcile this finding with existing refining capacity in the NYMTC region, an adjustment was developed to balance the flow of inbound, outbound, and intra-regional flows of refined petroleum to better match the patterns of distribution and consumption

[5] "Comprehensive Solid Waste Management Plan," New York City Department of Sanitation, 2006, available from: http://www.nyc.gov/html/dsny/html/swmp/swmp-4oct.shtml (accessed 05/01/2012).

[6] The New York FAF Zone, i.e., the NY part of the New York NY-NJ-CT-PA CSA includes the ten counties in the NYMTC region and Dutchess, Orange and Ulster counties.

of these products in the region. Consulting with USDOT, an adjustment was made using FAF3 to provide the total tons, direction split, and mode split, and using TRANSEARCH to disaggregate the regional FAF3 data to the county level.

1.2 KEY FINDINGS

A summary of key findings and trends in the regional commodity flow profile are presented below. More detailed analysis follows in Section 2.0.

Commodity Flow Summary

- More than 405 million tons of inbound, outbound, intraregional, and through freight moved over the NYMTC region's transportation network in 2007. Thirty-six percent of this traffic was inbound, 17 percent was outbound, 18 percent was intraregional, and 29 percent was through traffic.
- By 2040, inbound, outbound, intraregional and through freight is expected to increase to 592 million tons - a 46 percent increase. Forty percent of this traffic is expected to be inbound, 15 percent outbound, 15 percent intraregional, and 30 percent through traffic.
- When measured by weight, in 2007, 91 percent (368 million tons) of the regional freight moved by truck, 5 percent (22 million tons) by water, 2.5 percent (10 million tons) rail, and less than 1 percent (3 million tons) by each air and other modes.
- In 2040, the freight transportation mode split is expected to change slightly, with water declining in share from 5 percent to 3 percent, and other modes increasing in share from 1 percent to 3 percent.
- When measured by value, in 2007, $1.34 trillion of inbound, outbound, intraregional, and through freight moved in the NYMTC region. Ninety-eight percent ($1.32 trillion) moved by truck, 1 percent ($11 billion) by water, 1 percent ($9 billion) by rail, and less than 1 percent ($7 billion) by air and other modes.
- By 2040, the total value of the inbound, outbound, intraregional, and through freight is expected to increase 77 percent to $2.38 trillion. Truck will continue to carry 98 percent ($2.34 trillion) of freight by value; rail, water, and air will each carry about 0.5 percent of freight by value (between $12 and $13 billion each), and other modes will carry 0.2 percent ($4 billion) by other modes.
- Kings County (Brooklyn) is the largest freight generator and receiver within the region. In 2007, it accounted for 26 percent (18 million tons) of all outbound tonnage and nearly 22 percent (31 million tons) of all inbound tonnage. Kings County is projected to account for 32 percent (27 million tons) of the 2040 outbound tonnage and 21 percent (48 million tons) of the inbound tonnage in the region.

- Bronx, New York, Queens, and Suffolk counties each received 12 to 14 percent (17 to 20 million tons) of the incoming freight to the region in 2007. By 2040, Suffolk County is expected to account for 15 percent of inbound tons (34 million tons), Bronx and New York counties are expected to account for 13 percent (29 to 30 million tons) each, and Queens County is expected to receive 12 percent (28 million tons) of the region's inbound freight in 2040.
- Eighty-four percent of the tonnage moved into, out of, within, or through the study region traveled less than 500 miles in 2007, and this share is expected to be 80 percent in 2040.

Top Commodities

- The top five commodity groups moving inbound, outbound and intraregionally in both 2007 and 2040 are secondary traffic (defined here as freight flows to and from distribution centers or via intermodal facilities and typically represents consumer goods), nonmetallic ores and minerals, petroleum and coal products, food and kindred products, and clay, concrete, glass and stone products. Together they account for more than 73 percent of total commodities by weight both currently and in the future.

Top Trading Partners

- Domestic freight constituted 87 percent of the tonnage moving into, out of, within and through the region in 2007. By 2040, domestic freight is expected to account for 80 percent of the region's freight tonnage. International trade related (including NAFTA trade related) freight tonnage moving into, out of, within and through the region is expected to grow at a significantly higher rate than domestic freight tonnage.
- The top three trading partners of the study region – Northern New Jersey, Rest of New York State, and the South Atlantic states – account for about 60 percent of total inbound and outbound freight flows by weight in 2007, and will make up about 54 percent of the region's trade volume by 2040.

2.0 Commodity Flow Analysis

2.1 OVERVIEW

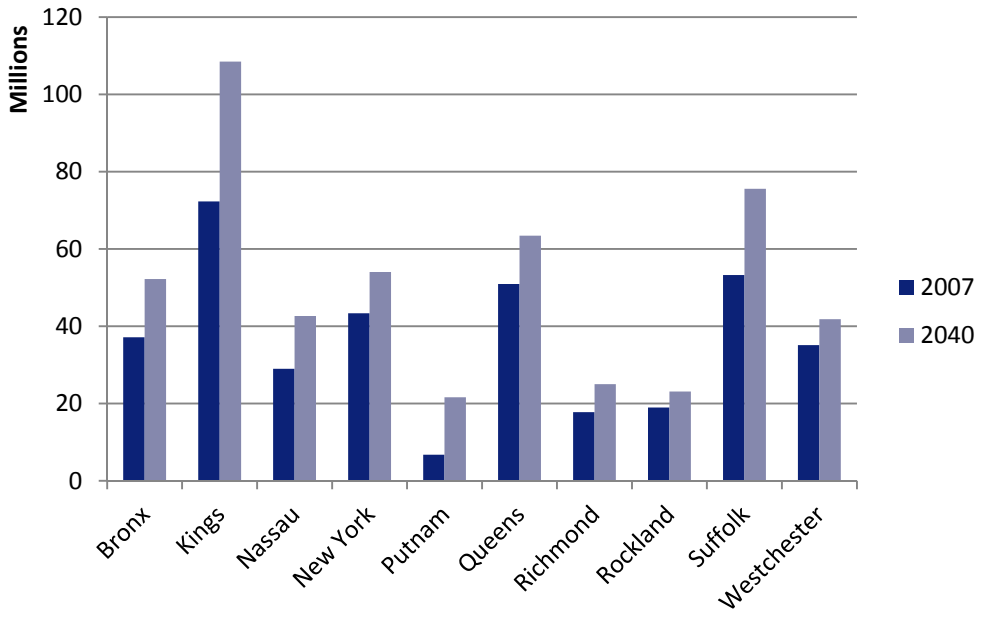
In 2007, 405 million tons of freight moved into, out of, within, or through the NYMTC region. This corresponded to 2 percent of the freight tonnage generated in the United States (18.9 billion tons). By 2040, freight tons in the study area are expected to increase 46 percent to 592 million, consistent with the projected national growth by 2040 (51 percent increase to 29 billion tons). Figures 2.1 and 2.3 show the expected freight tonnage growth from 2007 to 2040 for the ten counties in the study region, and for the country respectively.

Measured by value, in 2007 $1.3 trillion worth of freight moved into, out of, within, or through the NYMTC region, accounting for 8 percent of the $16.7 trillion worth of freight moved in the United States. The NYMTC region's freight worth is expected to grow 77 percent to $2.4 trillion by 2040. The national freight worth is expected to grow 136 percent to $39 trillion. Figures 2.2 and 2.4 present the regional and national freight value growth respectively.

In 2007, Kings County was the jurisdiction with the highest level of freight tonnage accounting for 72 million tons of the freight moving into, out of and within the region. Queens County and Suffolk County followed, each accounting for 50 million tons of the inbound, outbound and intraregional freight activity. By 2040, Kings County is expected to remain the top freight generator in the region, followed by Suffolk County and Queens County.

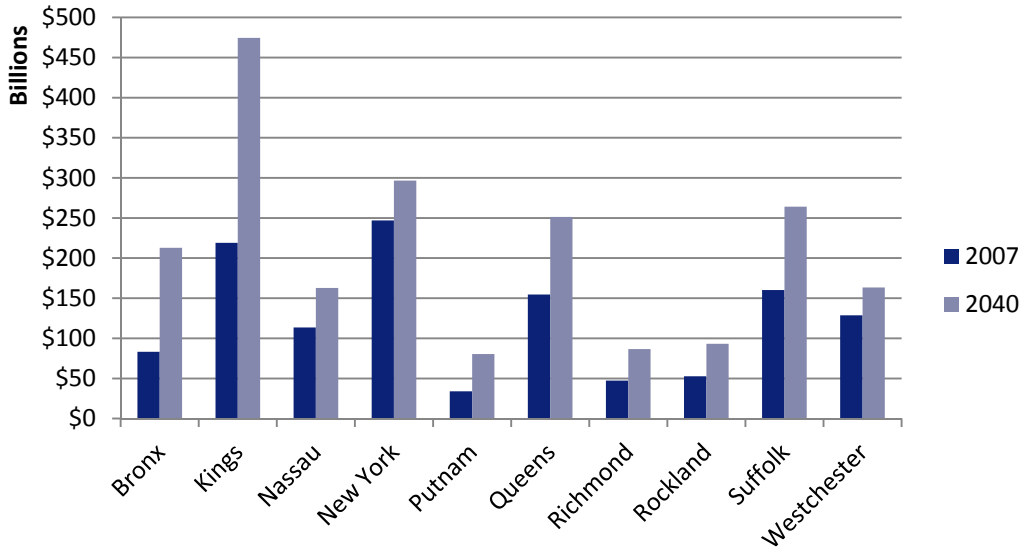
Measured in value, in 2007 New York County had the highest level of freight activity with $247 billion originating or terminating in the County. Kings County followed with $219 billion. By 2040, Kings County is expected to surpass New York County with a 117 percent growth to $474 billion. New York County is expected to grow moderately, 20 percent to $297 billion.

Figure 2.1 Change in Freight Tonnage by County
2007-2040



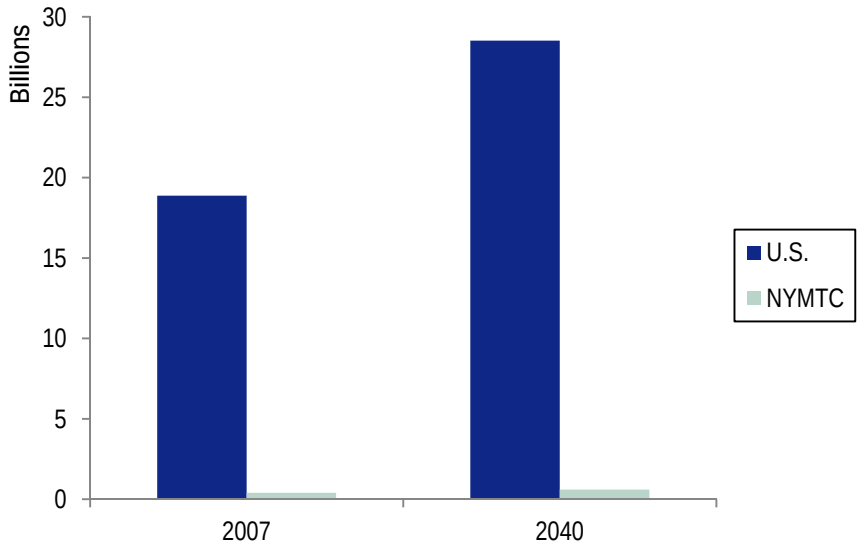
Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, and 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

Figure 2.2 Change in Freight Value by County
2007-2040



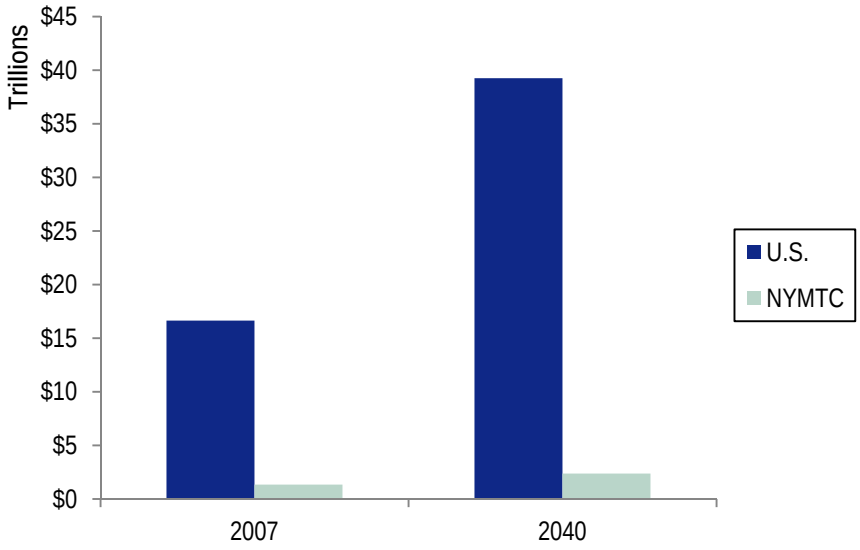
Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, and 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

Figure 2.3 Change in National Freight Tonnage
2007-2040



Source: FHWA's Freight Analysis Framework v3.4 (FAF3.4), Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, and 2035-2040 FAF3.4 Forecast.

Figure 2.4 Change in National Freight Value
2007-2040



Source: FHWA's Freight Analysis Framework v3.4 (FAF3.4), Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, and 2035-2040 FAF3.4 Forecast.

2.2 UNROUTED DIRECTIONAL ANALYSIS

In 2007, 405 million tons of freight moved into, out of, within, or through the study region. Table 2.1 displays freight flows by weight and direction in 2007 and 2040, and Figure 2.1 graphically displays the proportion of regional freight tonnage by direction for 2007 and 2040. Approximately 149 million tons (36 percent) traveled inbound, 69 million tons (17 percent) traveled outbound, and 72 million tons (18 percent) traveled from one point within the region to another point within the region. Through freight accounted for 112 million tons or nearly 29 percent of the total.

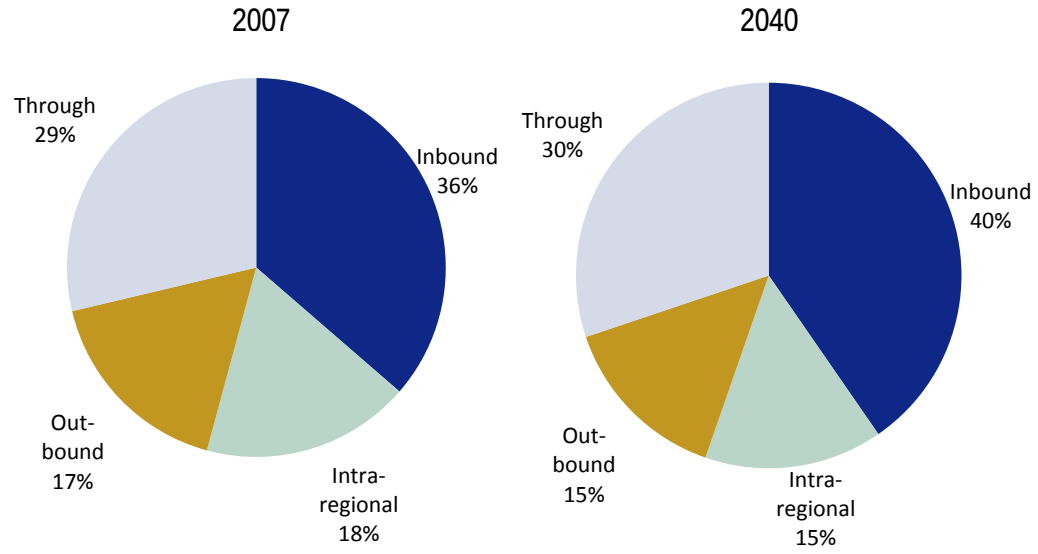
By 2040 these flows are expected to grow 46 percent amounting to 592 million tons. Inbound flows are expected to grow 62 percent to 239 million tons. Outbound shipments are expected to increase 24 percent to 86 million tons. Intraregional freight is estimated to increase 22 percent to 88 million tons, and through freight in expected to increase to 178 million tons by 2040, a 53 percent increase.

Table 2.1 Total Tonnage by Direction
2007-2040, Tons in Thousands

Direction	2007	2040	% Change (2007 to 2040)
Inbound	149,417	242,273	62%
Intraregional	73,314	89,714	22%
Outbound	70,157	87,154	24%
Through	112,371	172,194	53%
Total	405,254	591,336	46%

Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, and 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

Figure 2.5 Direction of Total Freight Flows by Weight
2007-2040



Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, and 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

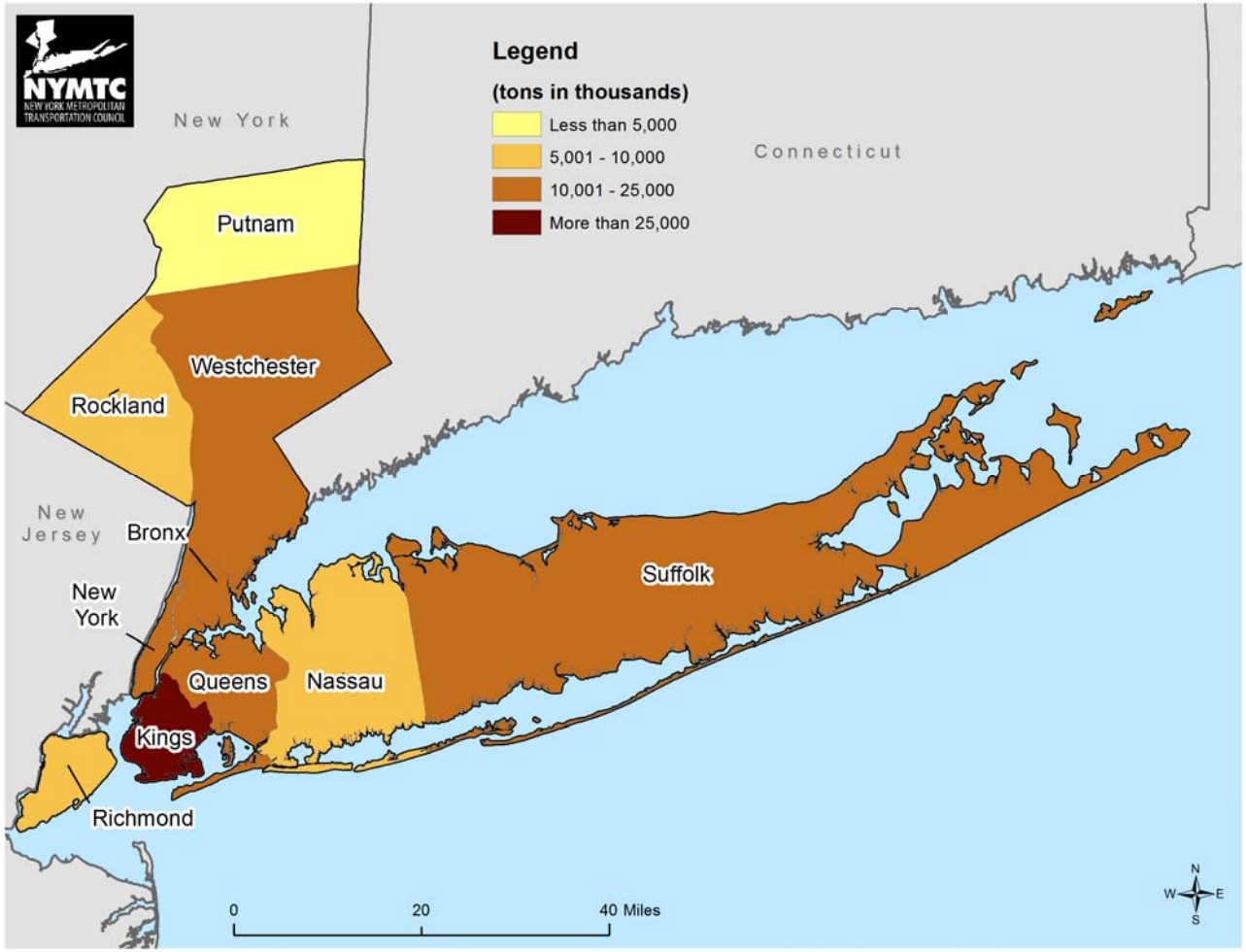
Inbound Freight

Terminating Counties for Total Inbound Freight

Figures 2.6 and 2.7 graphically present, by county, the distribution of total inbound tonnage for 2007 and 2040. Over the next thirty years Kings County is expected to remain the top county in the region receiving freight shipments, accounting in 2007 for 22 percent, or 31 million tons, of all inbound tonnage to the region and in 2040 for 21 percent, or 48 million tons of the inbound freight activity. Bronx, New York, Queens, and Suffolk counties each received 12 to 14 percent (17 to 20 million tons) of the incoming freight to the region in 2007. By 2040, Suffolk County is expected to account for 15 percent of inbound tons (34 million tons), Bronx and New York counties are expected to account for 13 percent (29 to 30 million tons) each, and Queens County is expected to receive 12 percent (28 million tons) of the region's inbound freight in 2040.

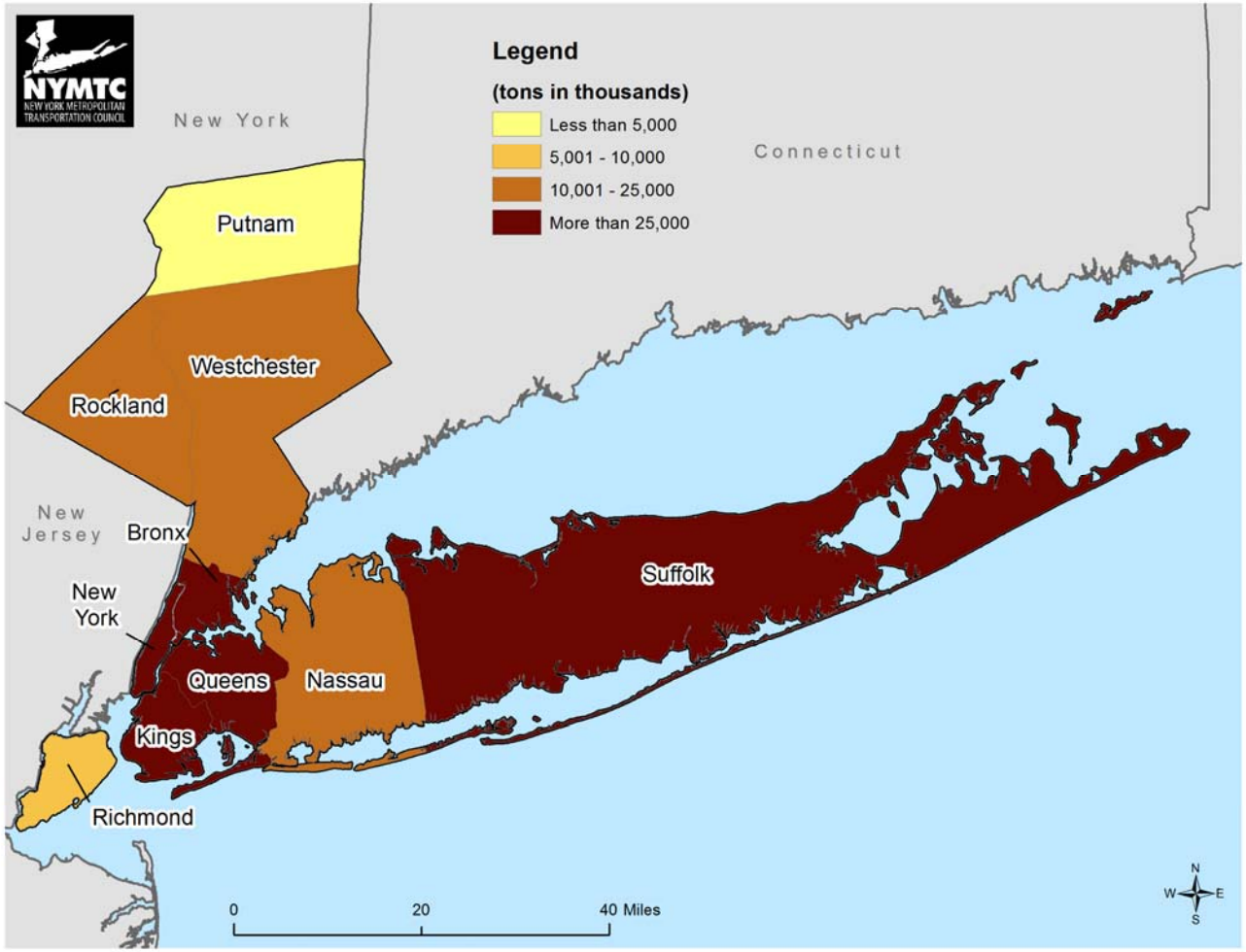
Eighty-three percent of the inbound freight tonnage moved by truck in 2007, and over the next thirty years truck shipments are expected to continue to make up the majority of the inbound movements by weight (86 percent in 2040). A relatively large proportion of these shipments are nonmetallic ores and minerals, petroleum and coal products, secondary traffic, food and kindred products, chemicals and allied products, and clay, concrete, glass and stone products.

Figure 2.6 Terminating Counties for Total Inbound Freight by Weight
2007



Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, and 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

Figure 2.7 Terminating Counties for Total Inbound Freight by Weight
2040



Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, and 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

Outbound Freight

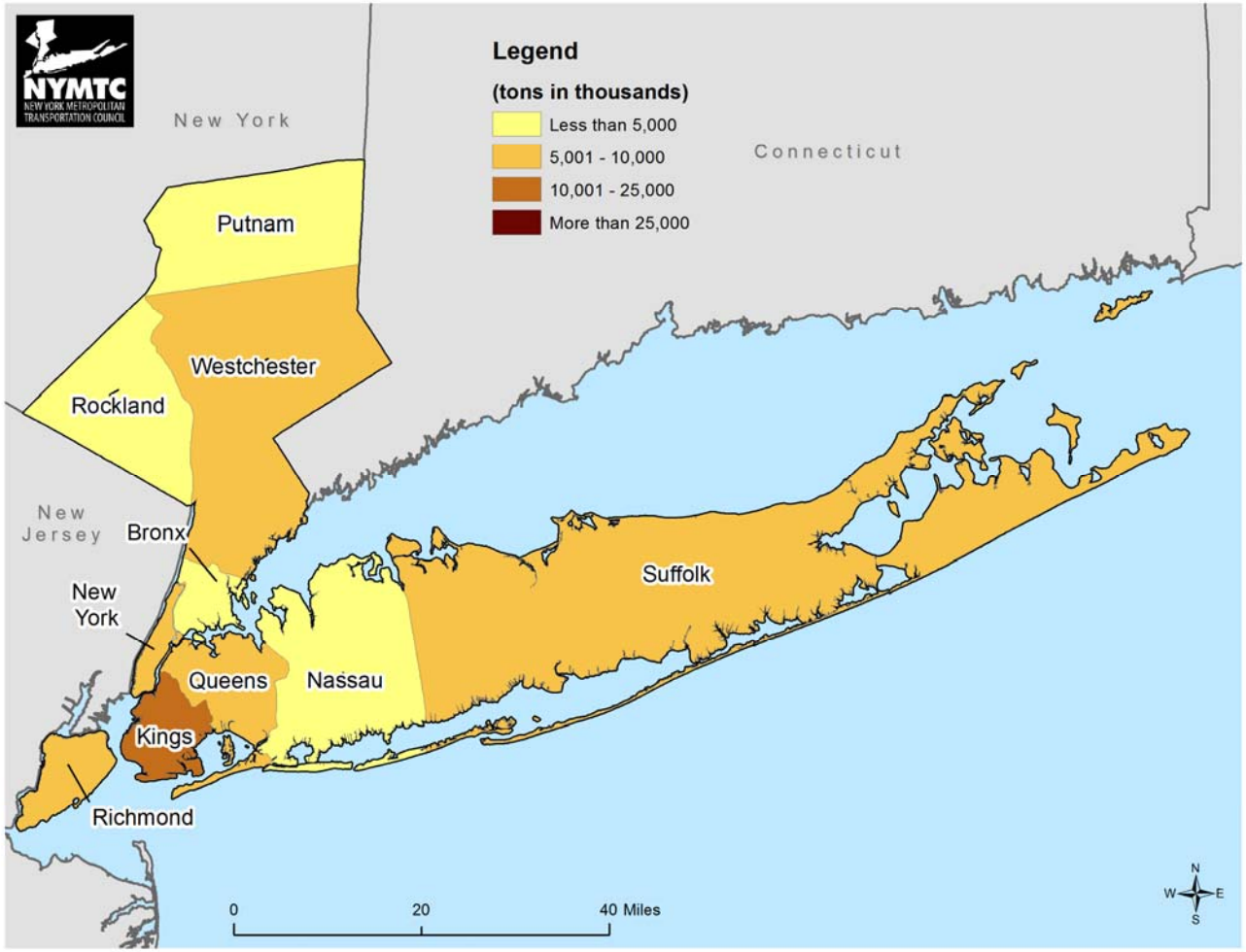
Originating Counties for Total Outbound Freight

Figures 2.8 and 2.9 graphically present, by county, the distribution of total outbound tonnage for 2007 and 2040 respectively. Kings County accounted for 26 percent (18 million tons) of outbound freight tonnage originating from the region in 2007 and by 2040 this share is expected to increase to 32 percent (27 million tons). Queens County is next accounting for 13 percent (9 million tons) of the outbound freight tonnage in 2007. By 2040 Queens' share of the region's freight production is projected to decrease to 10 percent (9 million tons). Westchester County accounted for 12 percent (8 million tons) of the region's outbound tonnage in 2007, and its share is expected to decrease to 11 percent (9 million tons) by 2040. Richmond County and Suffolk County each represented 10 percent (7 million tons) in 2007; this share is expected to remain at 10 percent (9 million tons) for Richmond County, and Suffolk County's share is expected to decline to 9 percent (8 million tons) of the region's 2040 outbound tonnage.

The remaining share of the outbound freight movements in 2007 is split 9 percent from New York County, 7 percent from Nassau, 6 percent from Bronx, 5 percent from Rockland, and 1 percent from Putnam County. By 2040 Putnam County's share of NYMTC's freight production is expected to increase to 5 percent, New York County is expected to account for 8 percent of outbound tonnage. Bronx and Rockland counties are each likely to produce 4 percent and 3 percent of the region's outbound freight, respectively.

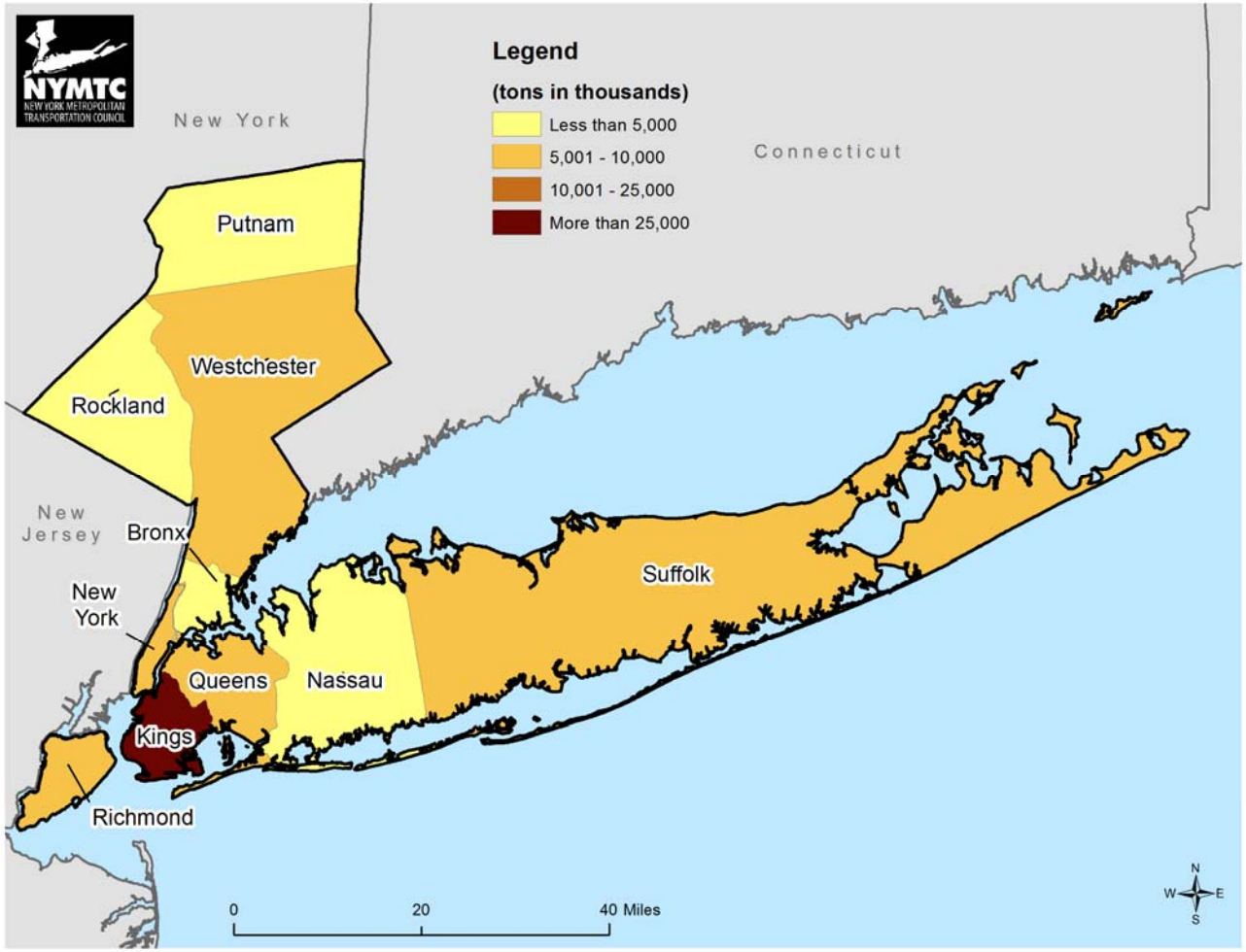
In 2007, 88 percent of the Region's outbound freight tonnage moved by truck, and 9 percent moved by water. Most of the outbound shipments consisted of secondary traffic (28 percent), and goods in the petroleum and coal products commodity group (23 percent). By 2040, shipments of these two commodity groups are expected to make up the 48 percent of the outbound movements by weight.

Figure 2.8 Originating Counties for Total Outbound Freight by Weight
2007



Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, and 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

Figure 2.9 Originating Counties for Total Outbound Freight by Weight
2040



Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, and 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

Intraregional Freight

To understand more about the intraregional freight moves, a ranked list of origin-destination pairs was developed for the current and future intraregional tonnage (see Table 2.2 below). In 2007, the top intraregional origin-destination movements by weight were intra-county moves in Suffolk County (9 percent of the intraregional moves, or 7 million tons). This is mostly due to intra-county truck shipments of nonmetallic ores and minerals, mostly gravel and sand, and some broken stone and riprap. By 2040, these intra-county shipments are expected to increase 29 percent (to 9 million tons). The decline in freight tonnage in some of the intraregional moves highlighted in Table 2.2 is mostly due to an expected decrease in nonmetallic ores and minerals that affects some of the top origin-destination pairs (Suffolk to Queens, Nassau to Queens, Rockland to Westchester, and Suffolk to Nassau). Additionally, intra-county moves in New York County of secondary traffic (warehouse and distribution center) and printed matter (newspapers and periodicals) are expected to decrease.

Overall, 99 percent of the intraregional freight is handled by trucks and a relatively large proportion of the tonnage of these shipments are secondary traffic, nonmetallic ores and minerals, and clay, concrete, glass and stone products. Over the next thirty years these shipments are expected to continue to make up the majority of the intraregional movements by weight.

Table 2.2 Top 10 Origin-Destination Pairs for Intraregional Traffic by Weight
2007-2040, Tons in Thousands

Origin	Destination	2007	2040	% Change (2007 to 2040)
Suffolk County	Suffolk County	6,817	8,773	29%
Suffolk County	Queens County	3,429	2,942	-14%
Nassau County	Queens County	3,006	2,621	-13%
Suffolk County	Kings County	2,745	3,541	29%
Rockland County	Westchester County	2,677	790	-71%
Queens County	Kings County	2,428	2,911	20%
Kings County	Kings County	2,395	4,386	83%
Kings County	Queens County	2,191	3,797	73%
Suffolk County	Nassau County	2,075	1,888	-9%
Suffolk County	New York County	1,916	2,285	19%
All Others		43,634	55,781	28%
Total		73,314	89,714	22%

Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, and 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

2.3 MODE SHARE ANALYSIS

Regional Mode Share

Table 2.3 and Figure 2.10 display the breakdown of total freight tonnage by mode for 2007 and 2040. Trucks are the dominant mode of freight transportation throughout the region. The NYMTC region is dependent on trucks for movement of most of its freight. About 91 percent of all freight tonnage in 2007 was moved by truck. Water is the second most common mode transporting more than 5 percent of the freight tonnage in 2007. Rail freight follows, accounting for 2.5 percent of the tonnage in 2007. The data show that 88 percent of the rail tonnage was carried in railcars (carload) and 12 percent in intermodal containers (which for this statistic include both containers and truck trailers moved on flat cars usually carrying miscellaneous mixed shipments), all of which is moving through the NYMTC Region via the River Line in Rockland County. Air cargo and other modes account for less than 1 percent of the freight tonnage.[7] These mode shares are expected to change slightly by 2040, with water's mode share decreasing to 3 percent, and the share of tons moved by other modes increasing to 3 percent of all tons moved.

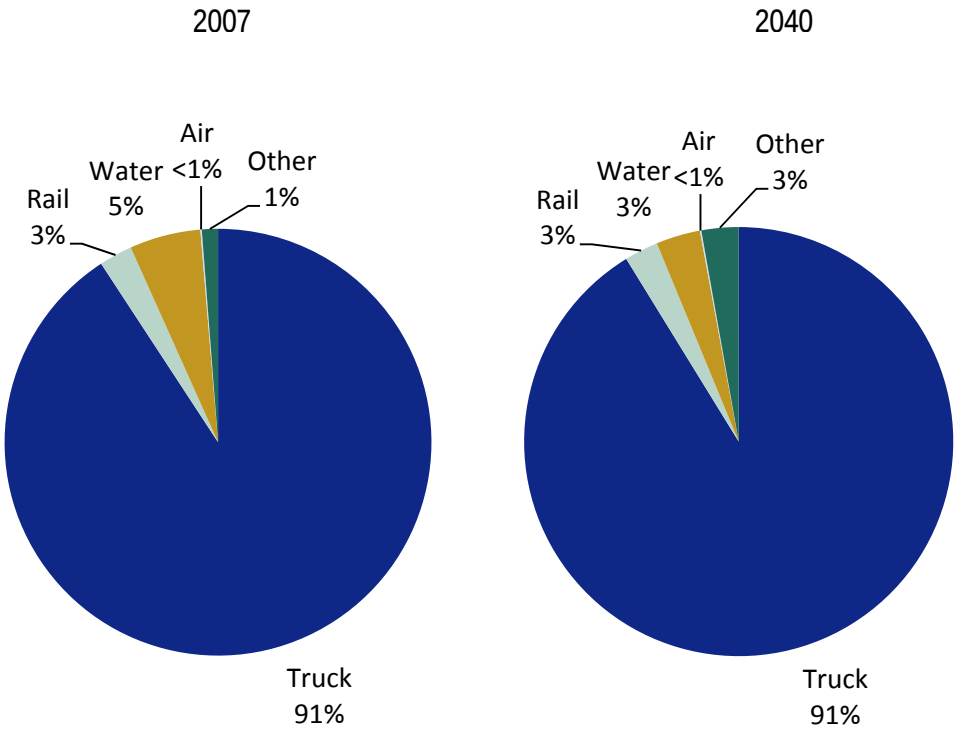
Table 2.3 Total Tonnage by Mode
2007-2040, Tons in Thousands

Mode	2007	2040	% Change (2007 to 2040)
Truck	367,838	539,654	47%
Rail	10,233	15,066	47%
Carload	9,053	11,902	31%
Intermodal	1,181	3,163	168%
Water	21,831	19,749	-10%
Air	420	634	51%
Other	4,932	16,508	235%
Total	405,254	591,611	46%

Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, and 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

[7] About 80 percent of the tonnage moving by "other" modes consists of crude petroleum, natural gas, and gasoline (STCC 13) moving into the NYMTC Region from Alberta, Canada. This commodity travels primarily by pipeline. Tons of STCC 13 moving by a combination of pipeline and water are reported as traveling by water in TRANSEARCH.

Figure 2.10 Mode Share by Weight
2007-2040



Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, and 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

County Mode Share

Table 2.4 presents the current and future mode share for each county in the NYMTC region. Overall, trucks move most of the counties' freight tonnage. Kings County with a 78 percent truck share in 2007 was the only county with a smaller truck share than the regional share of 91 percent. Most of NYMTC's waterborne freight originates or terminates in Kings County. In 2007, 21 percent of the freight tonnage originating or terminating in Kings County moved by water. Bronx County had the largest rail mode share in the region (4 percent). Queens County had the largest air cargo mode share in the region (1 percent). By 2040, "other" modes, which include pipeline, parcel, and use of multiple modes, are expected to achieve higher shares of the freight volume in every county except Westchester. The expected change by 2040 in the truck mode share of Kings County is due to more aggressive growth in food and secondary traffic (commodities moving to or from warehouses), which are transported primarily by truck. The projected decline of water mode share in Kings County is driven by a projected decline in outbound petroleum or coal products, much of which move by water. Inbound waste and scrap materials, nonmetallic minerals, and refined petroleum or coal products compose the majority of projected waterborne tons in Suffolk County by 2040.

Table 2.4 County Mode Share by Weight
2007-2040

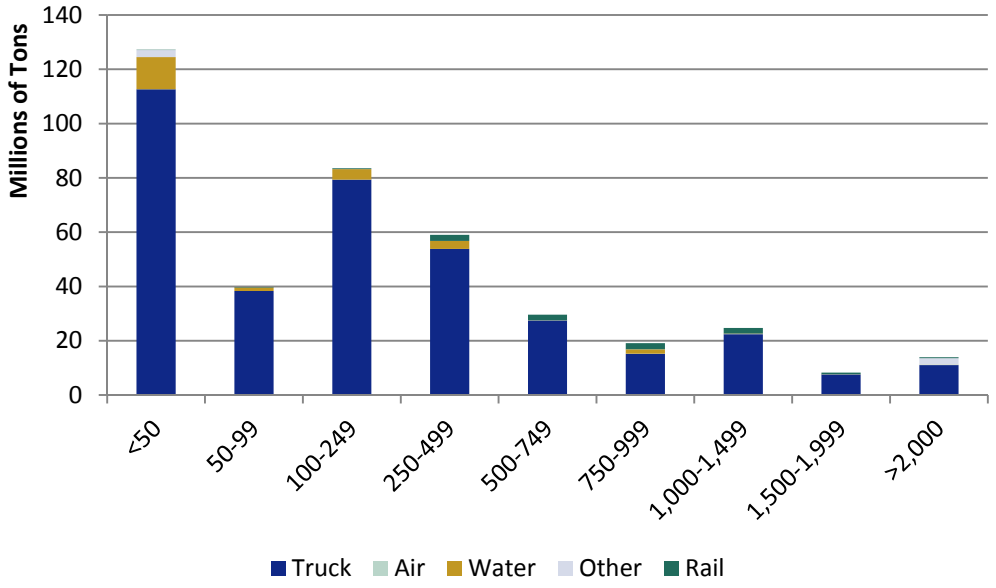
	2007					2040				
County	Truck	Water	Rail	Air	Other	Truck	Water	Rail	Air	Other
Bronx	95%	0%	4%	0%	0.4%	92%	0.2%	5%	0%	3%
Kings	78%	21%	0.8%	0%	0.7%	88%	9%	2%	0%	2%
Nassau	98%	0.1%	2%	0%	0.7%	95%	0.3%	1%	0%	4%
New York	93%	6%	0.1%	0%	1%	90%	6%	0.4%	0%	4%
Putnam	99%	0%	0%	0%	1%	93%	0.4%	0%	0%	7%
Queens	91%	7%	0.9%	1%	0.4%	90%	4%	2%	1%	3%
Richmond	97%	0%	0.9%	0%	2%	93%	0.3%	1%	0%	6%
Rockland	97%	0%	3%	0%	0.8%	91%	0.4%	2%	0%	7%
Suffolk	95%	4%	1%	0%	0.4%	89%	7%	1%	0%	2%
Westchester	92%	0%	0.3%	0%	7%	95%	0.2%	0.4%	0%	4%

Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, and 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast

Average Haul Length by Mode

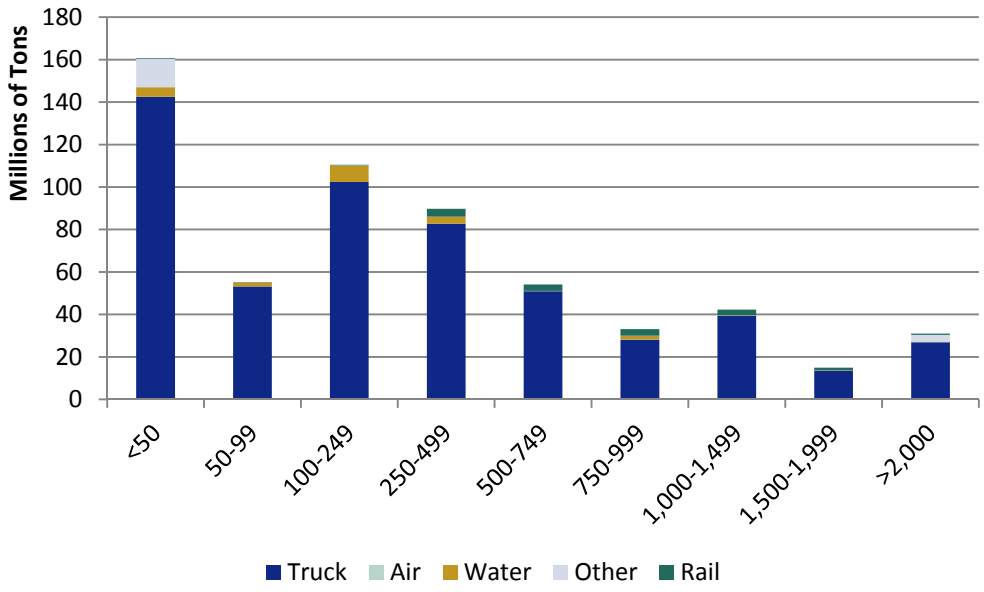
Figures 2.11 and 2.12 show how distance affects the freight tonnage mode share in 2007 and 2040 respectively. Eighty-four percent of the tonnage moved into, out of, within, or through the study region traveled less than 500 miles, and this share is expected to be 80 percent in 2040. Trucks carry the majority of the freight tonnage across all mileage segments. Domestic water's share of the freight tonnage moved in the region is largest for shipments traveling less than 50 miles (9 percent of all tons traveling less than 50 miles); these are predominantly intraregional moves and moves between the NYMTC region and Essex, Hudson and Middlesex counties in New Jersey. Rail's share of tonnage increases as distance increases reaching its peak with hauls between 750 and 999 miles long, where rail carries 12 percent of the tonnage. By 2040, assuming continuation of current economics, public policies, and relatively balanced investments across the modes, distribution of tons by distance is expected to remain similar. Truck is expected to achieve a slight increase in moves over 500 miles. Waterborne is expected to lose mode share for trips under 50 miles (9 percent in 2007 compared to 3 percent in 2040), and gain share among trips 100-249 miles long (5 percent in 2007 compared to 7 percent in 2040). Other modes are expected to increase their share among trips under 50 miles (2 percent in 2007 compared to 8 percent in 2040), but lose share among trips over 2,000 miles (16 percent in 2007 versus 10 percent in 2040).

Figure 2.11 Mode Share by Distance
In tons, 2007



Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast, and Oak Ridge National Laboratory (ORNL) Distance Matrix.

Figure 2.12 Mode Share by Distance
In tons, 2040



Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast, and Oak Ridge National Laboratory (ORNL) Distance Matrix.

2.4 REGIONAL COMMODITIES

Top Commodities – Inbound, Outbound, and Intraregional

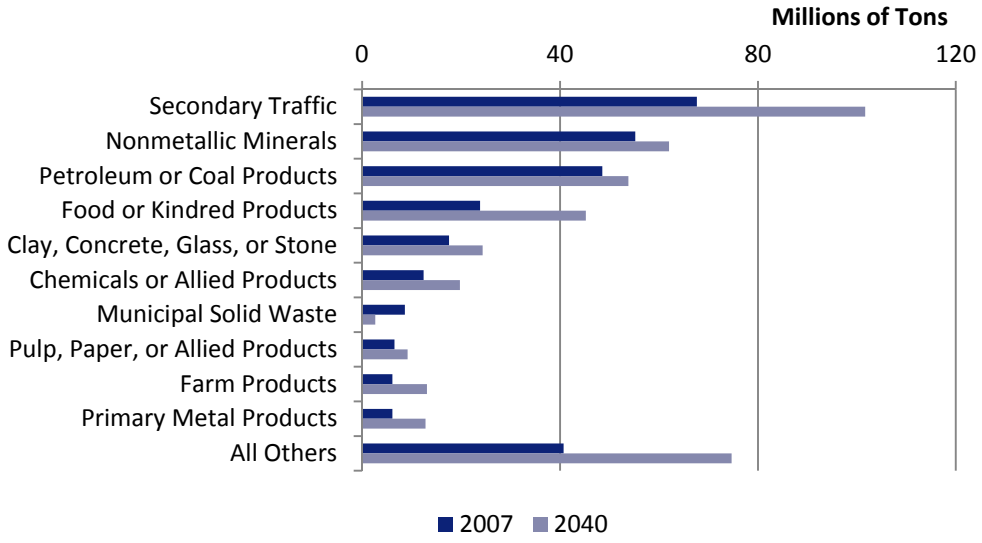
The top commodities by weight transported into, out of and within the region via all modes in 2007 and the 2040 forecast are shown in Table 2.5 and Figure 2.13. The top five commodities in both 2007 and 2040 are secondary traffic (defined here as freight flows to and from distribution centers or via intermodal facilities, typically representing consumer goods), nonmetallic minerals, petroleum and coal products, food and kindred products, and clay, concrete, glass and stone products. Combined, these commodities account for nearly 73 percent of the total inbound, outbound and intraregional freight in 2007 and in 2040.

Table 2.5 Top 10 Commodities by Weight – Inbound, Outbound, and Intraregional
2007-2040

Commodity	STCC2	2007	2040	% Change (2007 to 2040)
Secondary Traffic	50	67,654	101,687	50%
Nonmetallic Minerals	14	55,218	62,041	12%
Petroleum or Coal Products	29	48,563	53,835	11%
Food or Kindred Products	20	23,832	45,217	90%
Clay, Concrete, Glass or Stone	32	17,575	24,369	39%
Chemicals or Allied Products	28	12,249	19,777	59%
MSW	51	8,651	2,673	-69%
Pulp, Paper or Allied Products	26	6,558	9,206	40%
Farm Products	01	6,133	13,091	113%
Primary Metal Products	33	6,116	12,826	110%
All Others		40,735	74,694	83%
Total		293,464	419,417	43%

Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

Figure 2.13 Top 10 Commodities by Weight – Inbound, Outbound and Intraregional
2007-2040



Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

Top Through Commodities

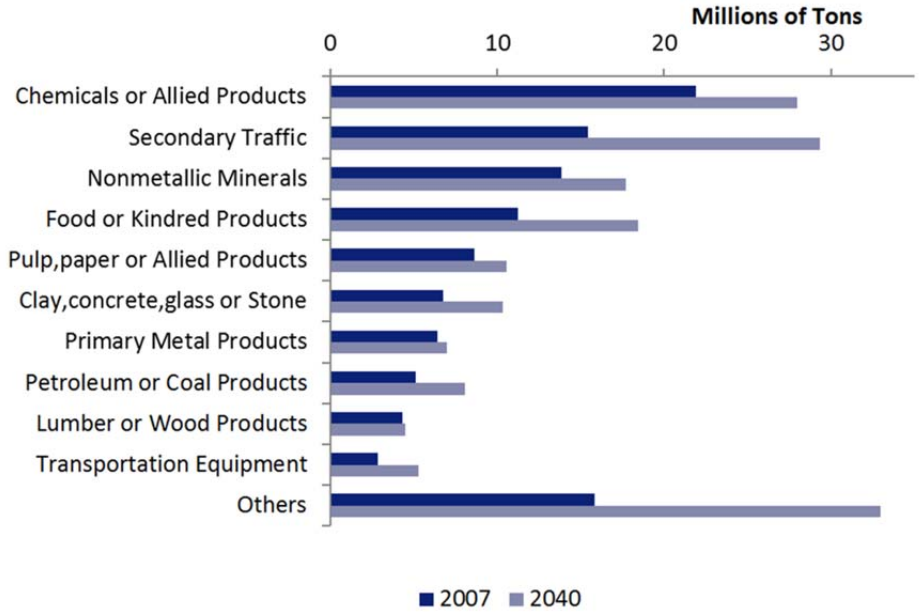
Through shipments in 2007 totaled 112 million tons, a 28 percent share of the freight tonnage moved in the region, and are expected to grow to 172 million tons by 2040, a 53 percent increase. The top through commodities in 2007 and the expected future trends by 2040 are detailed in Table 2.6, and displayed graphically in Figure 2.14. The top 10 commodities represent over 80 percent of the total through tons in 2007 and in 2040. Chemicals and allied products is the top commodity group accounting for 22 million tons, and is expected to grow moderately to 28 million by 2040. Secondary traffic, nonmetallic minerals, food products, and pulp, paper and allied products follow, each accounting for between 9 and 15 million tons, or 8 to 14 percent of the through tonnage. By 2040, secondary traffic is expected to grow by 90 percent (to 29 million tons) and food products by 64 percent (to 18 million tons). Nonmetallic minerals and pulp and paper products are expected to have a more moderate growth of 28 to 23 percent (to 18 million and 11 million tons each) respectively. The remaining commodity groups are detailed below.

Table 2.6 Top 10 Through Commodities by Weight
2007-2040

Commodity	STCC2	2007	2040	% Change (2007 to 2040)
Chemicals or Allied Products	28	21,891	27,983	28%
Secondary Traffic	50	15,423	29,337	90%
Nonmetallic Minerals	14	13,853	17,682	28%
Food or Kindred Products	20	11,222	18,428	64%
Pulp, Paper or Allied Products	26	8,639	10,587	23%
Clay, Concrete, Glass or Stone	32	6,777	10,342	53%
Primary Metal Products	33	6,448	6,992	8%
Petroleum or Coal Products	29	5,127	8,062	57%
Lumber or Wood Products	24	4,317	4,519	5%
Transportation Equipment	37	2,852	5,311	86%
Others		15,823	32,950	108%
Total		112,371	172,194	53%

Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

Figure 2.14 Top 10 Through Commodities by Weight
2007-2040



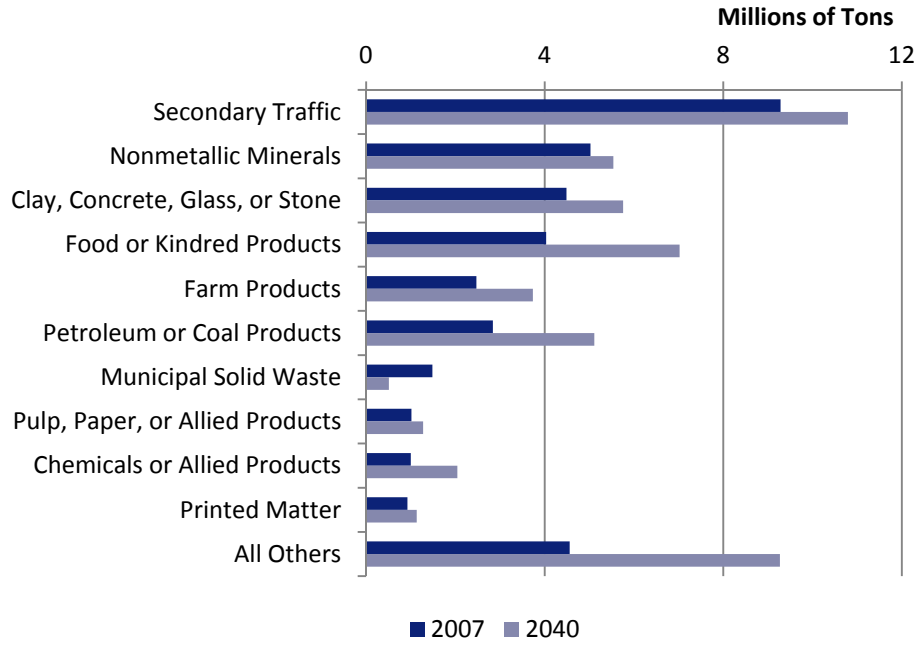
Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

2.5 COMMODITIES BY COUNTY

Bronx County

In 2007, about 37 million tons of freight moved inbound, outbound, and within Bronx County. By weight, secondary traffic, nonmetallic minerals, clay, concrete, glass or stone products, and food and kindred products are the top commodity groups, accounting for 23 million tons or 61 percent of the total tonnage in 2007. Farm products, and petroleum and coal products, are also top commodity groups, accounting for more than 5 million tons or 14 percent of the total tonnage. By 2040, petroleum and coal products, food products, and farm products are expected to grow by 80, 74, and 51 percent respectively. Secondary traffic, nonmetallic minerals, clay, concrete, glass or stone products are expected to grow slowly over the next three decades (see Figure 2.15).

Figure 2.15 Top 10 Commodities by Weight – Bronx County
2007-2040



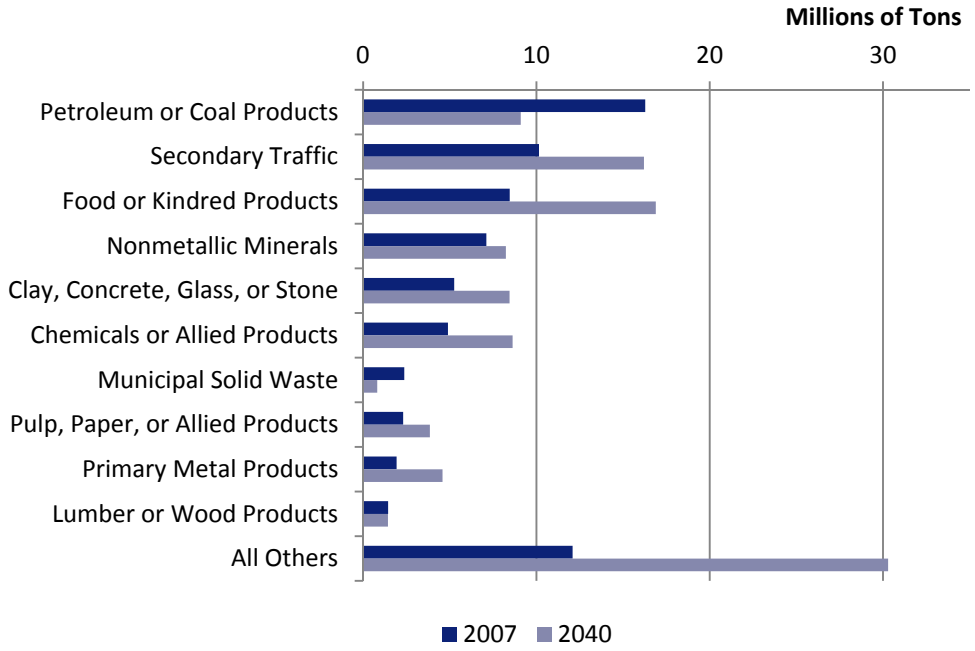
Note: Sum of inbound, outbound, and intracounty freight.

Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

Kings County

In 2007, about 72 million tons of freight moved inbound, outbound, and within Kings County. By 2040, these shipments are expected to grow to about 109 million tons. Petroleum and coal products, secondary traffic, food products, and nonmetallic minerals combined account for 42 million tons or 58 percent of total tonnage. By 2040, these shipments are expected to grow to 50 million tons, a 46 percent share of the total 2040 tonnage. Other important commodity groups moving into, out of and within Kings County are clay, concrete, glass and stone products, chemical products, municipal solid waste, pulp and paper products, primary metal products, and lumber and wood products (see Figure 2.16).

Figure 2.16 Top 10 Commodities by Weight – Kings County
2007-2040



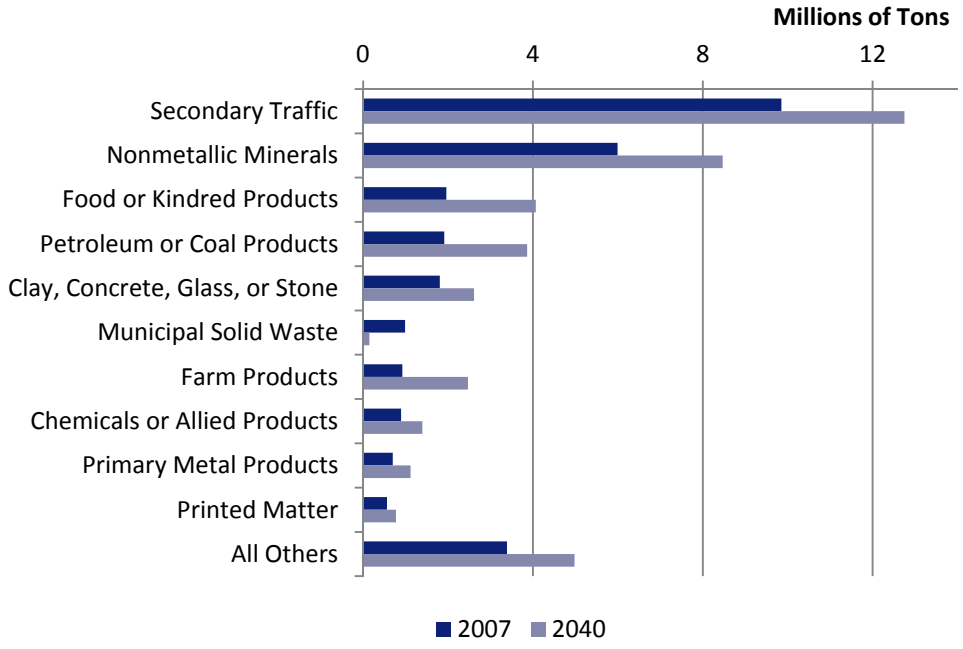
Note: Sum of inbound, outbound, and intracounty freight.

Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

Nassau County

In 2007, nearly 29 million tons of freight moved inbound, outbound, and within Nassau County. By weight, secondary traffic, and nonmetallic minerals, are the largest commodity groups moved in the county, accounting for nearly 16 million tons or approximately 55 percent of total inbound, outbound and intracounty tonnage (see Figure 2.17). By 2040, these commodity groups are expected to be the largest shipments originating or terminating in Nassau County accounting for 21 million tons. Food products, petroleum and coal products, and clay, concrete, glass and stone products follow and each account for 2 million tons and 6 percent of the 2007 tonnage. By 2040 these shipments are expected to total nearly 11 million tons: food products and petroleum and coal products are expected to double, and clay, concrete, glass and stone products are expected to grow 45 percent.

Figure 2.17 Top 10 Commodities by Weight – Nassau County
2007-2040



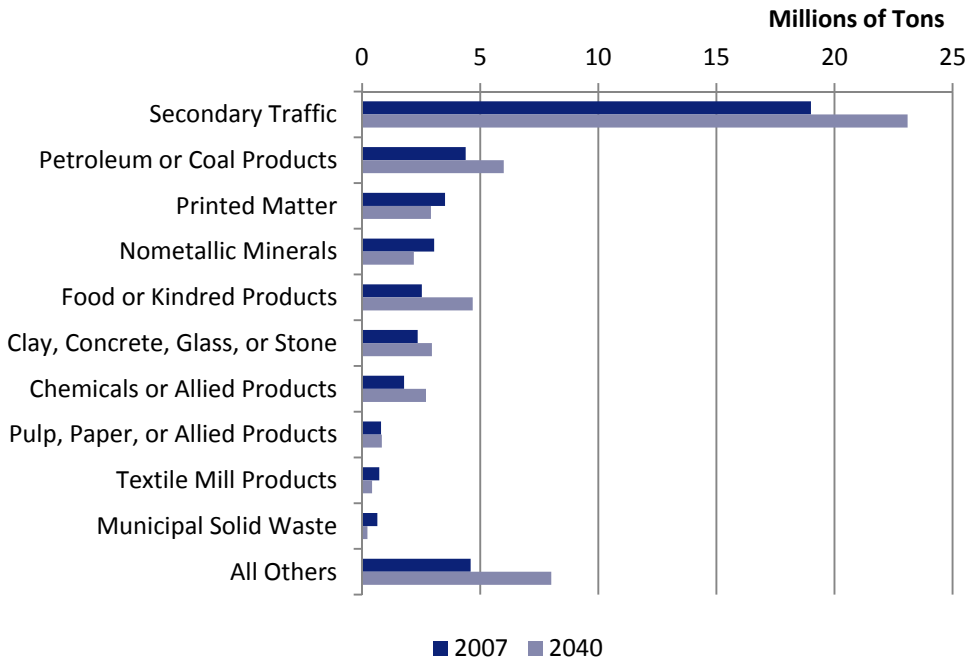
Note: Sum of inbound, outbound, and intracounty freight.

Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

New York County

In 2007, 43 million tons of freight moved inbound, outbound, and within New York County. By 2040, these shipments are expected to increase to 54 million tons, a 25 percent increase over the next three decades. Secondary traffic was the top commodity in 2007 totaling 19 million and accounting for 44 percent, and is expected to remain the top commodity group in 2040 accounting for 23 million tons or 43 percent of the 2040 New York County tonnage. Other important commodity groups are printed matter, nonmetallic minerals, food products, petroleum and coal products, clay, concrete, glass and stone products, chemicals, pulp and paper products, textile mill products, and municipal solid waste (MSW). Figure 2.18 graphically displays the future trends of the top commodities originating or terminating in New York County, where printed matter, nonmetallic minerals, textile mill products, and MSW are expected to decrease over the next three decades.

Figure 2.18 Top 10 Commodities by Weight – New York County
2007-2040



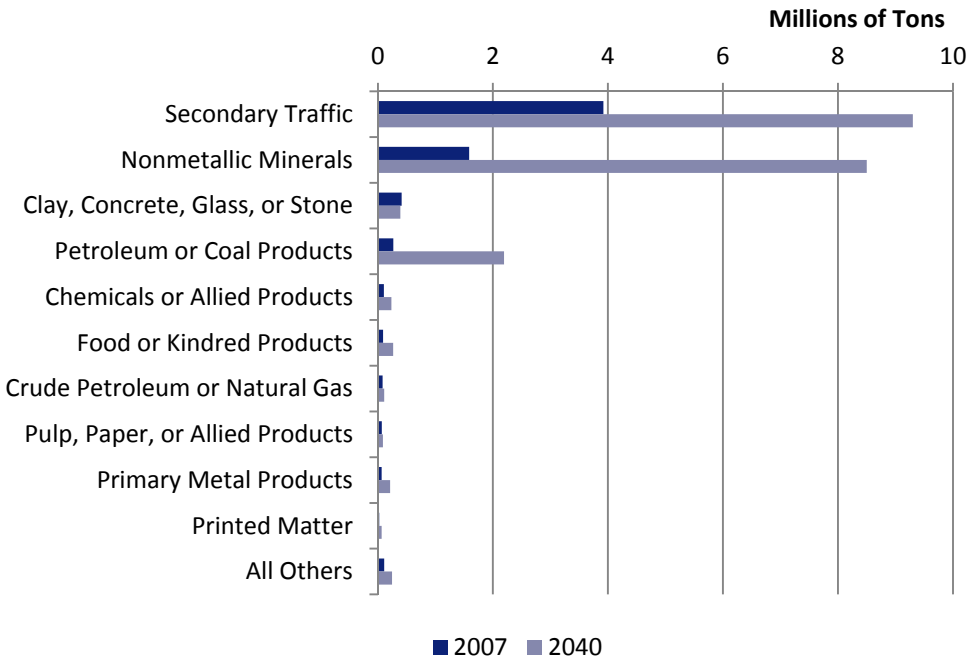
Note: Sum of inbound, outbound, and intracounty freight.

Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

Putnam County

In 2007, about 7 million tons of freight moved inbound, outbound, and within Putnam County. By 2040, these shipments are expected to grow to about 22 million tons, a growth of 220 percent. This growth is mostly due to a large increase of shipments of nonmetallic minerals over the next three decades. In 2007, secondary traffic and nonmetallic minerals accounted respectively for 58 percent (4 million tons) and 24 percent (2 million tons) of the Putnam County moves. By 2040, these shipments are expected to account for 43 percent and 39 percent of the tonnage, respectively, totaling 18 million tons (see Figure 2.19).

Figure 2.19 Top 10 Commodities by Weight – Putnam County
2007-2040



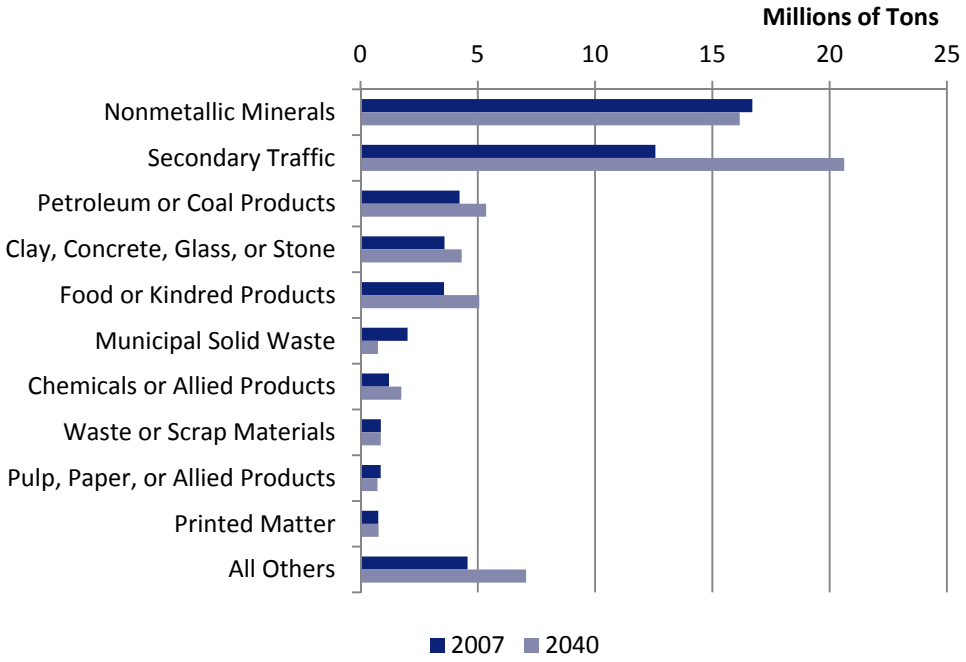
Note: Sum of inbound, outbound, and intracounty freight.

Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

Queens County

In 2007, nearly 51 million tons of freight moved inbound, outbound, and within Queens County. In 2040 these shipments are expected to grow 25 percent to 63 million tons. Nonmetallic minerals and secondary traffic combined accounted for 29 million tons or 57 percent of total 2007 tonnage. By 2040, this share is expected to be 58 percent accounting for 37 million tons, where nonmetallic minerals are expected to decrease 3 percent and secondary traffic to grow 64 percent. Figure 2.20 details the remaining top commodity groups by weight in 2007 and includes the 2040 forecast.

Figure 2.20 Top 10 Commodities by Weight – Queens County
2007-2040



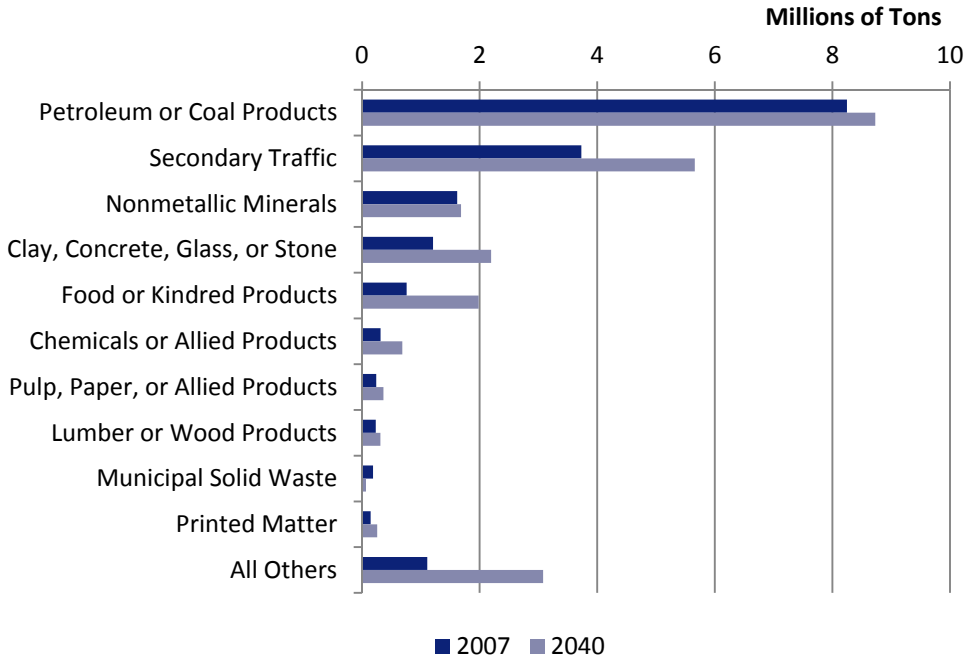
Note: Sum of inbound, outbound, and intracounty freight.

Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

Richmond County

In 2007, about 18 million tons of freight moved inbound, outbound, and within Richmond County. By weight, petroleum and coal products is the top commodity group accounting in 2007 for 8 million tons (46 percent) and expected to grow to 9 million tons in 2040 (35 percent). Secondary traffic (21 percent), nonmetallic minerals (9 percent), and clay, concrete, glass and stone products (7 percent) follow, accounting for 15 million tons in 2007. These commodities combined are expected to grow to 18 million tons by 2040. Figure 2.21 graphically displays the current and future trends of the remaining top commodity groups in Richmond County.

Figure 2.21 Top 10 Commodities by Weight – Richmond County
2007-2040



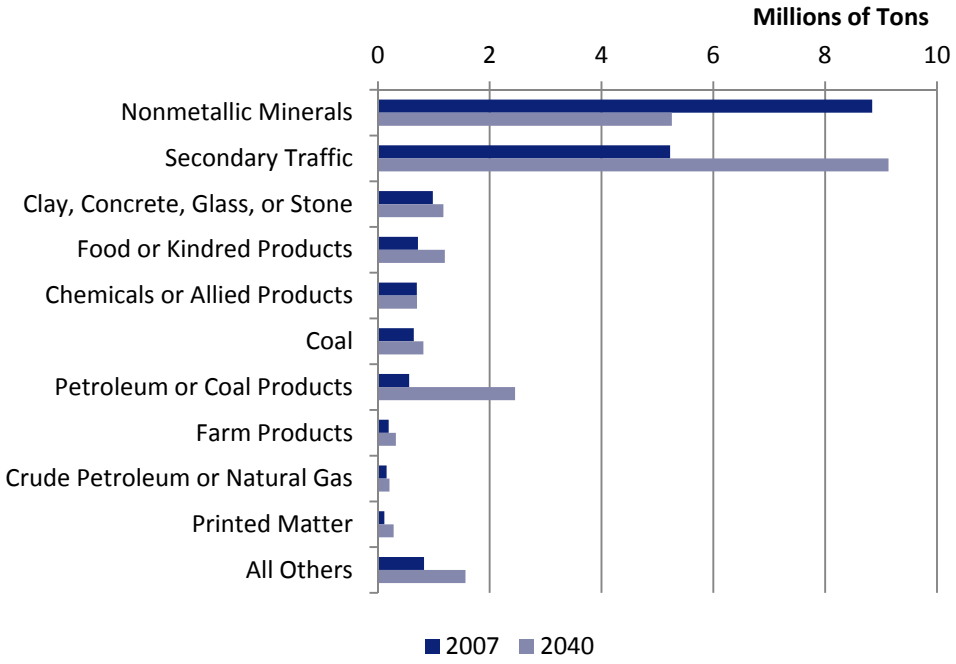
Note: Sum of inbound, outbound, and intracounty freight.

Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

Rockland County

In 2007, about 19 million tons of freight moved inbound, outbound, and within Rockland County. Nonmetallic minerals and secondary traffic, combined, account for 14 million tons or 74 percent of total inbound, outbound and intra-county tonnage. By 2040, these two commodity groups account for 14 million tons or 62 percent of the 2040 total inbound, outbound and intra-county tonnage. Secondary traffic, i.e., warehouse and distribution goods, are expected to increase 75 percent to become the top commodity moving into, out of and within Rockland County; and nonmetallic minerals are expected to decrease 40 percent (see Figure 2.22).

Figure 2.22 Top 10 Commodities by Weight – Rockland County
2007-2040



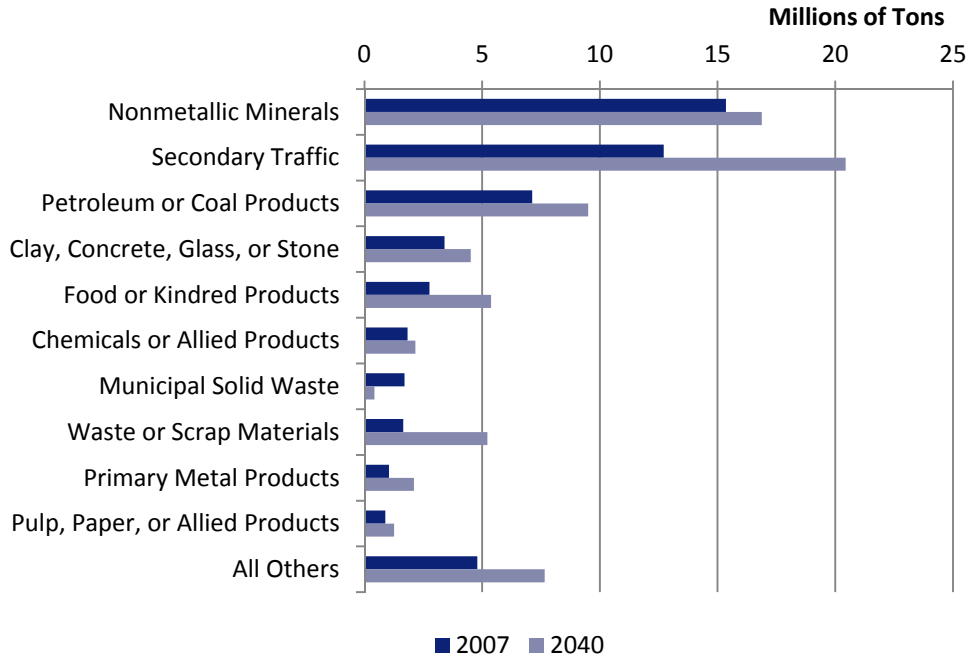
Note: Sum of inbound, outbound, and intracounty freight.

Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

Suffolk County

In 2007, 53 million tons of freight moved into, out of, within, and through Suffolk County. By 2040 these shipments are expected to grow 42 percent to 76 million tons. In 2007, nonmetallic minerals and secondary traffic were the top commodity groups totaling 28 million tons – a 53 percent share of the Suffolk County tonnage. By 2040, secondary traffic is expected to grow 61 percent to become the top commodity group moving into, out of and within the county; and nonmetallic minerals are expected to have a slower growth of 10 percent. Together these commodities account for 49 percent of the 2040 tonnage or 37 million tons. Other important commodity groups are clay, concrete, glass and stone products, petroleum and coal products, and food and kindred products. In 2007 and 2040 these shipments altogether account for 18 percent of Suffolk County's tonnage (see Figure 2.23).

Figure 2.23 Top 10 Commodities by Weight – Suffolk County
2007-2040



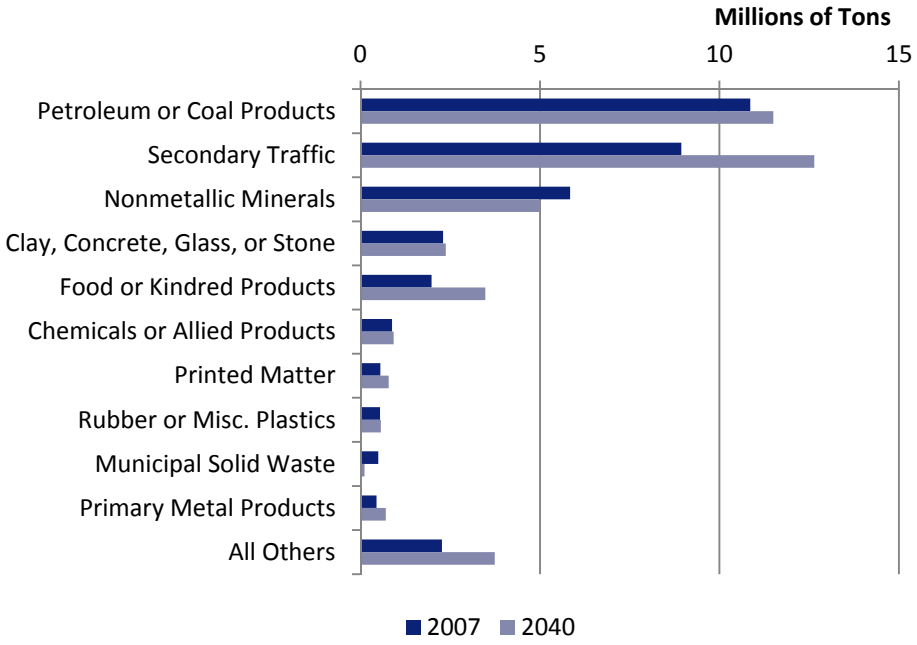
Note: Sum of inbound, outbound, and intracounty freight.

Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

Westchester County

In 2007, 35 million tons of freight moved inbound, outbound, and within Westchester County. In 2040 these shipments are expected to grow 19 percent to 42 million tons. Petroleum and coal products and secondary traffic, combined, accounted for 20 million tons or 56 percent of total 2007 tonnage. By 2040, this share is expected to be 58 percent, accounting for 24 million tons. Secondary traffic will grow faster than petroleum and coal products, and will become the top commodity in Westchester County by 2040. Other important commodity groups moved in the county are clay, concrete, glass and stone products and food products. In 2007, each of these commodity groups accounted for approximately 2 million tons. By 2040, clay, concrete, glass and stone products are expected to exhibit little growth (3 percent); food products are expected to grow 76 percent to over 3 million tons.

Figure 2.24 Top 10 Commodities by Weight – Westchester County
2007-2040



Note: Sum of inbound, outbound, and intracounty freight.

Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

2.6 TRADING PARTNERS

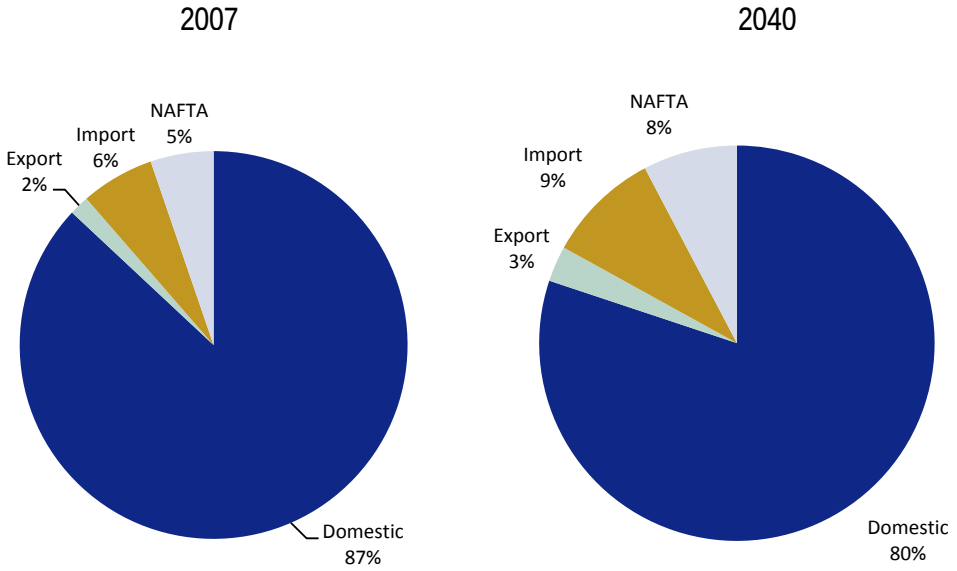
International and Domestic Freight

In addition to the analysis by mode and commodity summarized in the previous sections, it is also important to identify the region's key trading partners. A better understanding of where the region's shipments are originating and terminating is a critical step to understanding length of haul, market penetration, and modal preference.

Domestic freight constitutes the largest share of the freight moves in the NYMTC region. In 2007, 87 percent, or 352 million tons, of the region's inbound, outbound, intraregional and through moves were domestic or originated and terminated in the United States. Trade with Canada and Mexico (NAFTA trade) constituted 5 percent or 21 million tons; and international trade to destinations and origins other than Canada and Mexico accounted for 8 percent or 31 million tons, with just under 25 million from imports and less than 7 million tons from exports.

By 2040, domestic freight moves in the region are expected to grow moderately - 34 percent over the next thirty three years – compared to the international trade, including NAFTA trade and non-NAFTA international trade (imports and exports), which is expected to grow by 123 percent. Figure 2.25 shows the current and future share of international and domestic freight tonnage for all modes in the NYMTC region.

Figure 2.25 International and Domestic Share by Weight
2007-2040



Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

Trading Partners

Key trading partners are identified by combining the inbound and outbound freight flows between the study area and the trading partner region. The "trading partners" (external to the NYMTC region) are depicted in the maps in Figures 2.26 and 2.27, and consist of New York State excluding the NYMTC counties, Northern New Jersey, the remainder of New Jersey, Pennsylvania, Southwestern Connecticut, the remainder of Connecticut, Rhode Island, Massachusetts, the remaining states in the New England region (Maine, New Hampshire, and Vermont), the U.S. Census Region Divisions for the rest of the U.S., and the neighboring countries of Canada (as Quebec, Ontario, Eastern Canada and the remainder of Canada) and Mexico.

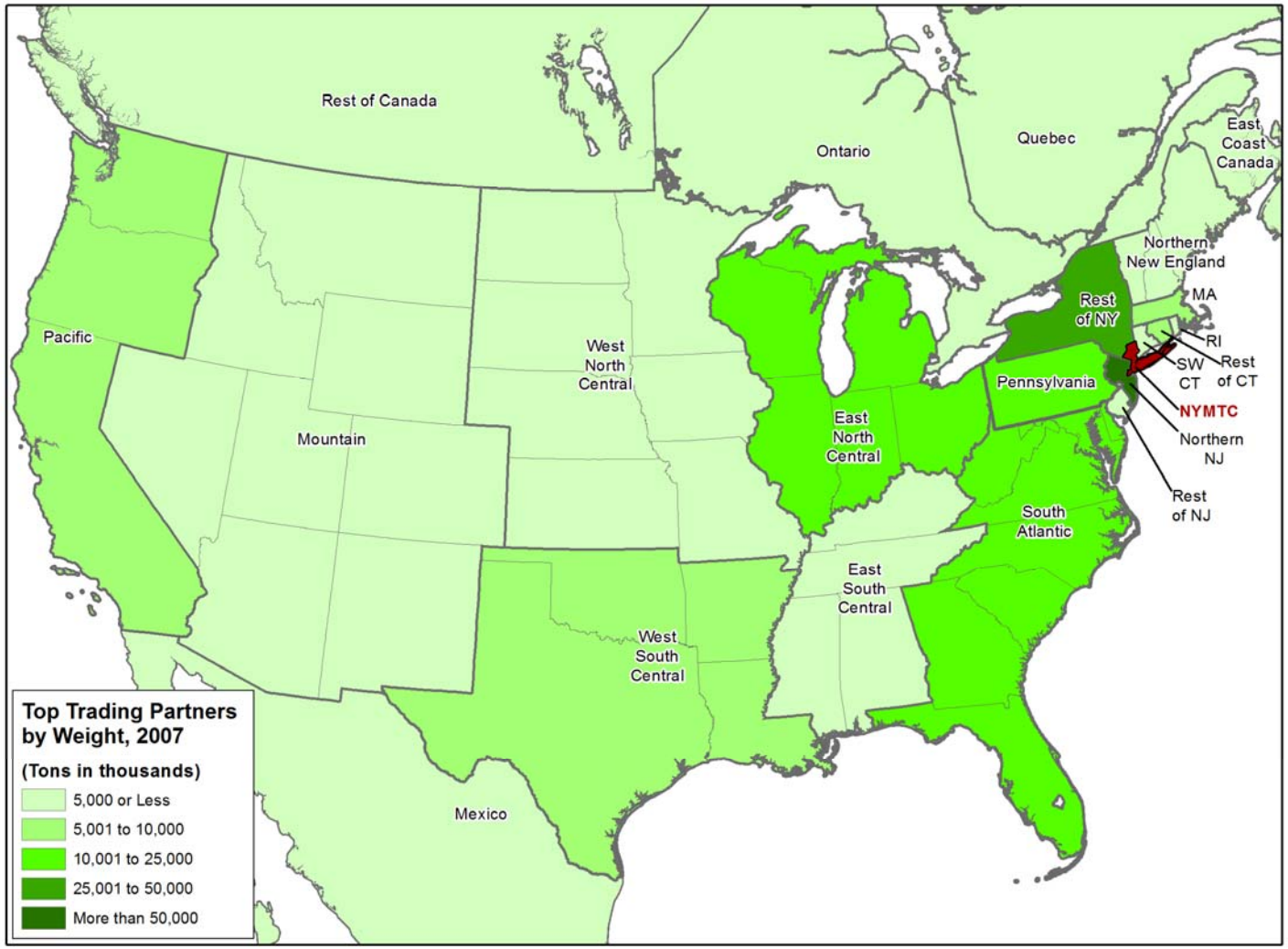
The top trading partners for freight movements into and out of the region by weight in 2007 and 2040 are shown in Table 2.7 and mapped in Figures 2.26 and 2.27. The top three trading partners are Northern New Jersey, the remainder of New York, and the South Atlantic states. These regions account for approximately 60 percent of the total inbound and outbound flows by weight in 2007 (131 million tons) and 54 percent of inbound and outbound flows in 2040 (177 million tons). Trade with Pennsylvania accounted for 16 million tons (7 percent) in 2007 and is expected to account for 20 million tons (6 percent) by 2040. The East North Central (i.e., Indiana, Illinois, Michigan, Ohio and Wisconsin) region accounted for 5 percent of inbound and outbound tonnage in 2007 (11 million tons) and in 2040 (16 million tons). Trade with the Pacific region (i.e., California, Oregon, Washington, Alaska and Hawaii) is expected to grow by 143 percent, increasing from 4 percent of the 2007 inbound and outbound tonnage to 6 percent of the 2040 tonnage.

Table 2.7 Top 10 Trading Partners by Total Weight
2007-2040, Tons in Thousands

	Total		% Change (2007 to 2040)	Inbound		Outbound	
Trading Partners	2007	2040		2007	2040	2007	2040
Northern NJ	65,573	91,822	40%	57,820	83,073	7,754	8,749
Rest of NY	44,132	42,638	19%	20,899	25,963	23,234	26,675
South Atlantic	20,978	32,951	57%	11,189	21,171	9,789	11,780
Pennsylvania	15,579	19,890	28%	8,570	12,570	7,009	7,320
East North Central	10,687	16,283	52%	4,933	11,045	5,754	5,239
Pacific	8,032	19,532	143%	6,667	17,277	1,365	2,254
West South Central	6,938	12,777	84%	4,569	10,236	2,369	2,541
Rest of CT	6,783	5,658	-17%	5,647	4,191	1,137	1,466
MA	5,326	7,109	33%	3,519	4,705	1,807	2,403
Ontario	4,804	11,450	138%	2,908	6,845	1,896	4,605
Others	30,737	59,318	93%	22,692	45,197	8,045	14,122
Total	219,570	329,428	50%	149,413	242,273	70,157	87,155

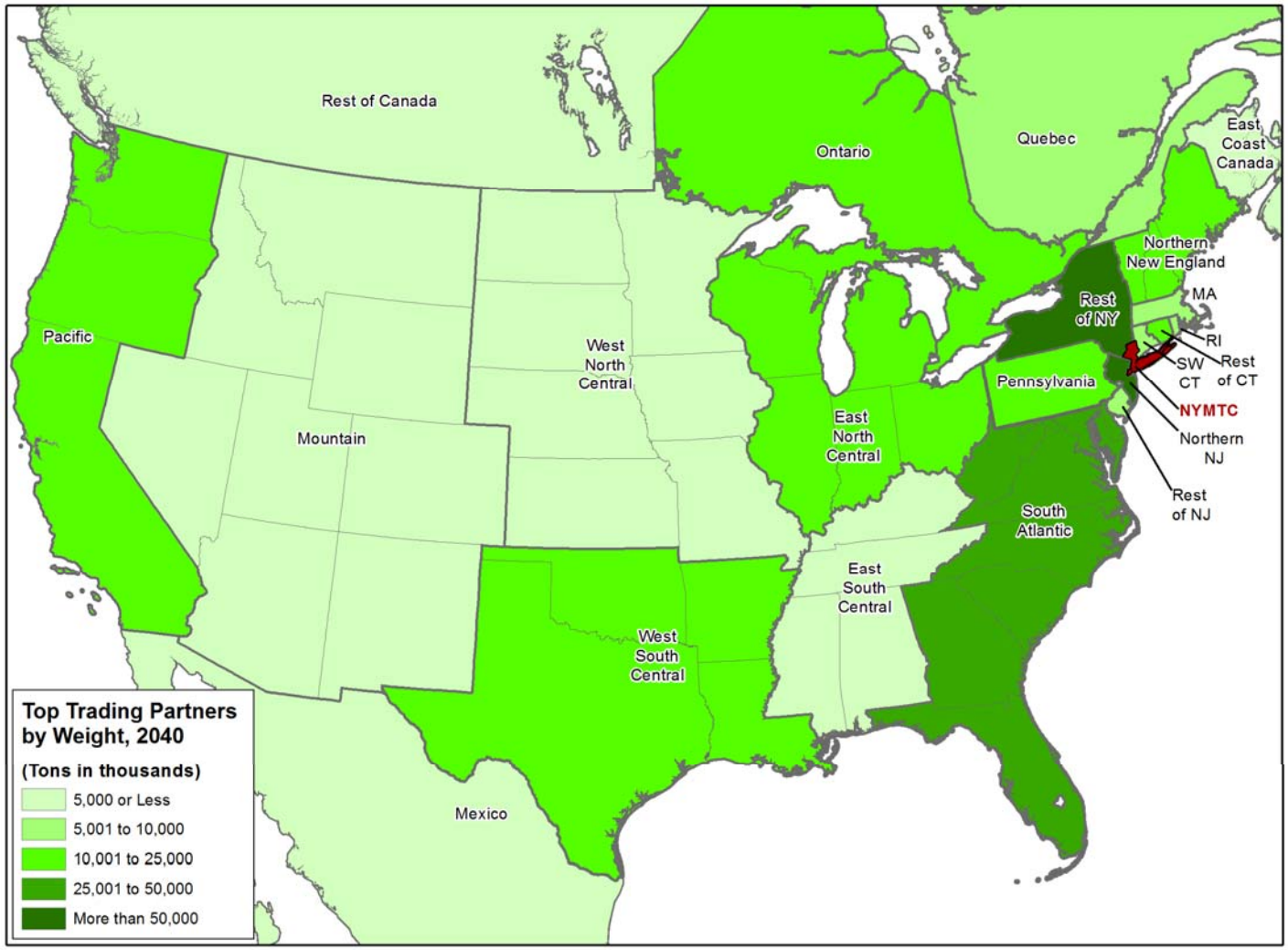
Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

Figure 2.26 Trading Partners by Weight
2007



Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast.

Figure 2.27 Trading Partners by Weight
2040



Source: Cambridge Systematics with 2007-2035 IHS Global Insight TRANSEARCH data, 2035-2040 FHWA's Freight Analysis Framework v3.4 (FAF3.4) Forecast