Appendix A.4
Freight Flow Methodology

List of Tables

List of Exhibits

List of Acronyms

BNSF	BNSF Railway
Caltrans	California Department of Transportation
CAGR	Compound Annual Growth Rate
CSRP	California State Rail Plan
CWS	Carload Waybill Sample
FAF	Freight Analysis Framework
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
GDP	Gross Domestic Product
NAICS	North American Industry Classification System
ODCM	Origin-Destination-Commodity-Mode
RTP	Regional Transportation Plan
SOUTHERN CALIFORNIA	Southern California Association of Governments
SCTG	Standard Classification of Transported Goods
SPLC	Standard Point Location Code
STB	Surface Transportation Board
STCC	Standard Transportation Commodity Code
UP	Union Pacific Railroad

Executive Summary

Examining the impact of future train volume changes on the rail system is a key element of the 2018 California State Rail Plan (CSRP). Changes from present train traffic volumes will affect the performance of the system, its capital needs, and potential shifts in mode share between rail and other competing modes. Since train volume changes will not be uniform across the entire network, some sections may be subject to substantial volume gains, others could face stable demand, while yet others could face declines. This technical memorandum describes how freight rail services are used by industries in California, how usage is expected to change over time, and how commodity flows and train volumes may change in the future.

Introduction

Examining the impact of future train volumes on the rail system is a key element of the 2018 California State Rail Plan (CSRP). Changes from present train traffic volumes will affect the performance of the system, its capital needs, and potential shifts in mode share between rail and competing modes. Since train volume changes will not be uniform across the entire network, some sections may be subject to substantial volume gains, others could face stable demand, while yet others could face declines. This document describes how California's freight rail system is used at present, and how commodity flows and train volumes may change in the future.

Throughout the analysis a base year of 2013 and forecast year of 2040 has been used. The 2013 base year was driven by the availability of historical data as this task was undertaken, and 2040 is consistent with the present plan year for Caltrans' long range planning efforts. The analysis relied on four principal data sources as follows:

1. **The Federal Highway Administration's Freight Analysis Framework (FAF3) database** containing aggregated annual volume summaries by origin-destination geography, mode, and commodity and provided this information on a historical and forecast basis, using a combination of actual data and modeled behavior. The version of FAF3 used in this analysis has a base year of 2007, with annual estimates for 2008 through 2013, and a forecast from Q2 2012, which was used to project traffic flows from 2014 through 2040.

2. **The US Surface Transportation Board's Confidential Carload Waybill Sample (CWS)** provided detailed information on a statistical sampling of rail shipments from 2007 and 2013.

3. **Base-year route-level traffic estimates** produced for the 2013 California State Rail Plan.

4. **Moody's Economy.com** Q3 2015 forecast of industry sector output that was used to adjust the FAF freight forecast.

CS' approach to utilizing this data is further discussed in the respective sections of this memorandum.

The memorandum is divided into three sections: The first, **Rail Traffic Trends**, discusses base- and forecast year conditions, with a focus on commodities, geography, trading partners and types of service. The second section, **Changes in Rail Volume Flows between 2013 and 2040** describes some of the key changes in traffic that are projected to occur between 2013 and 2040. The third and final section, **Train Volumes**, links rail traffic to physical network use in terms of train volumes for both the base and forecast years.

Rail Traffic Trends

A region's goods movement system reflects the industries and businesses that make up its economy. Heavy, low-value materials tend to be carried by transportation modes such as rail that can move large volumes at a low cost, while high-value materials favour transportation modes that offer fast and reliable delivery. Industries and businesses can be divided into two groups:

- **Freight-Intensive Industries**. Businesses that rely on physical goods as a key part of their business model. They may receive shipments of raw supplies as inputs to their manufacturing processes, require delivery of their own refined or finished products to market, or are involved in the process of fulfilling market demand for goods produced by others. Agriculture, manufacturing, wholesale and retail trade, construction, transportation and warehousing, electric utilities, and mining are economic sectors that are freight intensive. In California, all of these sectors rely to varying degrees on freight rail, and are thus the focus of goods movement analysis.
- **Service Industries**. Businesses that do not directly depend on the movement of raw or manufactured materials, but that do rely on small shipments of goods and supplies. This category includes industries such as government, education, health care, and other professional categories. To the extent that this traffic is handled by rail, most of it will appear as intermodal traffic.

Total Rail Flows and Flows by Direction of Movement

As shown in Exhibit 1, roughly 6.8 million units carrying 161 million tons of goods moved by rail in California in 2013. The majority moved inbound to destinations throughout California, 50 percent of all units and 58 percent of all tonnage.[1] About 11 million tons moved between origins and destinations within California (also known as "CA Local"), and 5 million tons traveled through the State between origins and destinations located beyond the State's borders (also known as "CA Through"). In 2013, both CA Local and CA Through tonnage had shown a decline from 2007 at 11.6 million tons and 6 million tons respectively.

[1] For purposes of clarity, this memorandum utilizes the term "unit" instead of "carload" when discussing reported rail traffic volumes. For carload service, a unit represents a railcar, while for intermodal service a unit represents a container or highway trailer. The latter has one-sixth to one-half the tonnage and volume capacity of a railcar.

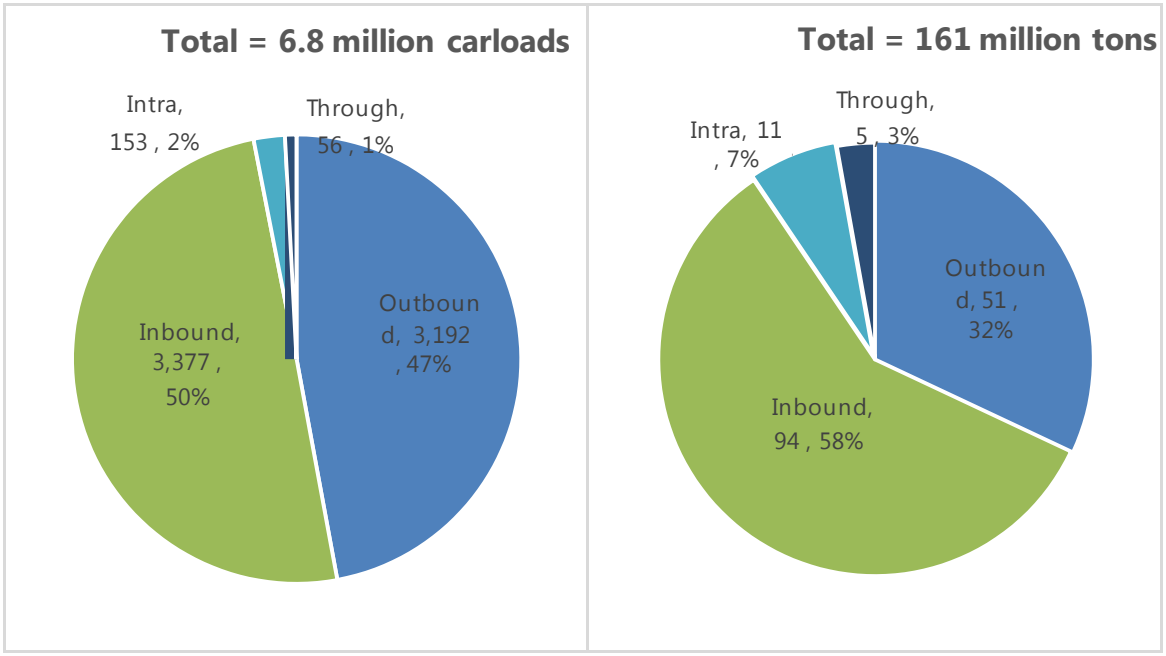

Exhibit 1: California Rail based Total Units (in thousands) and Tons (in millions), 2013

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample

Though there are roughly the same number of units traveling inbound as there are traveling outbound in California, there is a clear imbalance in tonnage flows. Nearly twice as many tons move into California than move out of the state, indicating that the state is a net importer of commodities.

Flows by Rail Service Type

Another way to examine rail commodity movements is by service type. There are two primary service types, intermodal and carload, with the latter being further split into multiple categories in this analysis. Intermodal traffic involves the handling of an intact highway trailers and containers by rail. On the other hand, carload traffic includes assembled motor vehicles, bulk goods moved in dedicated trains handling commodities such as grain, coal, crude oil, etc., and general merchandise (such as lumber, bagged cement, etc.) that are shipped in carload quantities.

Table 1 details four primary service types, with intermodal movements comprising the bulk of rail activity in California in 2013, 85 percent of total units and 52 percent of total tonnage.

Table 1: California Rail based Units and Tons by Rail Service Type, 2013

Service Type	2013 Units (thousands)	% of Total Units	2013 Tons (millions)	% of Total Tons
Intermodal	5,783.9	85%	84.0	52%
Coal, coke, iron ore and bulk grain	145.8	2%	14.4	9%
Assembled motor vehicles	166.0	2%	3.6	2%
All other traffic	681.8	10%	58.6	37%
Total	**6,777.5**	**100%**	**160.6**	**100%**

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample

The trend in intermodal shipments is in line with the forecasts from the 2013 California State Rail Plan. In 2007, 48 percent of all tonnage was intermodal, and by 2040 it was expected that 65 percent of all tonnage would be intermodal. Intermodal service is particularly high in California due to the Ports of Los Angeles and Long Beach, which are the two busiest ports in the United States in terms of container volumes. Together, the ports comprised 33 percent of all container traffic in the United States in 2013,[2] a direct reflection of their importance as the primary gateway for Asian trade in the United States. The Port of Los Angeles functions as an import destination for Chinese, Japanese, South Korean, and other Asian goods to be shipped throughout the United States and Canada.[3] Similarly, the Port of Long Beach receives nearly half of its imports from China, followed by South Korea, Hong Kong, and Japan.[4]

Although intermodal service continues to grow in importance in California and throughout North America, carload service is still very important, particularly for the movement of motor vehicles, petroleum and chemical products, and select products manufactured by heavy industries as well as agricultural products and related inputs. Some carload shippers have become concerned with the emphasis on intermodal and unit train movements by Class I railroads, fearing that their access to service may be limited in the future. Small-volume rail shippers may be the most at risk to this change.

[2] "Port Industry Statistics". American Association of Port Authorities. Accessed January 7, 2016. Available from: http://www.aapa-ports.org/Industry/content.cfm?ItemNumber=900#Statistics
[3] "2013 Los Angeles Trade Numbers". World City, Inc. Accessed January 7, 2016. Available from: https://www.portoflosangeles.org/pdf/Los-Angeles-Trade-Numbers-2013.pdf
[4] "Port of Long Beach Cargo Statistics". Accessed January 7, 2016. Available from: http://www.polb.com/civica/filebank/blobdload.asp?BlobID=3945

Top Commodities

Total and By Direction of Movement

The numerous types of commodities carried on California's rail system reflect its diverse economy, as shown in Table 2 and Exhibit 2. The most common type of commodity transported by rail in California in 2013 is mixed freight (i.e. intermodal), representing 36 percent of all tonnage, a total of 57 million tons. Cereal grains are the second most transported commodity (nearly 14 million tons) and basic chemicals are the third most transported (over 12 million tons). Together, these three commodities comprise over half of the total tonnage transported in California.

Table 2: California Rail based Tons by SCTG-2 Digit Commodity Type, 2013

SCTG Code	SCTG Commodity	Tons (in thousands) by Commodity and Percentage Distribution by Direction					
		All Directions	% of Total	O/B	I/B	IN	THRU
43	Mixed freight	57,001	36%	55%	45%	< 1%	0%
2	Cereal grains	13,762	9%	2%	97%	< 1%	< 1%
20	Basic chemicals	12,491	8%	18%	71%	9%	3%
7	Other foodstuffs	7,649	5%	45%	52%	2%	1%
4	Animal feed	6,018	4%	2%	94%	3%	1%
26	Wood prods.	5,384	3%	11%	57%	< 1%	32%
32	Base metals	5,280	3%	15%	46%	36%	4%
19	Coal and petroleum prods.	5,157	3%	23%	40%	34%	3%
15	Coal	4,596	3%	0%	98%	0%	2%
27	Newsprint/paper	4,400	3%	2%	88%	3%	8%
36	Motorized vehicles	4,200	3%	30%	67%	0%	3%
31	Nonmetal min. prods.	3,846	2%	28%	30%	38%	4%
24	Plastics/rubber	3,631	2%	18%	74%	2%	7%
12	Gravel	3,144	2%	< 1%	1%	99%	0%
8	Alcoholic beverages	2,626	2%	81%	18%	0%	2%
41	Waste/scrap	2,303	1%	19%	74%	3%	4%
3	Other ag prods.	2,080	1%	52%	44%	3%	2%
30	Textiles/leather	1,943	1%	55%	45%	< 1%	0%
37	Transport equip.	1,899	1%	4%	88%	8%	< 1%
6	Milled grain prods.	1,867	1%	15%	78%	1%	6%

40	Misc. mfg. prods.	1,574	1%	36%	64%	0%	0%
22	Fertilizers	1,385	< 1%	7%	68%	10%	16%
13	Nonmetallic minerals	1,255	< 1%	21%	38%	19%	22%
23	Chemical prods.	1,170	< 1%	22%	75%	2%	< 1%
28	Paper articles	979	< 1%	9%	91%	0%	0%
99	Unknown	851	< 1%	64%	36%	0%	< 1%
33	Articles-base metal	798	< 1%	36%	60%	< 1%	4%
5	Meat/seafood	693	< 1%	17%	84%	0%	0%
39	Furniture	589	< 1%	71%	29%	0%	0%
34	Machinery	508	< 1%	50%	47%	3%	< 1%
14	Metallic ores	443	< 1%	0%	95%	0%	5%
11	Natural sands	434	< 1%	1%	92%	6%	< 1%
35	Electronics	240	< 1%	47%	53%	0%	0%
18	Fuel oils	231	< 1%	47%	48%	3%	3%
29	Printed prods.	98	< 1%	23%	76%	0%	< 1%
25	Logs	84	< 1%	1%	91%	8%	0%
38	Precision instruments	38	< 1%	97%	3%	0%	0%
9	Tobacco prods.	0.4	< 1%	0%	100%	0%	0%
	TOTAL	**160,646**	**100%**	**32%**	**59%**	**7%**	**3%**

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample

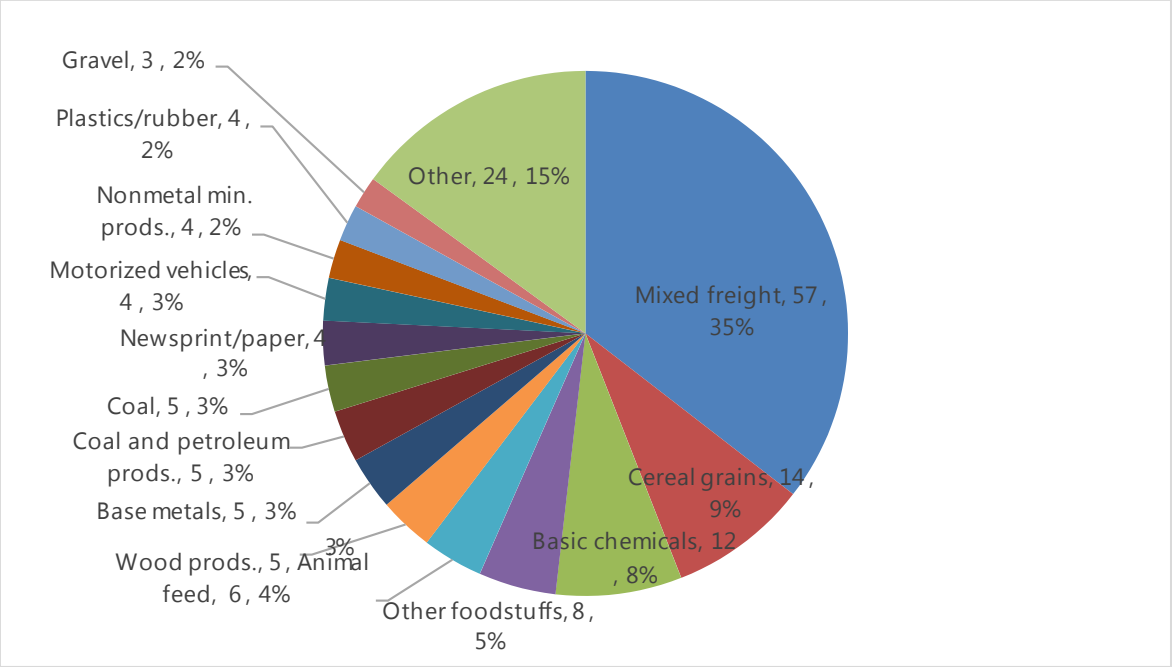

Exhibit 2: California's Top Rail Commodities (in millions of tons), All Traffic, 2013

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample

The mixed freight commodity category contains virtually all kinds of freight that can be moved in a trailer or container and is not reported as a specific commodity[5]. The primary commodities handled in this manner consist of consumer goods, including packaged foods, electronics, office supplies, and durable goods, along with a broad range of intermediate components for manufacturing, such as auto parts. Cereal grains include field crops such as wheat, corn, rye, barley, and oats. Basic chemicals are comprised of two categories, inorganic chemicals and organic chemicals. There are dozens of inorganic chemicals, such as chlorine, sodium sulfates, hydrochloric acid, and others, that can be shipped by rail. On the other hand, there are nine sub-types of organic chemicals, including phenols, organic dyes and pigments, and cyclic hydrocarbons. The fourth-most significant commodity group in California, other foodstuffs, contains seven sub-categories. This includes dairy products (i.e. milk, cream, cheese), processed or prepared vegetables, fruit, nuts, or juices (i.e. potato chips, jellies), coffee/tea/spices, animal or vegetable fats, sugar and cocoa preparations, and non-alcoholic beverages. Finally, animal feed contains other types of food products for consumption by animals. This includes products such as inedible flours, oil cake, and dog/cat food.

In comparison to the 2013 CSRP, there are a few notable changes among the top commodities. Although mixed freight and cereal grains were the two most commonly transported goods in

[5] Approximately 20 percent of traffic moving intermodally is reported with a specific commodity rather than mixed freight. This is a requirement for hazmat commodities, while for non-hazmat shipments specific commodity reporting is determined by commercial considerations.

the last analysis, basic chemicals more than doubled in tonnage during that period. Additionally, motorized vehicles declined from over 6.6 million tons in 2007, and wood products declined from 8.5 million tons. However, the transport of animal feed increased significantly during this period.

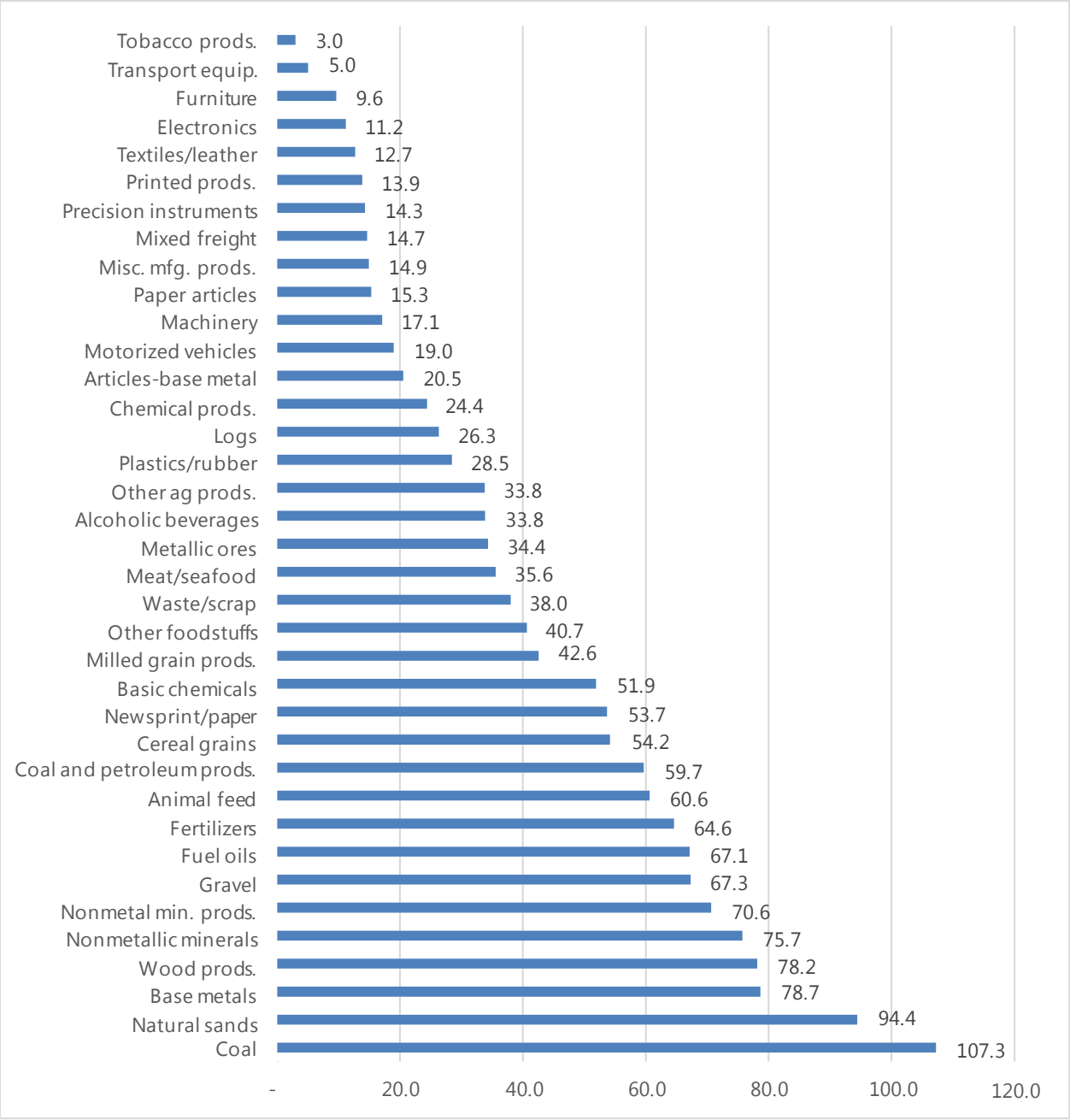

Exhibit 3: Tons per Unit per Commodity Shipped in California, All Directions, 2013

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample

Exhibit 3 shows the number of tons shipped per unit overall for each commodity type in 2013. For carload service, a unit typically represents a railcar, while for intermodal service a unit

represents a container or highway trailer. Thus, commodities with the fewest tons per unit, including tobacco, transportation equipment and furniture, are largely shipped in containers and trailers, and thus have a natural limit of around 18 tons to avoid being classified as overweight shipments. Coal, ranked ninth in terms of tonnage, had the highest number of tons per carload. Similarly, natural sands is one of the least shipped commodities in California ton-wise, but it is has the second highest number of tons per carload. These notably dense and heavy products are usually moved in bulk.

Top Trading Partners

Trade Regions beyond California

California's rail-based trading partners include various regions throughout the United States, Canada, and Mexico, as shown in Table 3. California's top five trading regions overall are as follows: East North Central, West South Central, West North Central, Mountain, and East South Central. For inbound commodities, California receives the highest number of tons from the East North Central region of the U.S., which includes the states of Illinois, Indiana, Michigan, Ohio, and Wisconsin. In 2013, California accepted nearly 26 million tons of goods from this region. The West North Central region is also an important region, and comprises 24 percent of inbound commodities. This area includes the states of Iowa, Kansas, Minnesota, Missouri, North Dakota, South Dakota, and Nevada. For outbound shipments, California sends 37 percent of all goods to East North Central, and 29 percent to West South Central, which includes the states of Louisiana, Oklahoma, Texas, and Arkansas. Exhibit 4 provides a visualization of total tonnage shipped to and from California to regions throughout North America. To highlight individual states, California's trade with Illinois is highest in all directions, followed by Texas. Total trade by rail with Illinois represents nearly 30 percent of all commodity tonnage, and 17 percent of tonnage with Texas.

Table 3: California's Top Trading Regions by Rail, 2013

Region	Total		Inbound		Outbound	
	Tons (millions)	% of Total	Tons (millions)	% of Total	Tons (millions)	% of Total
East North Central	44.8	47%	25.9	28%	18.9	37%
West South Central	32.6	35%	17.8	19%	14.8	29%
West North Central	26.2	28%	22.5	24%	3.6	7%
Mountain	15.8	17%	12.4	13%	3.4	7%
East South Central	7.4	8%	4.1	4%	3.4	7%
Pacific	6.8	7%	4.6	5%	2.2	4%
South Atlantic	5.3	6%	2.4	3%	2.9	5%
Canada	4.0	4%	3.6	4%	0.4	< 1%
Middle Atlantic	2.1	2%	0.6	< 1%	1.4	3%
New England	0.4	< 1%	0.1	< 1%	0.3	< 1%
Mexico	0.1	< 1%	0.1	< 1%	0.0	< 1%
TOTAL	**145.4**	**100%**	**94.1**	< 1%	**51.4**	**100 %**

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample

For many regions, the top inbound/outbound commodity is mixed freight, particularly the regions of East North Central, East South Central, New England, and West South Central. Cereal grains transported to California from the West North Central region comprise the highest amount of tonnage after mixed freight, with over 8.5 million tons in 2013. Coal from the Mountain region is also a significant California import; 4.5 million tons were shipped into the state in 2013. Finally, basic chemicals and animal feed are two other important imports from the West North Central region, which were transported in excess of 3.9 million and 3.2 million tons, respectively. On the outbound side, California ships high amounts of other food stuffs (1.4 million tons) and other agricultural products (970,000 tons) to East North Central, and high amounts of basic chemicals (718,000 tons) and motorized vehicles (590,000 tons) to the West South Central region. Overall, top inbound commodities in 2013 were 68 percent greater than outbound commodities, with over 43 million tons shipped outbound compared to 72.4 million tons shipped inbound.

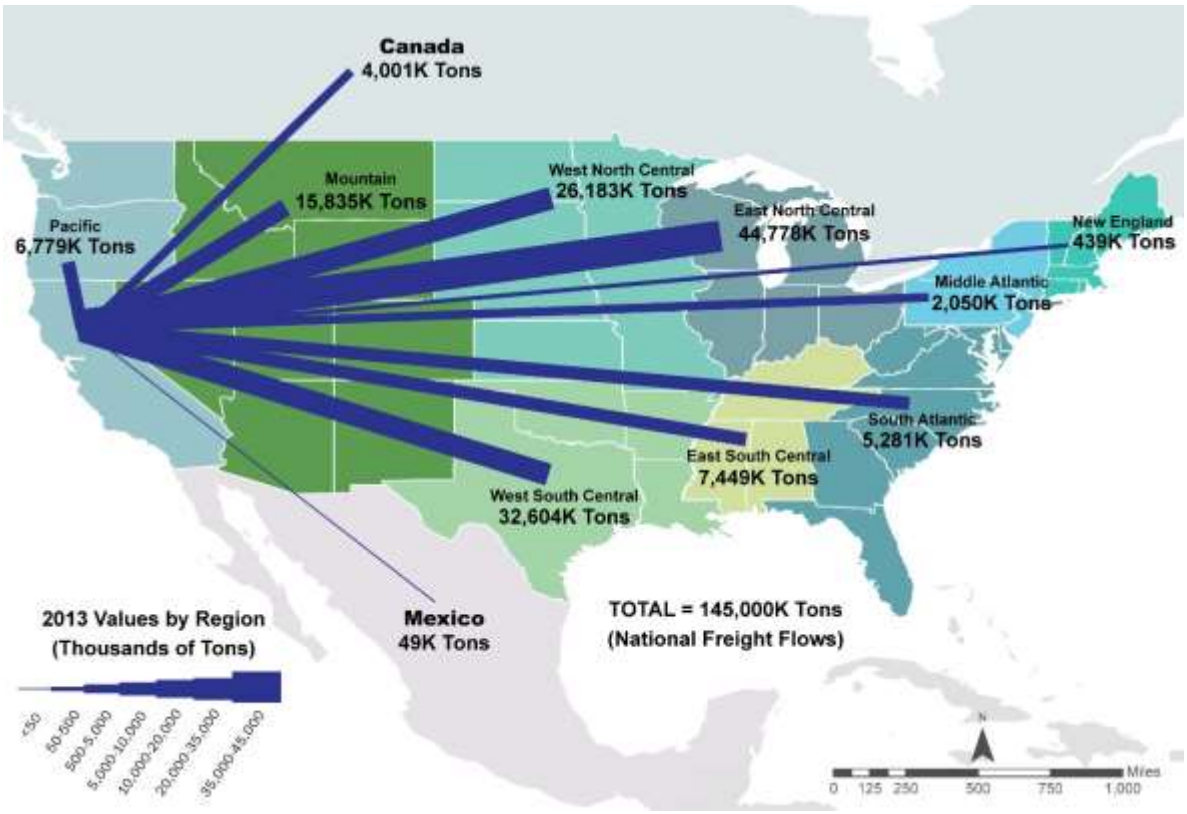

Exhibit 4: California Tail Trading Partner Tonnage Distribution

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample

Table 4 provides more detail on the breakdown of the top 5 regions per rail service type by tonnage between California and other trade regions throughout the United States, Canada, and Mexico. There is a clear mix of carload and intermodal traffic within each region depending on the direction of flow. The East North Central region – which includes Chicago, the single largest rail hub in North America - has the highest percentages of intermodal traffic traveling both inbound and outbound California. Additionally, coal, coke, iron ore, and bulk grain cargo is shipped to California primarily from the Mountain and West North Central Regions and shipped from California to several U.S. regions, but the largest proportion goes to West South Central.

Table 4: Top 5 Regions by Service Type and Tonnage, 2013

Service Type	Outbound			Inbound		
	Region	Tons (millions)	% of Region Total	Region	Tons (millions)	% of Region Total
All Other Traffic	East North Central	2.4	13%	West North Central	9.6	42%
	Mountain	2.3	69%	West South Central	6.8	38%
	West South Central	2.0	14%	Mountain	5.8	47%
	Pacific	1.3	59%	Pacific	4.2	91%
	East South Central	0.7	21%	Canada	3.5	98%
Intermodal	East North Central	16.3	86%	East North Central	23.2	90%
	West South Central	12.2	82%	West South Central	10.4	59%
	West North Central	2.9	79%	West North Central	4.7	21%
	East South Central	2.6	76%	East South Central	2.4	58%
	South Atlantic	2.4	82%	South Atlantic	1.9	80%
Coal, coke, iron ore, and bulk grain	West South Central	0.1	< 1%	West North Central	7.8	35%
	Mountain	0.1	2%	Mountain	5.6	45%
	East South Central	0.1	2%	West South Central	0.2	1%
	Canada	0.0	12%	Pacific	0.1	2%
	Pacific	0.0	2%	Canada	0.1	2%
Assembled motor vehicles	West South Central	0.5	3%	East North Central	1.1	4%
	East North Central	0.2	< 1%	East South Central	0.5	12%
	Mountain	0.1	3%	West North Central	0.4	2%
	West North Central	0.1	2%	West South Central	0.4	2%
	Pacific	0.1	3%	Mountain	0.1	< 1%

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample

Table 5 details the number of units for the top five regions for each service type. As in the prior table, the East North Central region has the highest share of its traffic traveling intermodally both inbound and outbound California, reaching upwards of 95 percent and 97 percent of all intermodal activity, respectively. However, four other regions – West South Central, West North Central, East South Central, and South Atlantic – all receive over 94 percent of their unit volume from California intermodally.

Table 5: Top 5 Regions by Service Type and Units, 2013

Service Type	Outbound			Inbound		
	Region	Units (thousands)	% of Region Total	Region	Units (thousands)	% of Region Total
All Other Traffic	East North Central	30.9	3%	West North Central	101.5	23%
	Mountain	27.5	25%	West South Central	84.2	10%
	West South Central	24.6	2%	Mountain	64.7	30%
	Pacific	16.0	22%	Pacific	45.5	58%
	East South Central	9.3	4%	Canada	36.3	96%
Intermodal	East North Central	1,221.0	97%	East North Central	1,302.8	95%
	West South Central	953.3	95%	West South Central	762.1	88%
	West North Central	222.1	95%	West North Central	246.9	56%
	East South Central	209.2	95%	East South Central	155.5	81%
	South Atlantic	183.8	97%	South Atlantic	127.0	95%
Coal, coke, iron ore, and bulk grain	West South Central	1.3	< 1%	West North Central	74.4	17%
	East South Central	0.6	< 1%	Mountain	61.3	29%
	Mountain	0.6	< 1%	West South Central	1.6	< 1%
	Canada	0.5	5%	Pacific	1.0	1%
	Pacific	0.4	< 1%	Canada	0.8	2%
Assembled motor vehicles	West South Central	24.9	3%	East North Central	49.5	4%
	East North Central	7.2	< 1%	East South Central	22.0	12%
	Mountain	4.8	4%	West North Central	21.1	5%
	West North Central	3.9	2%	West South Central	18.5	2%
	Pacific	2.9	4%	Mountain	1.9	< 1%

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample

Trade Regions within California

California can be categorized as having eight distinct regions of trade activity, as presented in Exhibit 5. Some regions are more freight intensive than others depending on the existence of ports, rail hubs, major cities, and intermodal facilities. Exhibit 6 details the outbound and inbound commodity volumes for each of the eight California regions. Four of the regions consist of major cities and economic hubs –San Francisco Bay Area, Sacramento, Southern California, and San Diego – while the remaining regions are based on geographical areas, including the Central Coast California, Central Valley, and Eastern California. For both inbound and outbound shipments, the Southern California region comprises the majority of traffic at 63 percent and 68 percent, respectively. In total, over 62 million tons of commodities were transported outbound and 104.7 million tons of goods were transported into California in 2013.

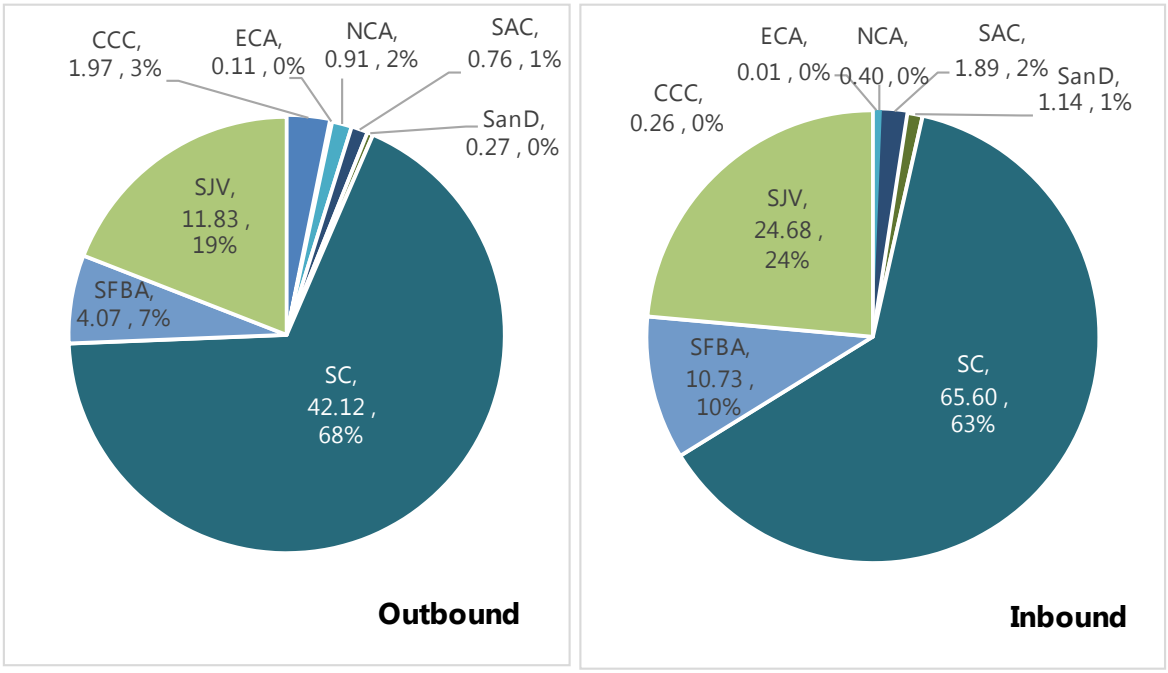

Exhibit 5: Trade Activity by Tons in California's 8 Regions, All Traffic, 2013

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample

Note: CCC = Central Coast California; ECA = Eastern California; NCA = Northern California; SAC = Sacramento; SanD = San Diego; SC = Southern California; SFBA = San Francisco Bay Area; SJV = Central Valley.

Exhibit 6: California's 8 Trade Regions

Source: Cambridge Systematics

There is also a significant amount of trade activity occurring within and between each of the eight regions of California, totaling over 10.6 million tons in 2013. Table 6 shows a matrix of trade flows between and within each of these regions. The Southern California region continues to be an important area of California with respect to intrastate trade.

Table 6: Intra-State Commodity Flow (in thousands of tons) between California's 8 Regions, All Traffic, 2013

		Termination Region								
Origin Region		CCC	ECA	NCA	SAC	SanD	SOUTHERN CALIFORNIA	SFBA	SJV	TOTAL
	CCC	3.7	0.0	0.0	0.0	0.0	633.7	1,200.8	0.0	**1,838.2**
	ECA	0.0	0.0	0.0	0.0	0.0	8.0	0.0	73.1	**81.1**
	NCA	0.0	0.0	0.0	141.1	0.0	13.1	0.8	50.1	**205.1**
	SAC	0.0	0.0	0.0	2.8	0.0	21.7	54.4	7.5	**86.3**
	SanD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
	SC	17.7	4.2	16.1	341.3	166.7	4,463.1	415.1	696.0	**6,120.2**
	SFBA	0.0	0.0	68.1	45.7	14.8	417.7	47.0	254.2	**847.5**
	SJV	8.8	5.0	12.2	12.1	39.7	665.5	340.5	393.6	**1,477.2**
	TOTAL	**30.2**	**9.2**	**96.3**	**543.0**	**221.2**	**6,222.9**	**2,058.5**	**1,474.4**	**10,655.7**

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample

Note: CCC = Central Coast California; ECA = Eastern California; NCA = Northern California; SAC = Sacramento; SanD = San Diego; SC = Southern California; SFBA = San Francisco Bay Area; SJV = Central Valley.

Exhibit 7 and Exhibit 8 show 2013 county-level origination and termination tonnage in California. The vast majority of tonnage flows in and out of Los Angeles County, CA, 46 percent of inbound commodities and 60 percent of outbound commodities. The ports of Los Angeles and Long Beach drive much of this traffic as the two largest container ports in the country. After Los Angeles, San Bernardino and San Joaquin counties also have a significant amount of inbound and outbound commodity traffic, comprising around 10 percent for each county in each direction. Located east of Los Angeles, San Bernardino County has become a major distribution hub for all of Southern California. San Joaquin County, which is east of San Francisco, serves the Bay Area in a similar capacity, along with having major local industries. The Port of Stockton features warehouse storage and handling facilities for both dry and liquid bulk materials. The Port also handles break-bulk and containerized cargoes by both land and sea modes, resulting in significant carload activity.

Exhibit 7: Terminating Tonnage in California by County, 2013

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample

Exhibit 8: Originating Tonnage in California by County, 2013

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample

2040 Rail Volumes

As shown in Exhibit 9, roughly 15.2 million units carrying 319 million tons of commodities are projected to move by rail in California in 2040. Overall, commodities shipped by rail in California

are projected to achieve a CAGR of 2.6 percent between 2013 and 2040. Inbound goods are expected to comprise 54 percent of total tonnage and 43 percent of total units. Outbound goods are expected to comprise 38 percent of total tonnage and 55 percent of total units. About 14.8 million tons are projected to move between origins and destinations within California ("CA Local"), and 7.6 million tons are projected to travel through the State without stopping ("CA Through"). Outbound goods have the highest compound annual growth rate (CAGR) of all flows at 3.3 percent between 2013 and 2040, followed by inbound goods (2.3 percent), CA Through goods (1.9 percent), and CA Local goods (1.2 percent).

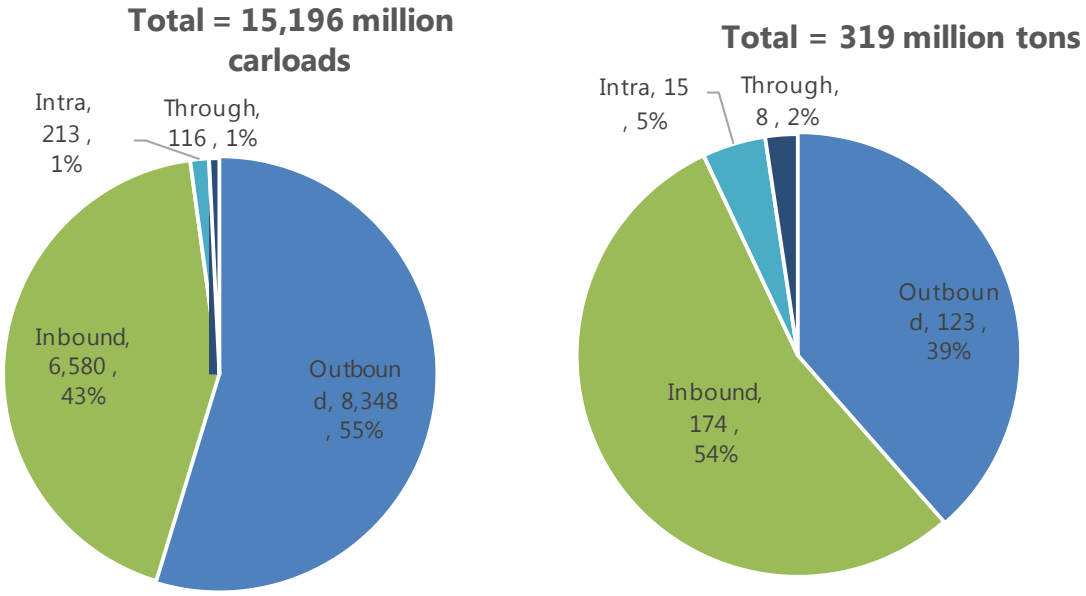

Exhibit 9: California Rail based Total Units (in thousands) and Tons (in millions), 2040

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample, Freight Analysis Framework 3, Ports of Long Beach and Los Angeles

In 2040, more units are anticipated to travel outbound versus inbound in California, as presented in Exhibit 9. However, inbound tonnage is expected to be higher than outbound tonnage, reflecting a different commodity mix and a greater portion of commodities moving in railcars versus containers and trailers.

Table 7 summarizes the forecasted carload and intermodal activity in California. Intermodal movements comprise the bulk of rail activity projected for California in 2040, 89 percent of total units and 60 percent of total tonnage. The share of units and tons traveling intermodally has increased notably from 2013.

Table 7: California Rail based Units and Tons by Rail Service Type, 2040

Service Type	2040 Units (millions)	% of Total Units	2040 Tons (millions)	% of Total Tons	CAGR Total Units	CAGR Total Tons
Carload	1.6	11%	127.4	40%	1.9%	1.9%
Intermodal	13.6	89%	191.9	60%	3.2%	3.1%
Total	**15.2**	**100%**	**319.3**	**100%**		

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample, Freight Analysis Framework 3, Ports of Long Beach and Los Angeles

To further illustrate the proportion of intermodal versus carload activity, Exhibit 10 depicts the share by type from 2013 to 2040 in terms of units and tonnage. Since the 2008 recession, sectors that have traditionally generated demand for carload rail service in California – such as construction and manufacturing – have exhibited low and uneven growth. Thus the share of traffic traveling intermodally in terms of units and tonnage is expected to continue to increase from the already high levels seen in 2013. This growth is expected to be driven by continued increases in international traffic, and a shift in commodity mix that favors intermodal over carload service.

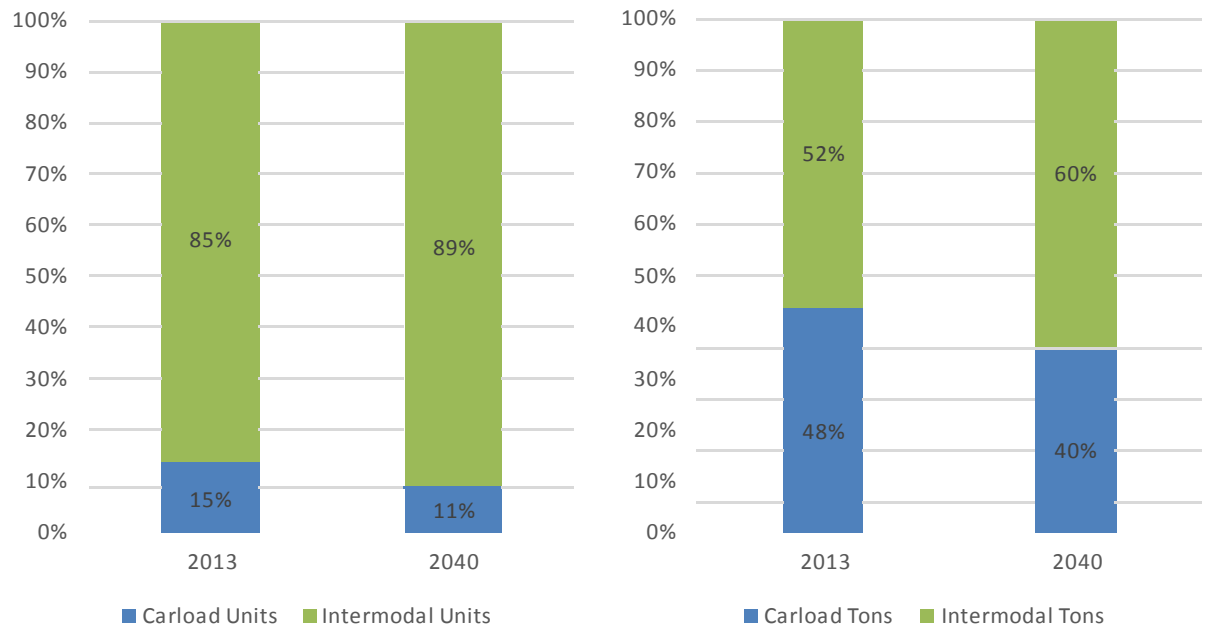

Exhibit 10: California Splits by Rail Service Type, Units (left) and Tons (right)

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample, Freight Analysis Framework 3, Ports of Long Beach and Los Angeles

This analysis also found that the annual growth rate for carload service to be roughly the same for units and tonnage, roughly 1.9 percent, as shown in Table 7. The annual growth rate for intermodal service is significantly higher, 3.2 percent for units and 3.1 percent for tonnage. This finding suggests stronger growth for intermodal freight activity throughout California through its rail system.

Forecasted Top Commodities

By far, mixed freight comprises the largest share of total tonnage by commodity at 45 percent as shown in Exhibit 11. This category includes almost any commodity that can be moved in a container or trailer, and commonly covers most consumer goods, packaged foods, intermediate manufactured goods (such as auto parts) as well as some packaged bulk materials (such as bagged cement). In California, international trade and the state's sizeable population have driven the growth of this traffic to its present dominance, a trend that is expected to continue through 2040.

Collectively, agricultural products (e.g. cereal grains, other foodstuffs, animal feed, and other agricultural products, among others) comprise a significant share of total tonnage on the California rail system. Given the prominence of the Central Valley as an agricultural region, it is intuitive that agriculture would represent an important industry sector to freight rail. Together, agricultural products represent more than 17 percent of total tonnage. A few of the common items shipped in this category include basic crops (such as wheat, corn, rye, barley, and oats), dairy products, vegetables, fruits, nuts, animal or vegetable fats, sugar and cocoa preparations, and non-alcoholic beverages.

Other commodity groups with significant tonnages on the California rail system include basic, assembled motorized vehicles, plastics/rubber, base metal, coal and petroleum products, non-metal mineral products, and newsprint/paper. Many of these commodities represent raw products that may be inputs to manufacturing processes while others (namely motor vehicles and newsprint/paper) are the outputs of those processes. The significant presence of these commodity groups along with mixed freight highlight the importance of California's manufacturing sector to the rail system.

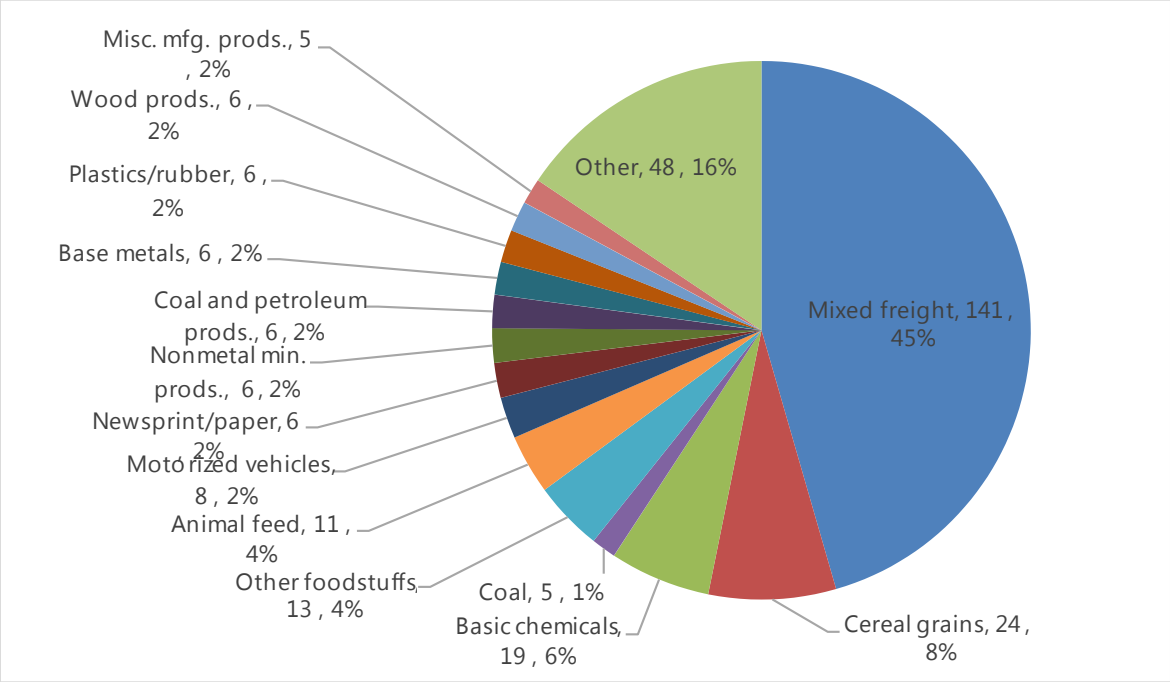

Exhibit 11: California's Top Rail Commodities (in millions of tons), All Traffic, 2040

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample, Freight Analysis Framework 3, Ports of Long Beach and Los Angeles

Exhibit 12 shows that mixed freight is projected to dominate the distribution of commodities on California's freight rail system in terms of units in addition to tonnage. By units, mixed freight comprises about 65 percent of total traffic. The collective of agricultural products (e.g. cereal grains, other foodstuffs, animal feed, and other agricultural products, among others) similarly represent a significant share of both freight rail traffic and tonnage. By units, agricultural products comprise about 7 percent of rail traffic. Other prominent commodity groups include basic chemicals, assembled motor vehicles, textiles/leather, plastics/rubber, coal and petroleum products, and furniture, among others.

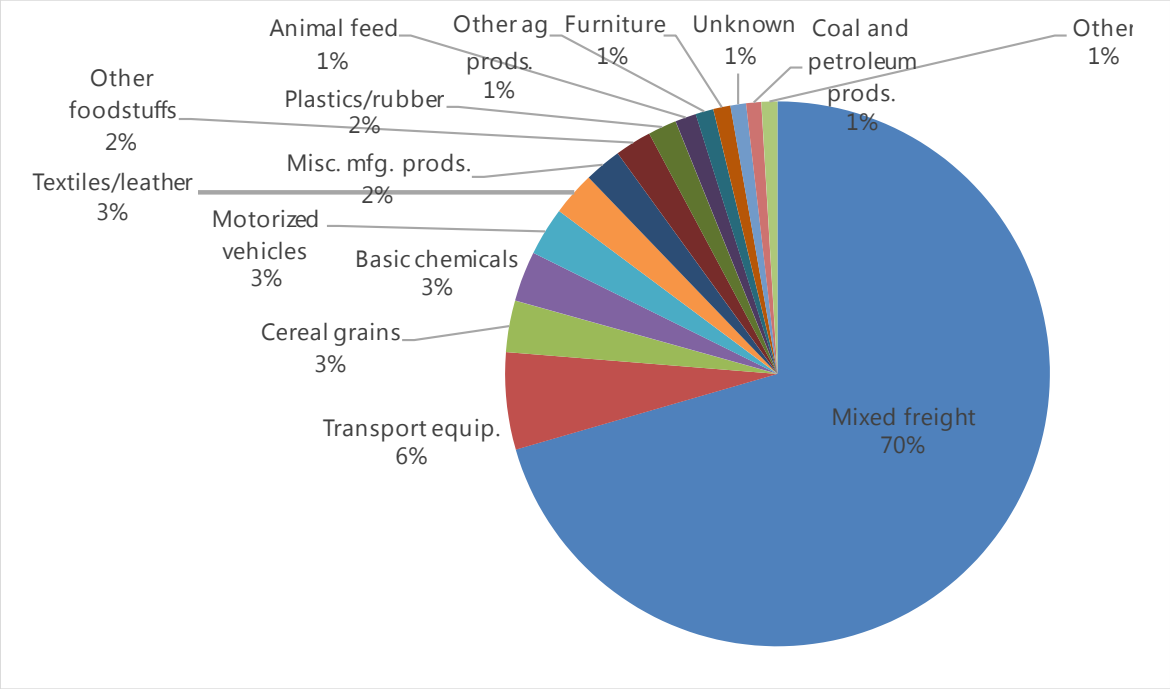

Exhibit 12: California's Top Rail Commodities (in units), All Traffic, 2040

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample, Freight Analysis Framework 3, Ports of Long Beach and Los Angeles

As noted previously, the reason for the change in commodity distribution when a unit, as opposed to tonnage, perspective is taken lies in the typical equipment used and commodity density. Commodities moving primarily in bulk, such as grain, coal and chemicals, are commonly shipped in railcars with a capacity of 80 or more tons, while manufactured goods are largely shipped in containers and trailers with a maximum capacity of around 20 tons. To handle an equivalent amount of volume in a trailer or container as is available in a railcar requires anywhere from 3 to 5 units. Thus, while dense commodities such as coal account for a greater share of tonnage, commodities moving in intermodal service are more prevalent in terms of traffic volumes on California's rail network.

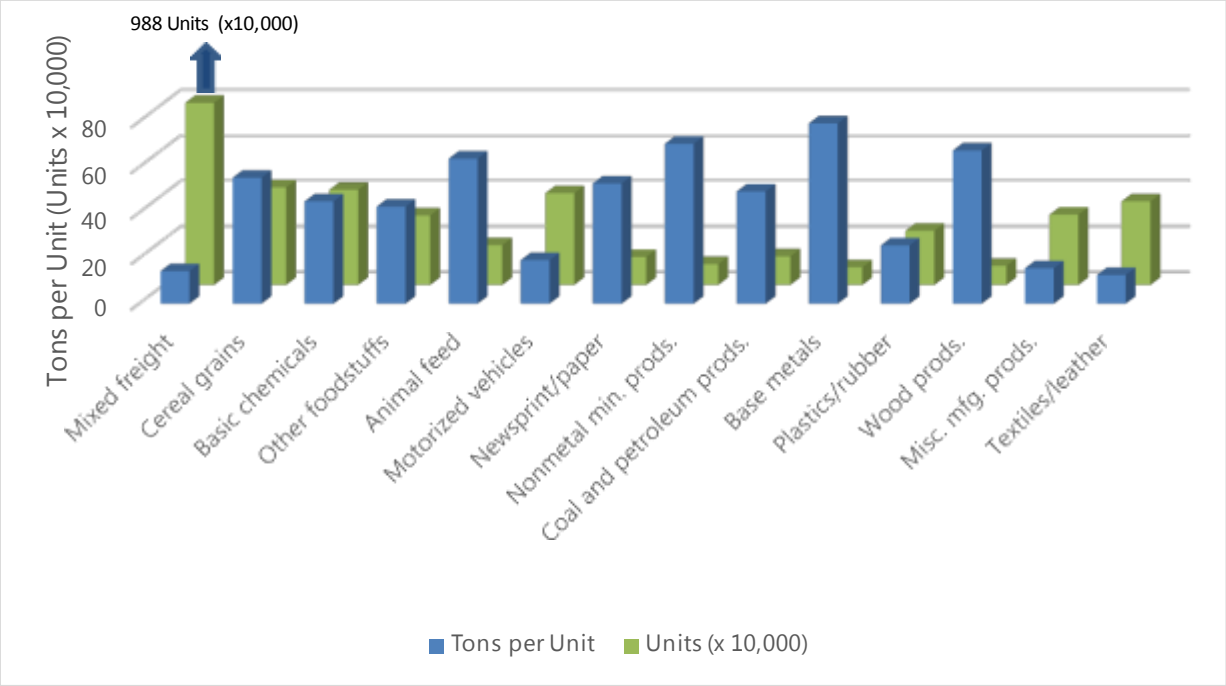

Exhibit 13: Ton-to-Carload Ratios for Various Commodities, 2040

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample, Freight Analysis Framework 3, Ports of Long Beach and Los Angeles

Traffic by Direction of Movement

In terms of total tonnage, inbound commodities comprise a larger share of freight volume on the California rail system by direction – about 53 percent. The primary reason for this is that the directional distribution of particularly dense, heavy commodities such as coal, metallic ores, and natural sands are largely skewed towards the inbound direction. On the other hand, lighter, higher-value commodities such as alcoholic beverages, textiles/leather, and precision instruments are skewed in the outbound direction. In total, outbound commodities comprise about 40 percent of total tonnage. Much of this traffic is associated with imports from Asia, along with specialty goods – such as wine – that are produced in the state.

Internal and through movements constitute relatively small shares of freight rail volume by direction – about 5 and 2 percent, respectively. Bulk commodities such as gravel, non-metallic minerals, and base metals comprise large shares of these movements.

When viewed from the perspective of traffic volumes, as opposed to tonnage, outbound shipments comprise the largest share of units on the California rail system – about 55 percent. Inbound shipments are the next largest share at 43 percent. The reason for the difference between the most prevalent commodities when viewed from a unit as opposed to tonnage

perspective is, again, the importance of California's ports serving as a gateway to Asian trade, most of which moves in containers.

Table 8: California Rail based Tons by SCTG-2 Digit Commodity Type, 2040

SCTG Code	SCTG Commodity	Tons (in thousands) by Commodity and Percentage Distribution by Direction					
		All Directions	% of Total	O/B	I/B	IN	THRU
43	Mixed freight	141,148	46%	62%	38%	< 1%	< 1%
02	Cereal grains	23,708	8%	3%	95%	< 1%	< 1%
20	Basic chemicals	18,767	6%	21%	64%	12%	3%
07	Other foodstuffs	13,007	4%	47%	48%	3%	2%
04	Animal feed	11,100	4%	3%	94%	3%	2%
36	Motorized vehicles	7,686	3%	28%	60%	0%	12%
27	Newsprint/paper	6,493	2%	2%	89%	4%	6%
31	Nonmetal min. prods.	6,428	2%	19%	38%	37%	6%
19	Coal and petroleum prods.	6,173	2%	24%	42%	29%	5%
32	Base metals	6,106	2%	13%	60%	22%	6%
24	Plastics/rubber	6,081	2%	24%	67%	3%	7%
26	Wood prods.	5,626	2%	9%	59%	< 1%	33%
40	Misc. mfg. prods.	4,775	2%	28%	72%	0%	0%
30	Textiles/leather	4,604	2%	60%	39%	< 1%	0%
15	Coal	4,596	2%	0%	98%	0%	2%
12	Gravel	4,594	2%	< 1%	2%	98%	0%
03	Other agricultural prods.	4,564	2%	63%	33%	2%	2%
37	Transport equip.	4,257	1%	5%	89%	5%	< 1%
41	Waste/scrap	4,216	1%	22%	63%	3%	12%
08	Alcoholic beverages	4,170	1%	66%	32%	0%	3%
06	Milled grain prods.	2,843	< 1%	16%	78%	1%	5%
23	Chemical prods.	2,738	< 1%	27%	70%	2%	< 1%
22	Fertilizers	2,475	< 1%	6%	76%	7%	12%
13	Nonmetallic minerals	2,093	< 1%	23%	40%	18%	20%
28	Paper articles	1,632	< 1%	10%	90%	0%	0%
99	Unknown	1,403	< 1%	68%	32%	0%	0%
34	Machinery	1,384	< 1%	57%	39%	4%	< 1%

14	Metallic ores	1,353	< 1%	0%	98%	0%	2%
33	Articles-base metal	1,337	< 1%	35%	60%	< 1%	4%
39	Furniture	1,332	< 1%	80%	21%	0%	0%
05	Meat/seafood	1,319	< 1%	22%	78%	0%	0%
11	Natural sands	858	< 1%	< 1%	97%	2%	< 1%
35	Electronics	496	< 1%	51%	49%	0%	0%
18	Fuel oils	226	< 1%	43%	51%	4%	2%
38	Precision instruments	203	< 1%	99%	< 1%	0%	0%
29	Printed prods.	132	< 1%	24%	76%	0%	< 1%
25	Logs	116	< 1%	1%	90%	9%	< 1%
09	Tobacco prods.	0.3	< 1%	0%	100%	0%	0%
	TOTAL	**160,646**	**100%**	**32%**	**59%**	**7%**	**3%**

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample

Table 9: California Rail based Units by SCTG-2 Digit Commodity Type, 2040

SCTG Code	SCTG Commodity	Units by Commodity and Percentage Distribution by Direction					
		All Directions	% of Total	O/B	I/B	IN	THRU
43	Mixed freight	9,877,126	65%	69%	31%	< 1%	0%
37	Transport equip.	806,665	5%	3%	94%	3%	< 1%
02	Cereal grains	428,586	3%	2%	97%	< 1%	< 1%
20	Basic chemicals	417,881	3%	34%	60%	5%	1%
36	Motorized vehicles	403,102	3%	33%	58%	0%	10%
30	Textiles/leather	366,831	2%	64%	36%	< 1%	0%
40	Misc. mfg. prods.	308,465	2%	33%	66%	0%	< 1%
07	Other foodstuffs	305,072	2%	53%	45%	1%	< 1%
24	Plastics/rubber	237,958	2%	40%	58%	< 1%	2%
04	Animal feed	174,299	1%	3%	90%	5%	1%
03	Other ag prods.	149,357	1%	70%	29%	< 1%	< 1%
39	Furniture	143,411	< 1%	84%	16%	0%	0%
99	Unknown	129,871	< 1%	68%	33%	0%	0%
19	Coal and petroleum prods.	125,260	< 1%	35%	43%	19%	3%

27	Newsprint/paper	122,908	< 1%	2%	92%	3%	4%
41	Waste/scrap	107,754	< 1%	25%	68%	2%	6%
08	Alcoholic beverages	105,020	< 1%	60%	37%	0%	3%
23	Chemical prods.	104,103	< 1%	28%	71%	< 1%	< 1%
28	Paper articles	103,219	< 1%	12%	88%	0%	0%
31	Nonmetal min. prods.	91,513	< 1%	20%	52%	24%	5%
26	Wood prods.	83,580	< 1%	17%	60%	0%	23%
32	Base metals	77,048	< 1%	14%	64%	17%	5%
34	Machinery	73,027	< 1%	65%	34%	< 1%	< 1%
06	Milled grain prods.	67,675	< 1%	27%	70%	< 1%	3%
12	Gravel	66,850	< 1%	< 1%	3%	97%	0%
33	Articles-base metal	59,666	< 1%	31%	68%	< 1%	1%
35	Electronics	42,613	< 1%	51%	49%	0%	0%
15	Coal	38,287	< 1%	0%	98%	0%	2%
14	Metallic ores	37,118	< 1%	0%	99%	0%	< 1%
22	Fertilizers	36,370	< 1%	17%	71%	4%	8%
05	Meat/seafood	34,739	< 1%	45%	55%	0%	0%
13	Nonmetallic minerals	29,052	< 1%	25%	46%	13%	16%
38	Precision instruments	13,883	< 1%	99%	< 1%	0%	0%
29	Printed prods.	10,058	< 1%	31%	69%	0%	< 1%
11	Natural sands	8,940	< 1%	2%	96%	2%	< 1%
25	Logs	4,329	< 1%	1%	96%	3%	0%
18	Fuel oils	3,827	< 1%	29%	67%	3%	2%
09	Tobacco prods.	95	< 1%	0%	100%	0%	0%
	TOTAL	**15,195,555**		**55%**	**43%**	**1%**	**1%**

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample, Freight Analysis Framework 3, Ports of Long Beach and Los Angeles

Top Trading Partners in 2040

Trade Regions beyond California

California's rail-based trading partners are projected to include various regions throughout the United States, Canada, and Mexico, as shown in Table 10. California's top five trading regions overall include the same regions from 2013: East North Central, West South Central, West North Central, Mountain, and East South Central. For inbound commodities, California is expected to

receive the highest number of tons from the East North Central region of the U.S., which includes the states of Illinois, Indiana, Michigan, Ohio, and Wisconsin. In 2040, California is projected to receive nearly 52 million tons of goods from this region. The West North Central region is also an important region, and comprises 22 percent of inbound commodities. This area includes the states of Iowa, Kansas, Minnesota, Missouri, North Dakota, South Dakota, and Nevada. For outbound shipments, California sends 36 percent of all goods to East North Central, and 34 percent to West South Central, which includes the states of Louisiana, Oklahoma, Texas, and Arkansas.

Table 10: California's Top Trading Regions by Rail, 2040

Region	Total		Inbound		Outbound	
	Tons (millions)	% of Total	Tons (millions)	% of Total	Tons (millions)	% of Total
East North Central	95.5	32%	51.8	32%	43.7	36%
West South Central	73.8	25%	32.4	20%	41.4	34%
West North Central	45.3	15%	36.4	22%	8.9	7%
Mountain	26.4	12%	20.0	12%	6.4	5%
East South Central	14.2	5%	6.1	4%	8.1	7%
Pacific	10.4	4%	6.1	4%	4.3	4%
South Atlantic	9.5	3%	3.9	2%	5.6	5%
Canada	6.5	2%	5.9	4%	0.6	< 1%
Middle Atlantic	4.1	1%	1.1	< 1%	3.0	3%
New England	0.9	< 1%	0.2	< 1%	0.6	< 1%
Mexico	0.1	< 1%	0.1	< 1%	0.0	0%
Total	**286.8**	**100%**	**164.1**	**100%**	**122.7**	**100%**

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample, Freight Analysis Framework 3, Ports of Long Beach and Los Angeles

For many regions, the top inbound/outbound commodity is expected to remain mixed freight in 2040, particularly the regions of East North Central, East South Central, Middle Atlantic, South Atlantic, New England, and West South Central. Cereal grains transported to California from the West North Central region are projected to comprise the highest amount of tonnage after mixed freight, with over 14.5 million tons. Coal from the Mountain region remains a significant California import with 4.5 million tons are expected to be shipped into the state in 2040, although this volume remains unchanged from 2013. Finally, basic chemicals and animal feed are two other important imports from the West North Central region, projected in excess of 5 million and 6 million tons, respectively. On the outbound side, California will ship amounts of other food stuffs and other agricultural products (2.6 million tons each) to East North Central,

and high amounts of basic chemicals (1.3 million tons) and motorized vehicles (1 million tons) to the West South Central region. Overall, top inbound commodities in 2040 are expected to be 17 percent greater than outbound commodities, with over 107 million tons shipped outbound compared to 125 million tons shipped inbound.

Table 11 provides more detail on the breakdown of the top 5 regions per rail service type projected for 2040 between California and other trade regions throughout the United States, Canada, and Mexico. There is a clear mix of carload and intermodal traffic within each region depending on the direction of flow. The East North Central region has the highest percentages of intermodal traffic traveling both inbound and outbound California, comprising the vast majority of this activity. This finding emphasizes the dominance of California as the gateway for Asian trade with Chicago as North America's largest freight hub. Additionally, coal, coke, iron ore, and bulk grain cargo is shipped to California primarily from the Mountain and West North Central Regions and shipped from California to several U.S. regions, but the largest proportion goes to West South Central.

Table 11: Top 5 Regions by Service Type and Tonnage, 2040

Service Type	Outbound			Inbound		
	Region	Tons (millions)	% of Region Total	Region	Tons (millions)	% of Region Total
All Other Traffic	East North Central	3.8	9%	West North Central	14.9	41%
	West South Central	3.2	8%	Mountain	10.1	50%
	Mountain	2.8	44%	West South Central	9.8	30%
	Pacific	1.6	36%	Canada	5.7	96%
	East South Central	1.6	19%	Pacific	5.3	87%
Intermodal	East North Central	39.8	91%	East North Central	47.1	91%
	West South Central	37.1	89%	West South Central	21.8	67%
	West North Central	7.4	83%	West North Central	7.6	21%
	East South Central	6.4	79%	Mountain	3.4	17%
	South Atlantic	4.7	83%	East South Central	3.3	54%
Coal, coke, iron ore, and bulk grain	West South Central	0.5	1%	West North Central	13.3	36%
	West North Central	0.1	2%	Mountain	6.7	33%
	East South Central	0.1	1%	Pacific	0.3	4%
	Pacific	0.1	2%	West South Central	0.2	< 1%
	Mountain	0.1	1%	Canada	0.2	3%
Assembled	West South Central	0.8	2%	East North Central	1.8	3%

motor vehicles	Mountain	0.2	3%	West North Central	0.9	2%
	East North Central	0.2	0.5%	East South Central	0.8	12.9%
	West North Central	0.1	1.4%	West South Central	0.6	1.9%
	Pacific	0.1	2.3%	Mountain	0.1	0.4%

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample, Freight Analysis Framework 3, Ports of Long Beach and Los Angeles

Table 12 details the number of units for the top five regions for each service type. As in the prior table, the East North Central region has the highest share of its traffic traveling intermodally both inbound and outbound California, reaching upwards of 96 percent and 98 percent of all intermodal activity, respectively. However, four other regions – West South Central, West North Central, East South Central, and South Atlantic – all receive over 95 percent of rail traffic intermodally from California.

Table 12: Top 5 Commodities by Service Type and Units, 2040

Service Type	Outbound			Inbound		
	Region	Units (thousands)	% of Region Total	Region	Units (thousands)	% of Region Total
All Other Traffic	East North Central	49.8	2%	West North Central	159.5	22%
	West South Central	39.2	1%	West South Central	128.6	7%
	Mountain	34.8	11%	Mountain	114.0	25%
	East South Central	20.5	4%	Pacific	59.7	52%
	Pacific	18.9	9%	Canada	58.1	94%
Intermodal	East North Central	2,991.7	98%	East North Central	2,703.5	96%
	West South Central	2,951.1	97%	West South Central	1,617.2	91%
	West North Central	567.7	96%	West North Central	390.6	55%
	East South Central	515.8	95%	Mountain	257.6	56%
	South Atlantic	368.6	97%	East South Central	218.0	79%
Coal, coke, iron ore, and bulk grain	West South Central	5.3	< 1%	West North Central	120.7	17%
	West North Central	1.2	< 1%	Mountain	86.6	19%
	East South Central	1.1	< 1%	Pacific	2.6	2%
	Pacific	1.0	< 1%	West South Central	2.3	< 1%
	Mountain	0.7	< 1%	Canada	2.1	3%
Assembled motor	West South Central	39.5	1%	East North Central	78.3	3%
	Mountain	10.4	3%	West North Central	41.5	6%

vehicles	East North Central	9.7	< 1%	East South Central	34.5	13%
	West North Central	6.0	1%	West South Central	29.5	2%
	Pacific	4.6	2%	Mountain	3.1	< 1%

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample, Freight Analysis Framework 3, Ports of Long Beach and Los Angeles

Trade Regions within California

Using the same eight distinct regions of trade activity, Exhibit 14 shows the projections of outbound and inbound commodity volumes in 2040 for each of the eight California regions. For both inbound and outbound shipments, the Southern California region comprises the majority of traffic at 56 percent and 74 percent, respectively. In total, nearly 138 million tons of commodities are expected to travel outbound and over 179 million tons of goods are expected to travel inbound California in 2040.

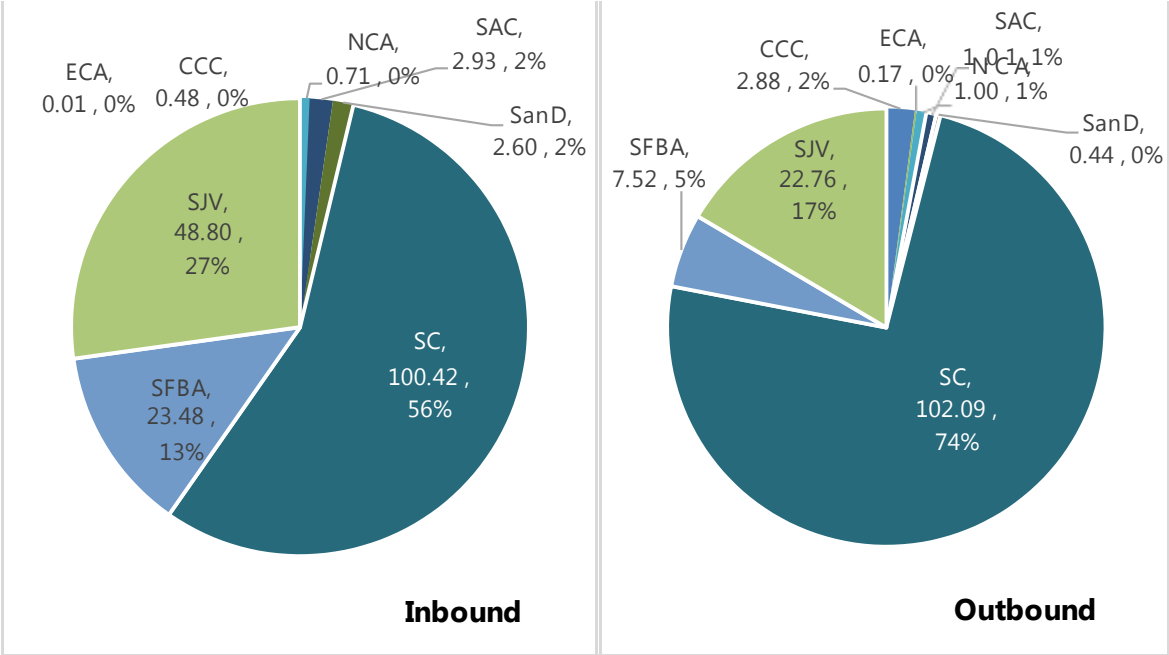

Exhibit 14: Trade Activity in California's 8 Regions, All Traffic, 2040

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample, Freight Analysis Framework 3, Ports of Long Beach and Los Angeles

Note: CCC = Central Coast California; ECA = Eastern California; NCA = Northern California; SAC = Sacramento; SanD = San Diego; SC = Southern California; SFBA = San Francisco Bay Area; SJV = Central Valley

Continuing recent trends, intra-state traffic is expected to account for only 5 percent of tonnage, or approximately 14.8 million tons. Table 13 shows a matrix of trade flows between each region, with some shipments originating and terminating in the same region. The Southern California

region, particularly within Southern California itself, continues to be an important element of trade in California with respect to intrastate trade.

Table 13: Intra-State Commodity Flow (in thousands of tons) between California's 8 Regions, All Traffic, 2040

		Termination Region								
Origin Region		CCC	ECA	NCA	SAC	SanD	SOUTHERN CALIFORNIA	SFBA	SJV	TOTAL
	CCC	12.6	0.0	0.0	0.0	0.0	734.9	1,947.0	0.0	**2,694**
	ECA	0.0	0.0	0.0	0.0	0.0	14.0	0.0	127.7	**141**
	NCA	0.0	0.0	0.0	247.2	0.0	13.3	2.8	38.4	**308**
	SAC	0.0	0.0	0.0	3.2	0.0	48.2	68.0	10.9	**130**
	SanD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0**
	SC	42.4	3.2	50.9	609.6	548.3	5,176.7	745.1	945.5	**8,122**
	SFBA	0.0	0.0	102.4	57.1	60.4	507.9	36.6	317.4	**1,082**
	SJV	9.4	5.7	20.9	25.4	96.3	899.5	436.4	858.7	**2,352**
	TOTAL	**64.4**	**8.9**	**174.1**	**942.5**	**705.1**	**7,394.4**	**3,235.9**	**2,298.6**	**14,824**

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample, Freight Analysis Framework 3, Ports of Long Beach and Los Angeles

Note: CCC = Central Coast California; ECA = Eastern California; NCA = Northern California; SAC = Sacramento; SanD = San Diego; SC = Southern California; SFBA = San Francisco Bay Area; SJV = Central Valley.

Exhibit 16 and Exhibit 17 show 2040 projections on a tonnage basis for county-level origination and termination in California. As was the case in 2013, the vast majority of tonnage is expected to flow in and out of Los Angeles County, 42 percent of inbound commodities and 71 percent of outbound commodities. The ports of Los Angeles and Long Beach drive much of this traffic as the top two largest ports in the county. After Los Angeles, San Bernardino and San Joaquin counties also have a significant amount of inbound and outbound commodity traffic, with between 12 percent and 13 percent arriving inbound and between 8 percent and 4 percent leaving outbound. In total, 49 percent of tonnage is expected to be domestic, 20 percent exported, and 31 percent imported, as shown in Exhibit 15.

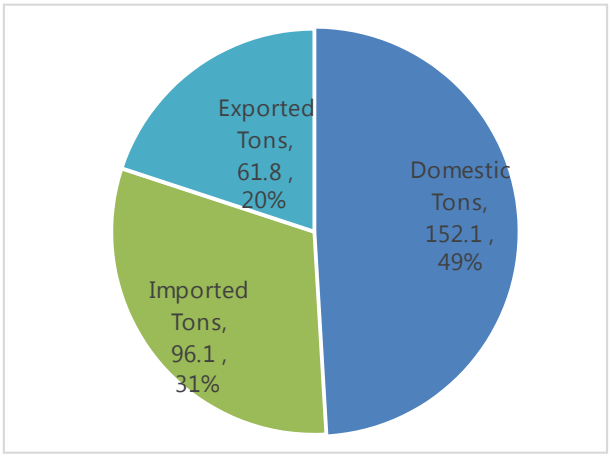

Exhibit 15: Tons by Origin in California, 2045

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample, Freight Analysis Framework 3, Ports of Long Beach and Los Angeles

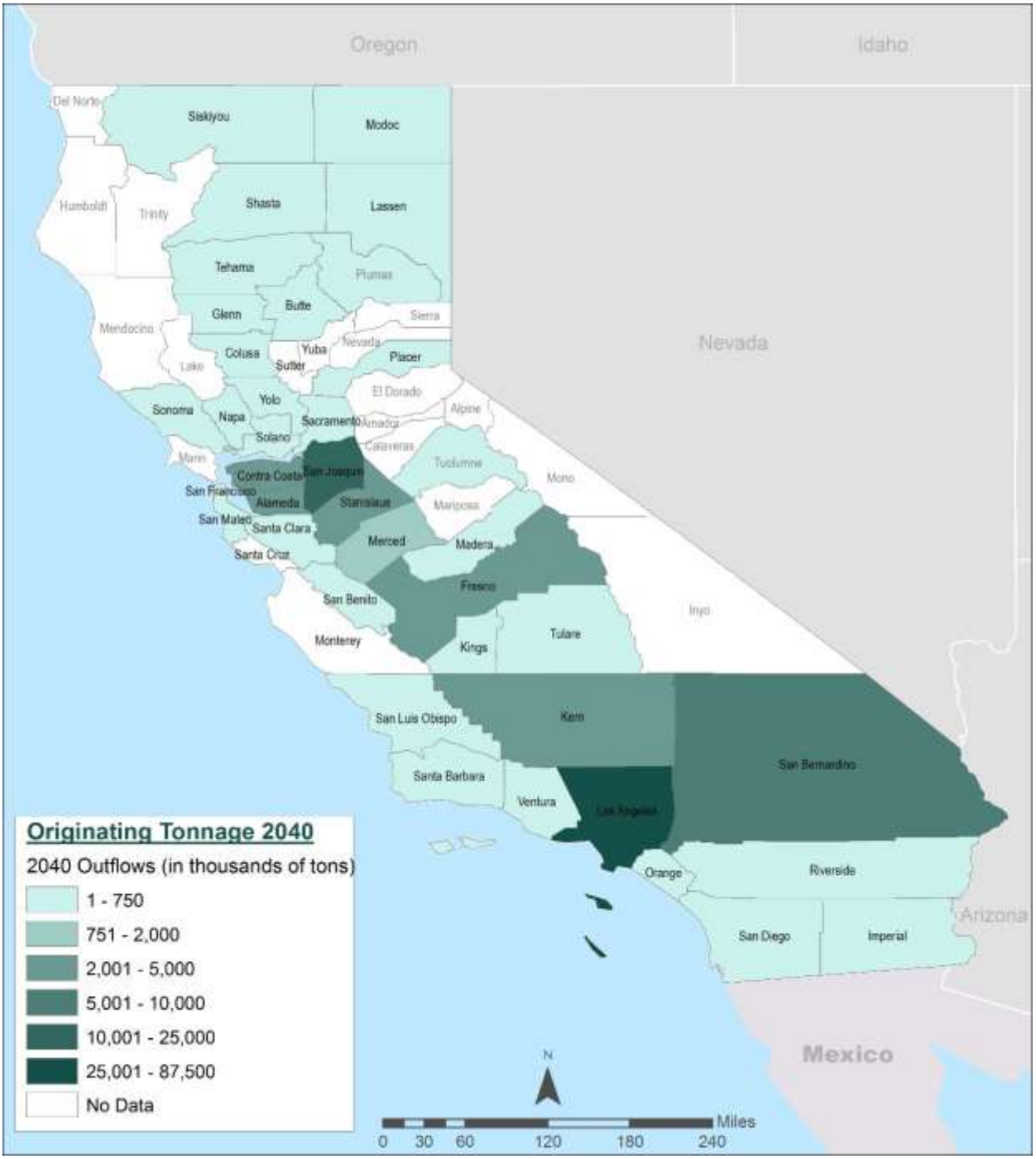

Exhibit 16: Originating Tonnage in California by County, 2040

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample, Freight Analysis Framework 3, Ports of Long Beach and Los Angeles

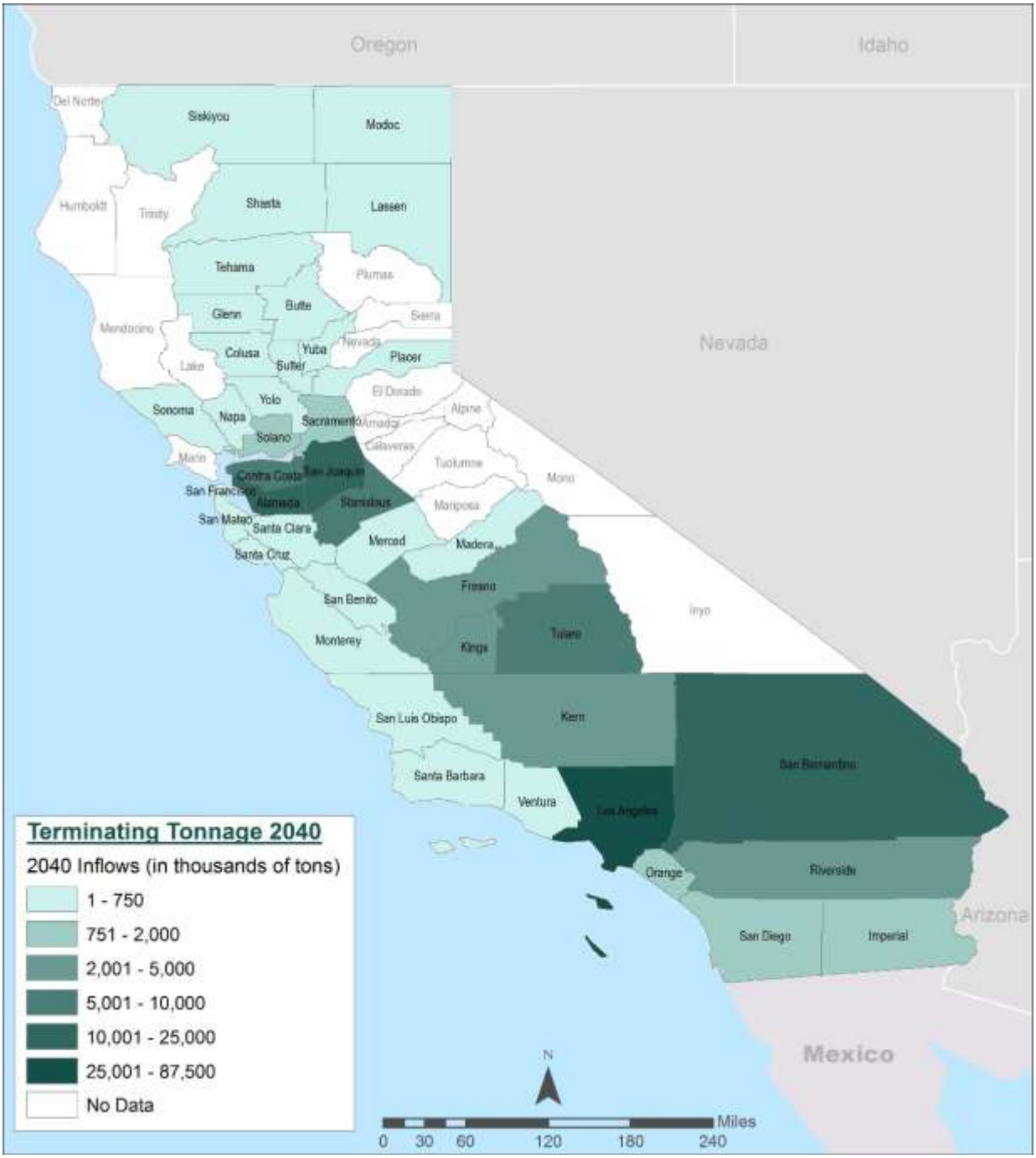

Exhibit 17: Terminating Tonnage in California by County, 2040

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample, Freight Analysis Framework 3, Ports of Long Beach and Los Angeles

Changes in Rail Freight Flows between 2013 and 2040

The forecasts for California's rail activity in 2040 suggest that some important changes in trade activity are expected to occur by 2040. First, tonnage is anticipated to grow substantially, from 161 million tons in 2013 to 310 million tons in 2040, a total growth of 93 percent. Exhibit 18 illustrates the breakdown of California's domestic, imported, and exported rail tonnage in 2013 and 2040. In 2013, 58 percent of tonnage originated within the United States, and exported tonnage and imported tonnage comprised 21 percent each of the remaining rail-based goods in California. By 2040, imported tonnage is expected to account for 31 percent of rail volume, at the loss of the domestic share, which declines from 58 to 49 percent of traffic. Exported tonnage is expected to decline slightly, from 21 to 20 percent. This shift implies the continued prominence of the California's ports as a principal gateway for imports from the Pacific Rim into the NAFTA region. The total growth of imported tons between 2013 and 2040 is 178 percent, and 87 percent for exported tons.

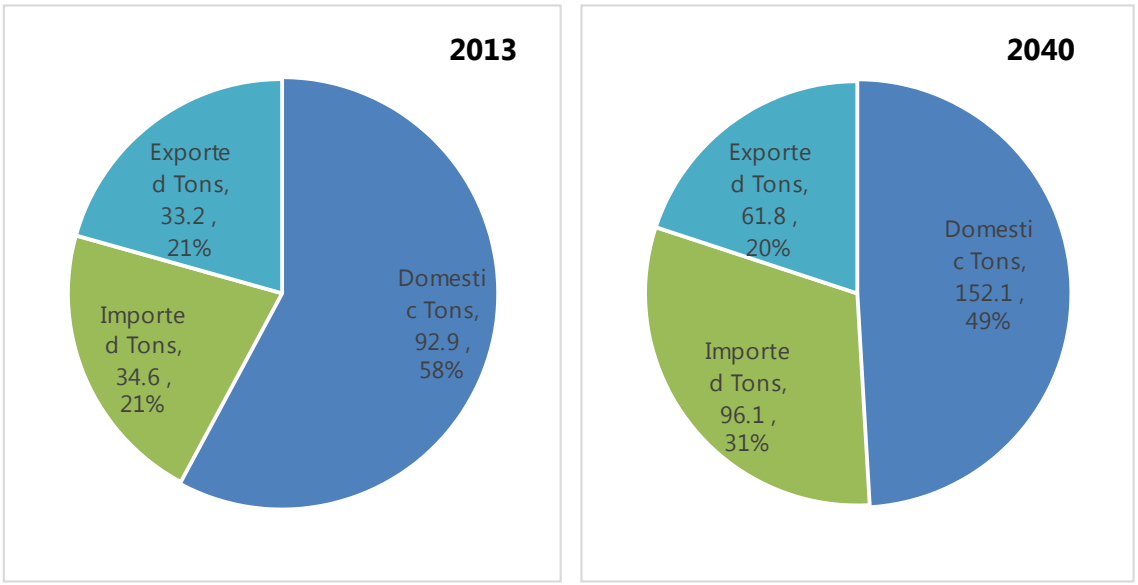

Exhibit 18: Origin of California Tonnage (in millions of tons), 2013 and 2040

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample, Freight Analysis Framework (FAF) 3, data from Ports of Long Beach and Los Angeles

Despite the shift in commodity origin, the directional distribution is not expected to change substantially between 2013 and 2040, as shown in Exhibit 19. Inbound traffic to California comprises the largest category, increasing from 94 million tons in 2013 to 165 million in 2040, a total growth of 75 percent. The second highest proportion of goods travel outbound from

California to other regions, increasing from 51.4 million in 2013 to 123.0 million tons in 2040, a total growth of 139 percent. The sharp increase in this traffic is largely related to increased imports. Intrastate and through tonnage also increase between 2013 and 2040, with total growth of 39 percent and 67 percent, respectively. When measured in units, volume increases between 2013 and 2040 are even greater. Outbound traffic increases by 162 percent, from 3.2 million units to 8.3 million units, and inbound traffic by 93 percent, from 3.4 million units to 6.5 million units.

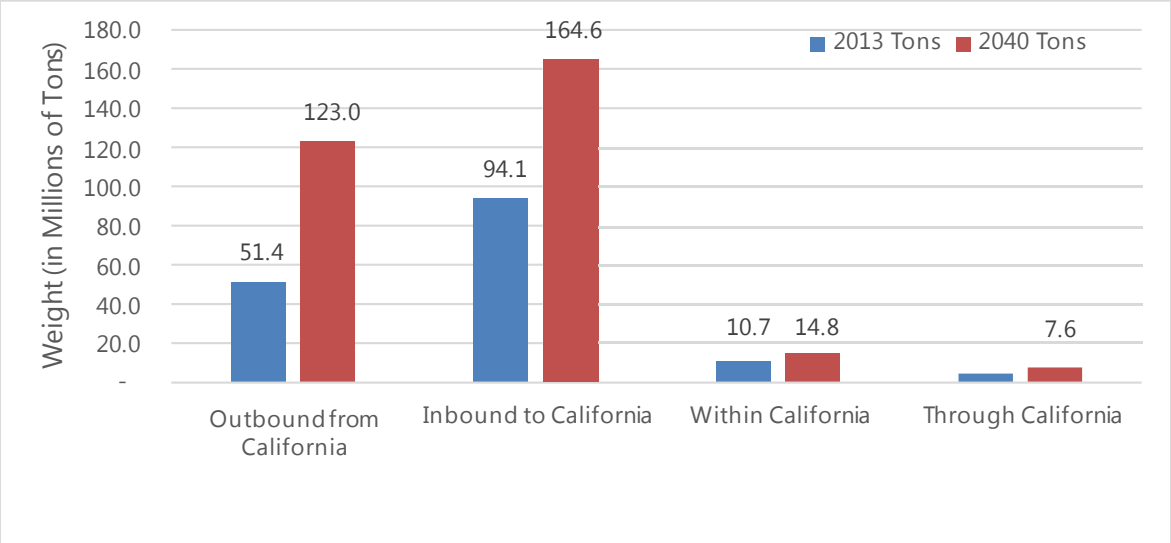

Exhibit 19: Directional Distribution of California Rail Tonnage

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample, Freight Analysis Framework (FAF) 3, Ports of Long Beach and Los Angeles

A shift is also expected in the top rail commodities in California between 2013 and 2040, as shown in Table 14. The totals include tonnage transported in, out, within, and through California by rail (including imports and exports through California's ports). As noted in previous sections, mixed freight is the dominant product traveling via rail, and is expected to be an even more important product in 2040. Mixed freight – which contains products such as consumer goods, including packaged foods, electronics, office supplies, and durable goods, along with a broad range of intermediate components for manufacturing, such as auto parts – increases from 57 million in 2013 to over 141 million in 2040 at an annual growth rate of 3.4 percent. Cereal grains and basic chemicals maintain the second and third rankings, respectively. Cereal grains are expected to increase at an annual rate of 2.0 percent and basic chemicals at a rate of 1.5 percent. Another notable shift is the transport of motorized vehicles by rail in California, which are expected to increase by 83 percent from 2013 to 2040, or 4.2 million tons to 7.7 million tons, respectively. This growth reflects a combination of continued growth in imports of motor vehicles, as well as increased volumes flowing into California from North American production centers.

Table 14: Top 20 Commodities on California Rail, All Directions, 2013 and 2040

SCTG Code	SCTG Commodity Description	2013 Tons Ranking	2040 Tons Ranking	Total Tons (millions), 2013	Total Tons (millions), 2040	Total Growth 2013-2040
43	Mixed freight	1	1	57.0	141.1	148%
02	Cereal grains	2	2	13.8	23.7	72%
20	Basic chemicals	3	3	12.5	18.8	50%
07	Other foodstuffs	4	4	7.6	13.0	70%
04	Animal feed	5	5	6.0	11.1	84%
26	Wood prods.	6	12	5.4	5.6	5%
32	Base metals	7	10	5.3	6.1	16%
19	Coal and petroleum prods.	8	9	5.2	6.2	20%
15	Coal	9	15	4.6	4.6	< 1%
27	Newsprint/paper	10	7	4.4	6.5	48%
36	Motorized vehicles	11	6	4.2	7.7	83%
31	Nonmetal min. prods.	12	8	3.8	6.4	67%
24	Plastics/rubber	13	11	3.6	6.1	68%
12	Gravel	14	16	3.1	4.6	46%
08	Alcoholic beverages	15	20	2.6	4.2	59%
41	Waste/scrap	16	19	2.3	4.2	83%
03	Other ag prods.	17	17	2.1	4.6	120%
30	Textiles/leather	18	14	1.9	4.6	137%
37	Transport equip.	19	18	1.9	4.3	124%
06	Milled grain prods.	20	21	1.9	2.8	52%

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample, Freight Analysis Framework 3, Ports of Long Beach and Los Angeles

Another clear shift in rail trade is evident in California's intrastate shipping trends. Although cargo is not expected to originate in San Diego by 2040, high growth is expected in shipments from San Francisco to San Diego (308 percent between 2013 and 2040) and the Southern California to San Diego (229 percent). Additionally, shipments within the Central Coast California are expected to increase by 242 percent, while shipments from Northern California to San Francisco are also expected to increase by a similar amount.

Most origin-destination combinations are projected to either increase in tonnage or remain stable. However, in three instances volumes are expected to decline. Shipments between Northern California and the Central Valley are expected to decrease by 24 percent between 2013

and 2040. Similarly, shipments between Southern California and Eastern California are expected to decrease 25 percent. Finally, commodities moved by rail within San Francisco are expected to decrease by 22 percent total. In origin-destination combinations where no commodities were shipped by rail in 2013, goods movement by rail was not projected for 2040.

Understanding the share of tonnage among the primary trade regions throughout California helps illustrate changes in the role of these regions in California's economy. Table 15 presents the share of outbound tons from each of California's 8 regions, which includes both domestic outbound traffic by rail and exported tonnage at California ports. Notably, the Southern California region is expected to increase its proportion of outbound tonnage by rail, from 68 percent to 74 percent. This region also has the highest annual growth rate (3.3 percent) and total growth (142 percent). This trend suggests continued increases in imports through the San Pedro Bay ports, arriving by ship and transported throughout the United States by rail. The Central Valley is the second most significant region for outbound tonnage by rail. Though its share is expected to decline between 2013 and 2040, it nearly doubles in size over the same period, with an annual growth rate of 2.5 percent.

Table 15: Share of Outbound Tons from California's 8 Regions, 2013 and 2040

Region	2013 Tons (millions)	% of Total	2040 Tons (millions)	% of Total	CAGR (2013-2040)	Total Growth (2013-2040)
Central Coast California	2.0	3%	2.9	2%	1.4%	47%
Eastern California	0.1	< 1%	0.2	< 1%	1.5%	50%
Northern California	0.9	2%	1.0	< 1%	0.3%	10%
Sacramento	0.8	1%	1.0	< 1%	1.1%	33%
San Diego	0.3	< 1%	0.4	< 1%	1.8%	60%
Southern California	42.1	68%	102.1	74%	3.3%	142%
San Francisco Bay Area	4.1	7%	7.5	6%	2.3%	85%
Central Valley	11.8	19%	22.8	17%	2.5%	92%
Total	**62.0**	**100%**	**137.8**	**100%**	**3.0%**	**122%**

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample, Freight Analysis Framework 3, Ports of Long Beach and Los Angeles

Next, Table 16 presents the share of inbound tons to each of California's 8 regions, which includes both domestic inbound traffic by rail and imported tonnage at California ports. As with outbound traffic, Southern California receives the majority of tonnage, but its share is expected to decrease from 63 percent in 2013 to 56 percent in 2040. However, it is still expected to receive 53 percent more tonnage over the course of this period, suggesting continued increases in exports at the Ports of Los Angeles and Long Beach, arriving from areas throughout the United States. Both the San Francisco Bay Area and Central Valley are expected to increase their share in inbound goods, and exhibit high annual growth rates and total growth overall.

Table 16: Share of Inbound Tons from California's Eight Regions, 2013 and 2040

Region	2013 Tons (millions)	% of Total	2040 Tons (millions)	% of Total	CAGR (2013-2040)	Total Growth (2013-2040)
Central Coast California	0.3	< 1%	0.5	< 1%	2.3%	84%
Eastern California	0.0	0%	0.0	0%	-0.1%	-3%
Northern California	0.4	< 1%	0.7	< 1%	2.1%	76%
Sacramento	1.9	2%	2.9	2%	1.6%	55%
San Diego	1.1	1%	2.6	1%	3.1%	129%
Southern California	65.6	63%	100.4	56%	1.6%	53%
San Francisco Bay Area	10.7	10%	23.5	13%	2.9%	119%
Central Valley	24.7	24%	48.8	27%	2.6%	98%
Total	**104.7**	**100%**	**179.4**	**100%**	**2.0%**	**71%**

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample, Freight Analysis Framework 3, Ports of Long Beach and Los Angeles

Note: CAGR = Compound Annual Growth Rate

The final point of comparison between rail shipments in 2013 and 2040 pertains to regional trade partners, as presented in Table 17. Overall, the most substantial increases in California's rail activity – which includes domestic, import, and export traffic – are projected to occur with the West South Central region, which has an expected growth of 126 percent. West South Central and West North Central are expected to have the highest growth of outbound goods from California, 179 percent and 145 percent, respectively. On the other hand, the New England and Mexico regions are expected to have the highest growth of goods shipped inbound, 145 and 116 percent, respectively.

Table 17: Total Growth for Regional Trade Activity with California, All Traffic, 2013-2040

Region	Total Tons	Inbound Tons	Outbound Tons
Canada	63%	64%	59%
East North Central	113%	101%	131%
East South Central	90%	51%	138%
Mexico	115%	116%	98%
Middle Atlantic	101%	72%	114%
Mountain	67%	61%	89%
New England	100%	145%	87%
Pacific	53%	31%	101%
South Atlantic	80%	63%	94%
West North Central	73%	62%	145%
West South Central	126%	83%	179%
TOTAL	**97%**	**74%**	**139%**

Source: 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample, Freight Analysis Framework 3, Ports of Long Beach and Los Angeles

Train Volumes

Examining the impact of future train volume changes on the rail system is a key element of the 2018 California State Rail Plan. Changes from present train volumes will affect the performance of the system, its capital needs, and potential shifts in mode share between rail and other competing modes. Since train volume changes will not be uniform across the entire network, some segments may be subject to substantial volume gains, others could face stable demand, while others may face declines. This section of the report describes the methodology for generating the rail forecast and presents an analysis of its results.

In estimating train volumes using the data sources described in the Introduction, efforts were made to: (a) maximize use of available data, (b) keep sufficient geographical and rail market detail that can enable statewide rail planning, and (c) be consistent with economic forecasts and freight rail forecasts done as part of other studies. Also, it is important to recognize that the train volume estimates only include revenue freight trains. The methodology utilized for this analysis does not project repositioning moves consisting solely of empty equipment, light engines, or traffic associated with maintenance of way activities. Such traffic can contribute significant additional volumes, particularly around dense terminal areas.

Forecast Methodology

The 2018 California State Rail Plan (CSRP) builds on progress already accomplished in the 2013 CSRP. The basic methodology for deriving base year (2013) and future year (2040) train volumes for the 2018 CSRP, was to adjust train volumes estimated in the 2013 CSRP in accordance with changes in commodity flows as indicated by more recent historical and forecast data. The 2013 CSRP provided a strong foundation for network flows as it conducted a network assignment of 2007 and 2040 rail tonnage flows in order to derive estimates of daily average freight train volumes. The 2013 plan also validated the 2007 train volume estimates against freight train counts on selected rail segments from the state's Class I carriers – Burlington Northern Santa Fe (BNSF) and Union Pacific (UP) – and against train volumes as estimated from the San Pedro Bay Ports' QuickTrip – Train Builder model for Southern California rail segments.

Calculate Base Year Volumes

The 2013 base year train volumes were determined by calculating and applying tonnage growth factors, based on the 2013 Surface Transportation Board Carload Waybill Sample (CWS) and the 2013 CSRP, to the 2013 CSRP's base year train volumes.

Step 1 – Organize Base Year Waybill Observations into Rail Segments – First, the 2013 CWS observations were aggregated by service type (i.e. intermodal or non-intermodal) and origin/destination into a geographical set of rail tonnage flows. Based on the origins and destinations of those flows, the tonnages were associated with rail segments as indicated by the 2013 CSRP's network assignment.

Step 2 – Estimate Base Year Train Volumes – Next, the ratios of the current plan's base year tonnages (2013) to the previous plan's base year tonnages (2007) were calculated. Those ratios were then applied to the previous plan's base year train volumes (2007) to estimate the 2013 train volumes. Thirty-two adjustment factors were developed in this Plan for eight rail corridors (located in non-overlapping geographical areas) in the State and for two rail service types (intermodal and non-intermodal).

Forecast Growth

The FHWA Freight Analysis Framework FAF version 3.5 (FAF3) served as the basis for determining the rate at which California rail traffic, as indicated by the 2013 CWS, will grow over the forecast horizon. This process involved linking FAF3-derived commodity flow growth rates (which are at the geographic level of FAF3 zones) to 2013 CWS rail traffic volumes (which are at the rail station level but can be matched to counties). The spatial disconnect between the two databases necessitated disaggregating the FAF3 to the county level. Counties were chosen as the spatial scale of analysis because they allow enough geographic detail for network assignment while containing enough data for meaningful analyses. Overall, the process was structured in a series of seven steps, discussed in more detail below.

Step 1 – Identify Unique CWS Shipping Lanes – The first step identified unique origin-destination-commodity-mode (ODCM) combinations observed in the 2013 CWS. Origins and destinations were specified at the county level for rail traffic with endpoints within California. Observations with endpoints outside of California were specified at the state level. Because the 2013 CWS utilizes the Standard Transportation Commodity Codes (STCC) while the FAF3 uses the Standard Classification of Transported Goods (SCTG), commodity codes as given in the 2013 CWS were matched to their SCTG counterparts using a crosswalk before specifying ODCM. Modes, as specified in ODCM, correspond to intermodal and non-intermodal as indicated in the 2013 CWS.

Step 2 – Disaggregate the FAF3 – The FAF3 divides California's economic geography into five zones: Los Angeles combined statistical area, San Diego metropolitan statistical area, Sacramento combined statistical area, San Francisco combined statistical area, and Remainder of California. In this step, FAF3 zone-level commodity flows are disaggregated to county-level commodity flows.

Data from a TREDIS[6] database that was provided by Caltrans in the 2013 Rail Plan was used to disaggregate the FAF3 into county level commodity flows. TREDIS provided estimates of employment by industry, imported and exported goods and services, and the total dollar value of the production and consumption of commodities. It was the monetary value of production and consumption by commodity and county for the years 2013 and 2040 that served as the basis for disaggregating the FAF3.

The FAF disaggregation proceeded as follows:

1. First, the industry classifications in the TREDIS database were matched to their corresponding or equivalent Standard Classification of Transported Goods (SCTG) commodity classifications in order to estimate production and consumption dollars by county and by SCTG commodity for the base and forecast years.

2. The analysis then linked each FAF3 zone with the respective counties that comprise it. It further identified those counties with a record of a rail flow (either as an origin or a destination) in the 2013 CWS. In this manner, the counties with rail access were determined.

3. After that, the analysis created a production-side disaggregation matrix. Each cell in the matrix represents a specific California county's share of the production for a particular commodity relative to all other California counties with rail access within the FAF3 zone to which the county belongs. This value was calculated for each commodity-county combination.

4. A consumption-side disaggregation matrix was likewise created. Each cell of the matrix represents a specific California county's share of the consumption for a particular commodity relative to all other California counties with rail access within the FAF3 zone to which the county belongs. This value was calculated for each commodity-county combination.

5. Next, the analysis addressed rail flows with an endpoint outside California. FAF3 zones outside of California were not disaggregated. Production and consumption shares for these areas entered their respective matrices as 1 (i.e. no disaggregation).

[6] http://www.tredis.com/. Accessed January 20, 2016.

6. The full FAF3 database was then reduced to only freight flows with "Rail" or "Multiple Modes and Mail" (which contains intermodal rail flows) as the domestic mode for the years 2013 and 2040.

7. The reduced FAF3 database was then joined with the production- and consumption-side disaggregation matrices using the domestic origin and destination FAF zones, effectively disaggregating the FAF.

8. Lastly, in order to be able to later merge the disaggregated FAF3 with the CWS, flows from or to areas outside of California in the disaggregated FAF were aggregated to the State level.

Because the disaggregation factors were only used to allocate the commodity flows in the FAF3 based on the shares of rail-served commodities and counties in each FAF region, we determined that there was likely very little change in the distribution of this activity between the 2013 and 2018 plan years. As a result, the previously calculated factors were still valid.

Step 3 – Calculate Growth Rates and Market Shares – Using the disaggregated FAF, the analysis then calculated growth rates by trade type (i.e. international or domestic) for the change in rail traffic volumes between 2013 and 2040. Growth rates were calculated for each unique combination of origin, destination, commodity, and mode. Because of the possibility that some unique origin-destination-commodity-mode (ODCM) combinations observed in the CWS may not be present in the FAF, growth rates were also calculated for unique commodity-mode combinations and also by mode alone, as fallback values for growth rates.

Similarly, market shares for each unique ODCM combination were calculated using the base year flows. Market shares are the percentage of an ODCM's flow that is either domestic or international (imports and exports). Again, to account for observations in the CWS that are not present in FAF, unique commodity-mode and mode market shares were calculated as well.

Step 4 – Merge Datasets – The next step merged the FAF3-derived forecast parameters (e.g. market shares and growth rates) with the CWS data using the ODCM as a unique identifier.

Step 5 – Adjust Near-Port Growth Rates and Market Shares – In order to incorporate more detailed information for stations that are located on or near California's major ports (e.g. Los Angeles, Long Beach, and Oakland), the analysis adjusted the intermodal growth rates and market shares associated with those stations by identifying their Standard Point Location Code (SPLC). The current long-range port forecasts were acquired and used to calculate growth rates and market shares for 2013 to 2040. Then, using the QuikTrip Train Builder model, the projected number of annual lifts was converted to container volumes. The same version of the QuikTrip Train Builder model used in the Southern California Association of Governments Regional Transportation Plan was used in this analysis.

Step 6 – Estimate Forecast Year Flows – This step applied the FAF3-derived forecast parameters (e.g. market shares and growth rates) to the 2013 CWS data using the ODCM and SPLC as unique identifiers. The result was a forecast containing tonnage, number of units, and value for each extant origin, destination, carrier (route), and commodity combination.

Step 7 – Estimate Forecast Year Train Volumes – The last step estimated forecast year train volumes. Forecast year (2040) train volumes were estimated by first calculating the ratios of the current plan's forecast year tonnages (2040) to the previous plan's base year tonnages (2007). Those ratios are then applied to the 2007 train volumes by service type to estimate the 2018 CSRP's forecast year train volumes.

Adjustments to Train Volume Estimates in 2013 California State Rail Plan

Daily average train volumes are estimated in the 2018 California State Rail Plan (CSRP) by adjusting the daily average train volume estimates in the 2013 CSRP. The 2013 CSRP conducted a network assignment of 2007 and 2040 rail tonnage flow estimates and derived 2007 and 2040 daily average freight train volume estimates. The 2013 CSRP also validated the 2007 train volume estimates against freight train counts using data available from Class I railroads of BNSF and UP on selected rail segments in the State, and San Pedro Bay Ports' QuickTrip – Train Builder model based train volume estimates for Southern California's freight rail mainlines. A summary of the methodology for the train volume estimations in 2013 CSRP is as follows:

1. **FAF3 Growth Rates based Approach including Network Assignment.** The set of rail segments for which the base year (2007) rail network assigned train volumes based on Association of American Railroads' 2007 National Rail Freight Infrastructure Capacity and Investment Study matched reasonably well against the UP and BNSF train counts, the train volume forecasts were done using the FAF3 dataset in a step-by-step manner:

    a. **Identification of growth rates**. Annual tonnage growth rates between 2007-2020 and 2007-2040 were taken from FAF3 database, and applied to base year (2007) 2007 Surface Transportation Board's (STB) Confidential Carload Waybill sample's tonnage data for California.

    b. **Adjustment of growth rates**. Three types of adjustments: (1) overall commodity growth rates for California Waybill sample were adjusted to be consistent with more recent economic growth trajectories, using TREDIS data, (2) the total growth rate from or to a California FAF3 zone was redistributed to their constituting counties by use of county's share of total FAF3 zone production forecast for outflows and a county's share of total FAF3 zone consumption

forecast for inflows, and (3) intermodal rail flows adjusted using published port forecasts.

c. **Train Volume Estimation and Network Assignment**. This involved converting annual tonnage data to daily train volumes, and estimation of train volumes over rail segments with the help of network assignment for the years 2020 and 2040, followed by routing corrections.

d. **Productivity related Adjustment to Train Volumes by Rail Segment**. The 2007 AAR National Capacity study suggested that railroads anticipate that train productivity will improve by at least 0.5 percent per year over the period from 2007 to 2035. Therefore, a similar productivity improvement was applied to train volume growth rates here as well.

2. **FAF3 Growth Rates based Approach NOT including Network Assignment.** For the set of rail segments for which the base year (2007) rail network assigned train volumes based on the AAR study did not closely match various sources of train counts, the train volume forecasts were still done using adjusted FAF3 growth rates, however, the future train volumes on rail segments were not estimated using the AAR study methodology for rail network assignment. Instead, the actual train counts over the rail segments observed from these various sources of data were increased to future year values using adjusted FAF3 tonnage growth rates aggregated over the rail market(s) to which the trains operating on the segments likely belong.

3. **San Pedro Bay Ports Train Volume Forecasts.** Freight rail forecasts for several of the rail segments in Southern California were developed in conjunction with planning efforts by the by San Pedro Bay Ports. These were adopted for 2013 CSRP in order to be consistent with regional and port planning efforts.

For the 2018 CSRP, thirty-two (32) adjustment factors were developed for eight rail corridors (located in non-overlapping geographical areas) in the State, for two rail service types (intermodal and carload) and for each of the years of 2013 and 2040. The factors represent ratios of the 2013 and 2040 rail tonnage flows by rail corridor and rail service type in this Plan to the 2007 tonnage flows by rail corridor and rail service type in the previous plan (the 2013 plan); where the tonnage flows of a particular rail corridor are specified in terms of railroad-origin-destination combinations.

Table 18 shows the location of rail corridors, rail segments in the rail corridors, railroad-origin-destination combinations of freight flow through the rail corridors and adjustment factors by rail service type for the rail corridors. The ratios show that there has been a decline in rail traffic between 2007 and 2013, the decline is higher in carload rail traffic than in intermodal rail traffic. Intermodal rail traffic is expected to grow faster than carload rail traffic. The highest growth ratio in terms of carload rail traffic is expected on rail segments between Sacramento and Barstow

and rail segments south of Orange. The highest growth in intermodal rail traffic is expected on rail segments between Sacramento and Barstow and rail segments east of Sacramento.

Table 18: Adjustment Factors to 2013 California State Rail Plan Freight Train Volume Estimates by Rail Corridor and Rail Service Type, 2013 and 2040

Rail Corridor Location	Origin-Destination-Railroad Combinations of Freight Flows through Rail Corridor	Base Year Freight Train Volumes Adjustment Factor (2013 to 2007 ratio)		Forecast Year Freight Train Volumes Adjustment Factor (2040 to 2007 ratio)	
		CL	IM	CL	IM
Rail segments east of Oakland, north of San Jose, west of Sacramento and west of Stockton	Originating or terminating by any railroad in San Francisco Bay Area	0.75	0.70	1.23	2.26
Rail segments east of LA, north of Orange, south of Barstow and west of Colton	Originating or terminating by any railroad in Southern California	0.85	0.99	1.38	2.15
Rail segments between Sacramento and Barstow and Sacramento and Los Angeles	(a) Originating or terminating by BNSF in San Francisco Bay Area or Northern California and headed to or coming from anywhere except Pacific northwestern parts of U.S., (b) Originating or terminating by UP in San Francisco Bay Area or Northern California and headed to or coming from Southern California or southwestern and southeastern parts of U.S., (c) Originating or terminating by any railroad in Central Valley, (d) Originating or terminating by any railroad in Southern California and headed to or coming from Pacific northwestern parts of U.S., (e) Through CA.	1.00	1.02	1.62	2.68
Rail segments east of Sacramento	(a) Originating or terminating by UP in San Francisco Bay Area or Northern California and headed to or coming from none of the following: Pacific northwestern parts of U.S. or southwestern and southeastern parts of U.S. or Southern California; (b) Originating or terminating by UP in Central Valley or Southern California and headed to or coming from one of the following states: ID, MT or WY.	0.94	0.97	1.50	3.60
Rail segments north of Sacramento	(a) Originating or terminating by any railroad in San Francisco Bay Area or Central Valley or Southern California and headed to or coming from: Pacific northwestern parts of U.S.; (b) Originating or terminating by any railroad in Northern California; (c)	0.70	0.95	1.02	2.63

	Through CA.				
Rail segments east of Barstow	(a) Originating or terminating by BNSF in San Francisco Bay Area or Northern California or Central Valley or Southern California and headed to or coming from anywhere except Pacific northwestern parts of U.S.; (b) Originating or terminating by UP in San Francisco Bay Area or Northern California or Central Valley and headed to or coming from southwestern and southeastern parts of U.S.; (c) Originating or terminating by UP in Southern California and headed to or coming from all except Pacific northwestern parts of U.S. and southwestern and southeastern parts of U.S.; (d) Through CA.	0.72	1.03	1.25	2.11
Rail segments between San Jose and Los Angeles	Originating or terminating by any railroad in Central Coast	0.71	0.00	1.07	0.00
Rail segments south of Orange	Originating or terminating by any railroad in San Diego or Mexico	0.82	1.00	1.75	2.58

Source: 2013 California State Rail Plan, 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample, Freight Analysis Framework 3, Ports of Long Beach and Los Angeles

Key: CL = Carload, IM = Intermodal

Forecasted Train Volumes

Table 19 and Table 20 show the estimated 2013 and 2040 freight train volumes using the adjustment factors by rail segment in the State. A rail segment is a part of a rail corridor with start station, end station and railroad subdivision. The tables also show whether the tracks in the rail segment have a shared use arrangement with passenger rail services.

The Southern California Association of Governments (SCAG) has made periodic updates to its forecast train volumes to account for additional information from the region's ports. However, the last update occurred in 2011 as part of the Comprehensive Regional Goods Movement Plan.[7] Since train volumes as estimated by SCAG are actively being used for planning purposes in the southern California region, they are jointly presented with the train volumes as estimated in this analysis as a range. As the SCAG forecast volumes are generally higher than those produced in this analysis, they may be viewed as an upper bound on likely future train volumes. Table 19 contains the projected future year daily total freight train volumes by rail subdivision for segments not included in the 2016 SCAG Regional Transportation Plan (RTP). Segments covered in the SCAG RTP are shown in Table 20.

[7] Southern California Association of Governments. Comprehensive Regional Goods Movement Plan and Implementation Strategy: Regional Rail Simulation Update Summary Report, Appendix J. November 2011.

Table 19: Proposed Future Year Total Freight Trains per Day by Rail Segment, Southern California Association of Governments Regional Transportation Plan (2016)

Subdivision	Segment From/To	Segment To/From	Operating Railroads	Passenger Rail Services That Share Tracks	Proposed Base Year Total Daily Freight Trains, 2013			Proposed Future Year Total Daily Freight Trains, 2040			Compound Annual Growth Rate (CAGR), 2013-2040
					CL	IM	Total	CL	IM	Total	
Ventura	Burbank Downtown	Burbank-Bob Hope Airport	UP	Intercity: PSS-AMTRK, CD-AMTRK Commuter: MTL-SCRRA Out-of-State: CS-AMTRK	6	0	6	10	0	10	1.9%
Ventura	Burbank-Bob Hope Airport	Gemco Plant	UP	Intercity: PSS-AMTRK, CD-AMTRK Commuter: MTL-SCRRA Out-of-State: CS-AMTRK	6	0	6	10	0	10	1.9%
Ventura	Gemco Plant	Chatsworth	UP	Intercity: PSS-AMTRK, CD-AMTRK Commuter: MTL-SCRRA Out-of-State: CS-AMTRK	6	0	6	8	0	8	1.1%
Ventura	Chatsworth	Ventura	UP	Intercity: PSS-AMTRK, CD-AMTRK Commuter: MTL-SCRRA Out-of-State: CS-AMTRK	4	0	4	6	0	6	1.5%
Santa Barbara	Ventura	Goleta	UP	Intercity: PSS-AMTRK, CD-AMTRK Commuter: NONE Out-of-State: CS-AMTRK	4	0	4	6	0	6	1.5%
Coast	Goleta	Guadalupe	UP	Intercity: PSS-AMTRK, CD-AMTRK Commuter: NONE	4	0	4	6	0	6	1.5%

				Out-of-State: CS-AMTRK							
Coast	Guadalupe	Callender	UP	Intercity: PSS-AMTRK, CD-AMTRK Commuter: NONE Out-of-State: CS-AMTRK	4	0	4	6	0	6	1.5%
Coast	Callender	San Luis Obispo	UP	Intercity: PSS-AMTRK, CD-AMTRK Commuter: NONE Out-of-State: CS-AMTRK	2	0	2	4	0	4	2.6%
Coast	San Luis Obispo	Salinas	UP	Intercity: CD-AMTRK Commuter: NONE Out-of-State: CS-AMTRK	2	0	2	4	0	4	2.6%
Coast	Salinas	Gilroy	UP	Intercity: CD-AMTRK Commuter: NONE Out-of-State: CS-AMTRK	2	0	2	4	0	4	2.6%
Coast	Gilroy	Tamien	UP	Intercity: CD-AMTRK Commuter: CAL-JPBX Out-of-State: CS-AMTRK	2	0	2	4	0	4	2.6%
Coast	Tamien	San Jose	UP	Intercity: CD-AMTRK Commuter: CAL-JPBX Out-of-State: CS-AMTRK	2	0	2	4	0	4	2.6%
Tracy	Martinez	Port Chicago	UP	Intercity: SJ-AMTRK Commuter: NONE Out-of-State: NONE	0	0	0	0	0	0	0.0%
Martinez	Martinez	Richmond	BNSF, UP	Intercity: CC-AMTRK, SJ-AMTRK Commuter: NONE Out-of-State: CS-AMTRK, ZE-AMTRK	10	8	18	24	12	36	2.8%
Stockton	Port Chicago	Stockton	BNSF	Intercity: SJ-AMTRK Commuter: NONE Out-of-State: NONE	4	6	10	6	14	20	2.6%

Sacramento	El Pinal	Sacramento	UP	Intercity: HSR Commuter: NONE Out-of-State: NONE	14	24	38	20	60	80	2.8%
Fresno	Stockton	El Pinal	UP	Intercity: SJ-AMTRK Commuter: NONE Out-of-State: NONE	20	24	44	30	60	90	2.7%
Fresno	El Pinal	Sacramento	UP	Intercity: SJ-AMTRK Commuter: NONE Out-of-State: NONE	8	0	8	10	0	10	0.8%
Stockton	Stockton	Merced	BNSF	Intercity: SJ-AMTRK Commuter: NONE Out-of-State: NONE	14	14	28	20	34	54	2.5%
Fresno	Stockton	Merced	UP	Intercity: HSR Commuter: NONE Out-of-State: NONE	12	10	22	18	22	40	2.2%
Stockton	Merced	Madera	BNSF	Intercity: SJ-AMTRK Commuter: NONE Out-of-State: NONE	14	14	28	20	34	54	2.5%
Fresno	Merced	Madera	UP	Intercity: HSR Commuter: NONE Out-of-State: NONE	12	10	22	18	22	40	2.2%
Stockton	Madera	Fresno	BNSF	Intercity: SJ-AMTRK Commuter: NONE Out-of-State: NONE	14	14	28	20	34	54	2.5%
Fresno	Madera	Fresno	UP	Intercity: HSR Commuter: NONE Out-of-State: NONE	12	10	22	18	22	40	2.2%
Stockton	Fresno	Bakersfield	BNSF	Intercity: SJ-AMTRK Commuter: NONE Out-of-State: NONE	14	16	30	20	38	58	2.5%
Valley	San Fernando Valley	Lancaster	UP	Intercity: NONE Commuter: MTL-SCRRA	8	0	8	10	0	10	0.8%

				Out-of-State: NONE							
Oakland	Niles	Stockton	UP	Intercity: NONE Commuter: ACE-SJRRC Out-of-State: NONE	2	2	4	2	6	8	4.2%
Valley	Burbank Downtown	San Fernando Valley	UP	Intercity: NONE Commuter: MTL-SCRRA Out-of-State: NONE	8	0	8	10	0	10	0.8%
Coast	San Jose	Santa Clara	UP	Intercity: CD-AMTRK, CC-AMTRK Commuter: CAL-JPBX, ACE-SJRRC Out-of-State: CS-AMTRK	8	0	8	12	0	12	1.5%
Coast	Santa Clara	Newark	UP	Intercity: CC-AMTRK Commuter: ACE-SJRRC Out-of-State: CS-AMTRK	8	0	8	12	0	12	1.5%
Niles	Niles	Oakland	UP	Intercity: CC-AMTRK Commuter: NONE Out-of-State: CS-AMTRK	2	0	2	4	0	4	2.6%
Niles	Newark	Niles	UP	Intercity: CC-AMTRK Commuter: NONE Out-of-State: CS-AMTRK	2	2	4	4	6	10	3.5%
Coast	Newark	Oakland	UP	Intercity: CC-AMTRK Commuter: ACE-SJRRC Out-of-State: CS-AMTRK	3	3	6	4	8	12	3.6%
Martinez	Emeryville	Oakland	BNSF, UP	Intercity: CC-AMTRK, SJ-AMTRK Commuter: NONE Out-of-State: CS-AMTRK	10	14	24	16	34	50	2.8%
Martinez	Richmond	Emeryville	BNSF, UP	Intercity: CC-AMTRK, SJ-AMTRK Commuter: NONE Out-of-State: CS-AMTRK,	10	14	24	16	34	50	2.8%

				ZE-AMTRK							
Martinez	Martinez	Sacramento	UP	Intercity: CC-AMTRK, SJ-AMTRK Commuter: NONE Out-of-State: CS-AMTRK, ZE-AMTRK	8	10	18	11	25	36	2.6%
Sacramento	Sacramento	Marysville	UP, BNSF	Intercity: NONE Commuter: NONE Out-of-State: CS-AMTRK	8	4	12	12	12	24	2.6%
Valley / Black Butte	Marysville	Klamath Falls, OR	UP	Intercity: NONE Commuter: NONE Out-of-State: CS-AMTRK	4	4	8	6	12	18	3.0%
Peninsula	Santa Clara	San Francisco	UP	Intercity: CD-AMTRK Commuter: CAL-JPBX Out-of-State: NONE	6	0	6	12	0	12	2.6%
Martinez	Sacramento	Roseville	UP	Intercity: CC-AMTRK Commuter: NONE Out-of-State: ZE-AMTRK	14	18	32	22	66	88	3.8%
Roseville	Roseville	Reno, NV	UP	Intercity: Commuter: NONE Out-of-State: ZE-AMTRK	0	18	18	0	66	66	4.9%
Valley	Los Angeles	Burbank Downtown	UP	Intercity: PSS-AMTRK, CD-AMTRK Commuter: MTL-SCRRA Out-of-State: CS-AMTRK	12	0	12	18	0	18	1.5%
River East Bank	Los Angeles	East Los Angeles	UP	Intercity: NONE Commuter: MTL-SCRRA Out-of-State: NONE	0	8	8	0	18	18	3.0%
Needles	Barstow	Yermo	BNSF, UP	Intercity: NONE Commuter: NONE Out-of-State: XPW-AMTRK, SW-AMTRK	14	48	62	24	98	122	2.5%

Needles	Yermo	Needles	BNSF	Intercity: NONE Commuter: NONE Out-of-State: SW-AMTRK	12	42	54	18	86	104	2.5%
Cima	Yermo	Las Vegas, NV	UP	Intercity: NONE Commuter: NONE Out-of-State: XPW-AMTRK	4	8	12	6	14	20	1.9%
Orange	Fullerton	Orange	BNSF, UP	Intercity: PSS-AMTRK Commuter: MTL-SCRRA Out-of-State: NONE	6	0	6	12	0	12	2.6%
Orange	Orange	Irvine	BNSF, UP	Intercity: PSS-AMTRK Commuter: MTL-SCRRA Out-of-State: NONE	8	0	8	16	0	16	2.6%
Orange	Irvine	Laguna Niguel	BNSF	Intercity: PSS-AMTRK Commuter: MTL-SCRRA Out-of-State: NONE	8	0	8	16	0	16	2.6%
San Diego	Laguna Niguel	Oceanside	BNSF	Intercity: PSS-AMTRK Commuter: MTL-SCRRA Out-of-State: NONE	4	0	4	8	0	8	2.6%
San Diego	Oceanside	San Diego	BNSF	Intercity: PSS-AMTRK Commuter: CSTR-NCTD Out-of-State: NONE	6	0	6	12	0	12	2.6%
Fresno	Fresno	Bakersfield	UP	Intercity: NONE Commuter: NONE Out-of-State: NONE	12	10	22	18	22	40	2.2%
BNSF Mojave	Barstow	Mojave	BNSF	Intercity: NONE Commuter: NONE Out-of-State: NONE	14	16	30	20	38	58	2.5%
UPRR Mojave	Mojave	Bakersfield	UP	Intercity: NONE Commuter: NONE Out-of-State: NONE	24	24	48	36	60	96	2.6%
Gateway	Keddie	Klamath Falls, Oregon	BNSF	Intercity: NONE Commuter: NONE	4	0	4	6	0	6	1.5%

				Out-of-State: NONE							
Canyon	Marysville	Keddie	BNSF, UP	Intercity: NONE Commuter: NONE Out-of-State: NONE	18	0	18	28	0	28	1.6%
Canyon / Winnemucca	Keddie	Flanigan, Nevada	BNSF, UP	Intercity: NONE Commuter: NONE Out-of-State: NONE	16	0	16	24	0	24	1.5%
UPRR Valley	Marysville	Roseville	UP	Intercity: NONE Commuter: NONE Out-of-State: NONE	16	0	16	24	0	24	1.5%
UPRR Mojave	Mojave	Lancaster	UP	Intercity: NONE Commuter: NONE Out-of-State: NONE	12	10	22	18	22	40	2.2%
UPRR Mojave	Lancaster	Palmdale	UP	Intercity: NONE Commuter: NONE Out-of-State: NONE	12	10	22	18	22	40	2.2%
UPRR Mojave	Palmdale	Silverwood	UP	Intercity: NONE Commuter: NONE Out-of-State: NONE	14	0	14	20	0	20	1.3%
Stockton	Port Chicago	Richmond	BNSF	Intercity: NONE Commuter: NONE Out-of-State: NONE	4	6	10	6	14	20	2.6%
Tracy	Stockton	Port Chicago	UP	Intercity: NONE Commuter: NONE Out-of-State: NONE	0	0	0	0	0	0	0.0%
Olive	Atwood	Orange	BNSF	Intercity: NONE Commuter: MTL-SCRRA Out-of-State: NONE	4	0	4	6	0	6	1.5%

Source: 2013 California State Rail Plan, 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample, Freight Analysis Framework 3, Ports of Long Beach and Los Angeles

Table 20: Proposed Future Year Total Freight Trains per Day by Rail Segment, Southern California Association of Governments Regional Transportation Plan (2016)

Subdivision	Segment From/To	Segment To/From	Operating Railroads	Passenger Rail Services That Share Tracks	Proposed Base Year Total Daily Freight Trains, 2013			Proposed Future Year Total Daily Freight Trains, 2040			Compound Annual Growth Rate (CAGR), 2013-2040
					CL	IM	Total	CL	IM	Total	
Alhambra	Los Angeles	El Monte	UP	Intercity: NONE Commuter: NONE Out-of-State: SL-AMTRK	6	16	22	10 - 14	36	46 - 50	2.8 – 3.1%
Alhambra	El Monte	Bassett	UP	Intercity: NONE Commuter: NONE Out-of-State: SL-AMTRK	6	16	22	10 - 14	36	46 - 50	2.8 – 3.1%
Alhambra	Bassett	Pomona	UP	Intercity: NONE Commuter: NONE Out-of-State: SL-AMTRK	6	16	22	10 - 31	36 - 79	46 - 110	2.8 – 6.1%
Alhambra	Pomona	Montclair	UP	Intercity: NONE Commuter: NONE Out-of-State: SL-AMTRK	8	16	24	12 - 29	35 - 36	48 - 64	2.6 – 3.7%
Los Angeles	Pomona	Montclair	UP	Intercity: NONE Commuter: MTL-SCRRA Out-of-State: NONE	2	16	18	4 - 8	35 - 36	40 - 43	3.0 – 3.3%
Alhambra	Montclair	W. Colton	UP	Intercity: NONE Commuter: NONE Out-of-State: SL-AMTRK	10	16	26	13 - 14	12 - 36	50 - 63	2.5 – 3.1%
Alhambra	W. Colton	Colton	UP	Intercity: NONE Commuter: NONE Out-of-State: SL-AMTRK	12	14	26	20 - 27	32	52 - 59	2.6 – 3.1%

Yuma	Colton	Palm Springs	UP	Intercity: COA-AMTRK Commuter: NONE Out-of-State: SL-AMTRK	16	26	42	26 - 35	56 - 60	82 - 95	2.5 – 3.1%
Yuma	Palm Springs	Indio	UP	Intercity: NONE Commuter: NONE Out-of-State: SL-AMTRK	16	26	42	26 - 35	56 - 60	82 - 95	2.5 – 3.1%
Los Angeles	East Los Angeles	Pomona	UP	Intercity: NONE Commuter: MTL-SCRRA Out-of-State: NONE	2	12	14	4 - 13	26 - 27	30 - 39	2.9 – 3.9%
Los Angeles	Montclair	Mira Loma	UP	Intercity: NONE Commuter: MTL-SCRRA Out-of-State: NONE	4	16	20	6 - 8	35 - 36	42 - 43	2.8 – 2.9%
Los Angeles	Mira Loma	W. Riverside	UP	Intercity: NONE Commuter: MTL-SCRRA Out-of-State: NONE	4	16	20	6 - 14	35 - 36	42 - 49	2.8 – 3.4%
* River West Bank	Los Angeles	Hobart	NONE	Intercity: PSS-AMTRK, COA-AMTRK Commuter: MTL-SCRRA Out-of-State: SW-AMTRK	0	0	0	0	0	0	0.0%
San Bernardino	Hobart	Fullerton	BNSF	Intercity: PSS-AMTRK, COA-AMTRK Commuter: MTL-SCRRA Out-of-State: SW-AMTRK	4	28	32	6 – 15	62 – 66	68 - 80	2.8 – 3.5%
San Bernardino	Fullerton	Atwood	BNSF	Intercity: COA-AMTRK Commuter: MTL-SCRRA Out-of-State: SW-AMTRK	4	28	32	6 – 15	62 – 66	68 - 80	2.8 – 3.5%
San Bernardino	Atwood	W. Riverside	BNSF	Intercity: COA-AMTRK Commuter: MTL-SCRRA Out-of-State: SW-AMTRK	6	28	34	10 - 25	62 – 66	72 - 91	2.8 – 3.7%

San Bernardino	W. Riverside	Riverside	BNSF, UP	Intercity: COA-AMTRK Commuter: MTL-SCRRA Out-of-State: SW-AMTRK	12	42	54	20 – 24	92 – 101	112 - 125	2.7 – 3.2%
San Bernardino	Riverside	High Grove	BNSF, UP	Intercity: COA-AMTRK Commuter: MTL-SCRRA Out-of-State: SW-AMTRK	12	42	54	20 – 24	92 – 101	112 - 125	2.7 – 3.2%
San Bernardino	High Grove	Colton	BNSF, UP	Intercity: COA-AMTRK Commuter: MTL-SCRRA Out-of-State: SW-AMTRK	12	42	54	20 – 24	92 – 101	112 - 125	2.7 – 3.2%
San Bernardino	Colton	San Bernardino	BNSF, UP	Intercity: NONE Commuter: MTL-SCRRA Out-of-State: SW-AMTRK	12	32	44	20 - 26	70 - 71	90 - 97	2.7 – 3.0%
Cajon	San Bernardino	Keenbrook	BNSF, UP	Intercity: NONE Commuter: NONE Out-of-State: SW-AMTRK	14	36	50	24 – 90	77 – 78	102 - 167	2.7 - 4.6%
Cajon	Keenbrook	Silverwood	BNSF, UP	Intercity: NONE Commuter: NONE Out-of-State: SW-AMTRK	14	36	50	24 – 55	77 – 78	102 - 132	2.7 - 3.7%
Cajon	Silverwood	Victorville	BNSF, UP	Intercity: NONE Commuter: NONE Out-of-State: SW-AMTRK	18	38	56	28 - 50	82	110 - 132	2.5 – 3.2%
Mojave	Keenbrook	Silverwood	UP	Intercity: NONE Commuter: NONE Out-of-State: NONE	14	4	18	19 - 24	5 - 10	25 - 34	1.2 - 2.4%
Alameda Corridor	Ports	Redondo Jct	UP, BNSF	Intercity: NONE Commuter: NONE	4	30	34	0 – 6	42 – 66	42 - 72	0.8 – 2.8%

				Out-of-State: NONE							
Alameda Corridor	Redondo Jct	East Los Angeles	UP, BNSF	Intercity: NONE Commuter: NONE Out-of-State: NONE	0	16	16	0	25 - 36	25 - 36	1.7 – 3.0%
River East Bank	East Los Angeles	LATC	UP	Intercity: NONE Commuter: NONE Out-of-State: NONE	0	8	8	0	12 - 18	12 - 18	1.5 – 3.0%
San Bernardino	Redondo Jct.	Hobart	BNSF	Intercity: NONE Commuter: NONE Out-of-State: NONE	4	14	18	0 - 6	17 - 32	17 - 38	0 – 2.8%

Source: 2013 California State Rail Plan, 2013 Surface Transportation Board's (STB) Confidential Carload Waybill Sample, Freight Analysis Framework 3, Ports of Long Beach and Los Angeles

Note: Segments marked with an asterisk (*) denote segments with consistent volumes and growth rates as derived by this analysis and the 2016 Southern California Association of Governments Regional Transportation Plan.

Key: RR = Railroad, CL = Carload, IM = Intermodal, TOT = Total, CAGR = Compound Annualized Growth Rate

Freight Rail Services: BNSF – Burlington Northern Santa Fe Railway, UP – Union Pacific Railroad

Intercity Rail Services: PS-AMTRK – Pacific Surfliner – Amtrak, CC-AMTRK – Capitol Corridor – Amtrak, SJ-AMTRK – San Joaquin – Amtrak, COA-AMTRK – Coachella Valley – Amtrak, CD-AMTRK – Coast Daylight – Amtrak, HSR – California High Speed Rail

Commuter Rail Services: ACE – Altamont Commuter Express - San Joaquin Regional Rail Commission, CAL-JPBX – Caltrain - Peninsula Corridor Joint Powers Board, MTL-SCRRA – Metrolink - Southern California Regional Rail Authority, CSTR-NCTD – Coaster - North County Transit District

Out-of-State Rail Services: CS-AMTRK – Coast Starlight – Amtrak, ZE-AMTRK – Zephyr – Amtrak, SL – Sunset Limited – Amtrak, SW – Southwest Chief – Amtrak, XPW – XpressWest - Amtrak