

Working Paper



Arizona State Freight Plan

(ADOT MPD 085-14)

Phase 3 Working Paper Forestry Sector Profile and Transportation Performance Needs

Prepared for:

Arizona Department of Transportation

Prepared by:

CPCS

In association with:

HDR Engineering, Inc.

American Transportation Research Institute, Inc.

Elliott D. Pollack & Company

Dr. Chris Caplice (MIT)

Plan*ET Communities PLLC (Leslie Dornfeld, FAICP)

Gill V. Hicks and Associates, Inc.

Working Paper

This working paper is one of 10 sector papers focusing on key Arizona economic sectors. Its purpose is to document the economic profile, outlook and transportation performance needs of Arizona's forestry sector. This working paper will later inform system improvement needs to increase Arizona's economic competitiveness and growth. This working paper is provided for comment and discussion and should not be interpreted as final.

Acknowledgements

The CPCS team would like to thank the Arizona Department of Transportation (ADOT) for its guidance and input in developing this working paper. The team also recognizes the considerable contribution of the forestry and wood product stakeholders consulted in the development of this working paper.

Opinions

Unless otherwise indicated, the opinions herein are those of the author and do not necessarily reflect the views of ADOT or the State of Arizona.

Contact

Questions and comments on this working paper can be directed to:

Elizabeth Drake
Forestry Sector Analyst
T: +1.613.237.2500 ext. 316
edrake@cpcstrans.com

Donald Ludlow
Project Manager
T: +1.202.772.3368
dludlow@cpcstrans.com

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Executive Summary

Economic and Traffic Profile

The forestry sector in Arizona can be categorised into three general and related sub-sectors: forestry products (logging, brush removal, etc.), wood products (lumber, plywood, oriented strand board, veneer and other manufactured wood products) and paper products (paper, cardboard, tissue paper, etc.).

Forest products historically played an important role in Arizona's economy, particularly in the northern and eastern regions of the State where Arizona's forests are concentrated. The once vibrant commercial logging and downstream sawmill industry has been increasingly stagnant over the past twenty years, in large part due to changes in environmental and economic conditions.

For instance, the wood products sector, which contributed \$404 million to the State's gross domestic product (GDP) in 2012, or .1 percent of the State's total economic output, has contracted by over 1.5 percent per annum since 1997, compared to state-wide GDP growth levels averaging 4.9 percent per annum over that same period.

Limited logging has led to major overcrowding of Arizona's forests, resulting in an increased risk and incidence of wildfire. A major government initiative to increase logging in select regions of the state (the Four Forest Restoration Initiative – 4FRI) is underway.

Due to the currently limited timber harvesting and downstream processing industry in the state, the majority of inputs for paper and cardboard products manufacturing in Arizona consist of recycled paper and virgin fiber brought in from outside of the state. Likewise, the vast majority of lumber, wood products and paper products consumed in Arizona are brought into the state from other parts of the U.S. and Canada.

Supply Chain Structure and Transportation Performance Needs

The majority of Arizona originated traffic flows in Arizona are moved by truck, comprising moves of timber from logging (landing) sites, to regional sawmill, biomass power plant and wood pellet plant facilities, typically located within 50 to 100 miles of the landing sites. A combination of rail

	Measure	Forestry Sector	Arizona (Statewide)
Economy	GDP (2012, \$ million)	\$404	\$271,503
	GDP Annualized Growth (1997-2012)	-1.6%	4.9%
Jobs	Employment (2013)	5,702	2,619,055
	Compensation per Employee (2013)	\$50,687	\$57,393
Transportation	Total Commodity Flows (2012, Mt)	2.3	138.2
	Top Origin (2012, Mt)	Canada (.7)	California (9.5)
	Top Domestic Destination (2012, Mt)	California (.3)	Mexico (5.6)
	Intrastate Flows (2012, Mt)	.7	101.8
	% Truck (2012)	78.2%	87.2%
Source: CPCS analysis of data from Bureau of Economic Analysis and 2012 Commodity Flow Survey			

and truck are used to bring in lumber, wood products and paper products to Arizona from other parts of the country and Canada.

The value of the product being transported determines the degree to which transportation costs are important relative to transit time, service level and reliability. The costs associated with harvesting and transporting logs and biomass to regional sawmills and processing facilities exceed the prices obtained for these very low value products for all but the shortest journeys. For producers of these products keeping transportation costs low is paramount. Producers of higher value products (wood products, paper products) place relatively more importance on reliability, service levels and transit time than on transportation costs.

Notable Barriers and Related Priority Improvements to Enhance Competitiveness and Growth

In the logging sector, a number of transportation-related barriers affect competitiveness and growth. First and foremost, the low value and heavy weight of logs makes transporting them over distances greater than 100 miles commercially challenging. The ongoing two-year ADOT pilot program – Healthy Forests Initiative – which increases axle weights for forestry vehicles to 90,800 pounds on certain roads has been extremely beneficial to the industry. Stakeholders would like to see this program made permanent and expanded to other regions of the state (notably to the regions where the current 4FRI logging contracts are underway).

Second, there is a relative shortage of available logging trucks, trailers and truck drivers willing and able to work in the logging industry, located largely in northeastern Arizona and now in the first 4FRI contract area around Williams and Flagstaff. The work conditions are challenging, hauls are typically only in one direction, and the value of product is low meaning shippers cannot pay premiums to carriers.

Though some shippers face challenges securing trucking carriers, particularly during the peak agriculture produce season, there were no significant transportation barriers noted by stakeholders in other sub-sectors of the forestry industry.

Going forward, the 4FRI initiative has the potential to jump-start the local forestry sector in Arizona, and with it, the local downstream wood processing industry. The current 4FRI contract is for logging in northern Arizona in the Flagstaff and Williams areas, over 150 miles from the existing (historical) wood processing industries in northeastern Arizona. This has somewhat limited the economic benefits and economies of scale which could have resulted from the 4FRI initiative had the contract been awarded in northeastern Arizona.

When subsequent 4FRI contracts are awarded in northeastern Arizona, it should provide a major boost to the local industry and result in larger truck freight flows in the region, and from the region to Phoenix. Long-term contracts and stable traffic volumes for sawmills will also contribute to attracting more trucking carriers, easing some of the commercial challenges faced by regional producers.

Acronyms and Abbreviations

4FRI	FOUR FOREST RESTORATION INITIATIVE
ADOT	ARIZONA DEPARTMENT OF TRANSPORTATION
BNSF	BURLINGTON NORTHERN SANTA FE RAILROAD COMPANY
CFS	COMMODITY FLOW SURVEY
EU	EUROPEAN UNION
FHWA	FEDERAL HIGHWAY ADMINISTRATION
GDP	GROSS DOMESTIC PRODUCT
MAP-21	MOVING AHEAD FOR PROGRESS IN THE 21 ST CENTURY ACT
MPD	MULTIMODAL PLANNING DIVISION (OF ADOT)
Mt	MILLION TONS
NAICS	NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM
OSB	ORIENTED STRAND BOARD
U.S.	UNITED STATES OF AMERICA

1 Introduction

Key Messages

The Arizona Department of Transportation, Multimodal Planning Division, retained a team led by CPCS Transcom Inc. to assist in the development of Arizona's State Freight Plan.

The aim of this working paper is to establish the freight transportation performance needs, outlooks, and economic contribution of Arizona's forestry sector. This will later inform the analysis of broader transportation system based needs and priorities.

This working paper was developed in large part through stakeholder consultations and analysis of forestry sector data.

1.1 Introduction: Why an Arizona State Freight Plan?

Arizona's economic potential is supported by the state's transportation infrastructure, which connects sources of production to markets.

When transportation infrastructure and related services are efficiently designed and competitively positioned, businesses benefit from lower transportation costs, faster and better transportation services, and increased reliability, which in turn contribute to their own competitiveness and growth, and that of the broader region.

Jurisdictions with access to competitive transportation infrastructure and services are at a competitive advantage in attracting investment, creating jobs and realizing economic growth. Arizona's State Freight Plan can help enable this outcome.

To this end, the ADOT's Multimodal Planning Division (MPD), is developing Arizona's State Freight Plan which will provide strategic guidance to enhance Arizona's economic competitiveness and facilitate economic growth.

1.2 Project Objectives

The State Freight Plan will define immediate and long-range investment priorities and policies that will generate the greatest return for Arizona's economy, while also advancing other key transportation system goals, including national goals outlined in MAP-21. It will identify freight transportation facilities in Arizona that are critical to the State's economic growth and give appropriate priority to investments in such facilities.

The State Freight Plan will ultimately provide Arizona with a guide for assessing and making sound investment and policy decisions that will yield outcomes consistent with the state's visions, goals, and objectives, and notably, promote regional competitiveness and economic growth.

1.3 Purpose of this Working Paper

Since it is economic activity – particularly from goods movement sectors – that drives demand for freight transportation infrastructure and services, optimization of the state's freight transportation system, and related strategies, goals and investments, must start by addressing the transportation performance needs of the sectors moving freight. Yet, the transportation

performance needs of freight can differ by sector and commodity group, locations and even company.

For this reason, the team identified 10 key freight sectors in Arizona for specific focus: wholesalers and retailers, food and beverage, high-tech manufacturing, general manufacturing, transportation equipment manufacturing, transportation and logistics, mining (except oil and gas), energy (oil and gas), agriculture, and forestry.

The purpose of this working paper is to provide a focused assessment of the transportation performance needs, outlooks and economic contribution of the forestry sector (defined here as NAICS Codes 113, 321 and 322).

Specifically, it addresses the following key questions:

- At a high level, what is the profile and economic contribution of forestry sector to Arizona's economy?
- How do the supply chains of Arizona's forestry sector utilize the transportation system and what are the major origins, destinations, intermediate points, and final products of these chains?
- How are forestry sector supply chains structured, managed, and what are the primary drivers of transportation decisions and related performance needs?
- What are the key trends in the forestry sector, how are these influencing freight flows, and what are the implications, opportunities and challenges for the competitiveness of Arizona's freight system going forward?

1.4 Methodology

This working paper is informed by a combination of literature review, data collection and analysis, and consultation with forestry sector stakeholders. Documents reviewed are footnoted throughout the working paper, as appropriate. A list of individuals consulted is provided in Appendix A (unless the stakeholder has specifically requested non-attribution).

1.5 Limitations

This working paper is in many cases informed by data and input provided by third parties. CPCS has verified this information to the extent possible through analysis and cross-checking with other sources but cannot guarantee the accuracy of data received from third parties.

2 Forestry Sector Profile

Key Messages

The forestry sector in Arizona is dominated by wood products and paper products, with very limited logging taking place.

The logging industry - concentrated in northern and northeastern Arizona - is in slow transition phase, after 20 years of stagnation. Recently awarded thinning contracts will increase the timber supply to regional sawmills and processing facilities.

The vast majority of wood products and paper products consumed in Arizona are brought into the state from other parts of the U.S. and Canada.

2.1 Overview of Forestry and Wood Products Sector

Forests have long contributed to Arizona's economy, though changes in economic conditions, environmental concerns, an overall reduction of large trees, and a shift to recycled paper have resulted in changes in the sector over the past 20 years.

The sector can be categorised into three general and related sub-sectors: forestry products (logging, brush removal, etc.), wood products (lumber, plywood, oriented strand board (OSB), veneer and other manufactured wood products) and paper products (paper, cardboard, tissue paper, etc.). Each sub-sector is described below and referenced where relevant with respect to transportation issues in the remainder of this Working Paper.

Forestry Products

Forest covers roughly 27 percent of the State of Arizona and occupies 19.4 million acres, stretching across large parts of northern and northeastern Arizona. Over 95 percent of the timber harvest areas in Arizona are federal land, managed by the U.S. Forestry Service. The remaining timber harvest areas are owned by the State, tribal and private entities.¹ Government agencies control the issuance of logging permits on government-owned lands.

The once vibrant commercial logging industry has been increasingly stagnant over the past twenty years. Beginning in the late 1980s, concerns regarding the ecological impact of logging resulted in a near moratorium on logging activity across the State.² The decline in logging activity had a major downstream economic impact for regional sawmills – largely concentrated in northeastern Arizona – which have struggled to remain commercially viable in the face of very limited timber supplies.

As a result of limited logging, Arizona's forests have become increasingly overcrowded, which has increased the risk and incidence of wildfires and flooding in region. To address wildfire risks, government agencies collaborated to develop a program which contracts private loggers to thin³ small-diameter trees and remove biomass to reduce wildfire risks and restore natural ecosystems⁴. The major Four Forest Restoration Initiative (4FRI), which was recently launched, awards thinning contracts across four national forests, encompassing treatment of 50,000

¹ University of Montana, Bureau of Business and Economic Research. "The Four Corners Timber Harvest and Forest Products Industry, 2012".

² In particular, the Mexican Spotted Owl which inhabits forests in Arizona (and across the Pacific North West) was listed as a threatened species in the late 1980s, which severely limited the amount of logging which could be done in these regions.

³ Four Forest Restoration Initiative (www.fourforestrestorationinitiative.org)

⁴ Unlike clear-cut logging in other parts of the U.S., most logging projects in Arizona involve thinning - leaving a small number of trees behind on each acre which results in an eco-system similar to what existed before settlers arrived in the area.

acres per year over a 20-year period⁵. The first major 4FRI contract covering 300,000 acres in northern Arizona has been underway for three years of a 10-year contract, and further contracts are in development.

Despite the huge number of trees to be cleared, they are worth relatively little because of their small diameter (largely ponderosa pine between 13-16 inches in diameter). The low value of logs has significant impacts in terms of the transportation supply chain, as discussed later in this paper.

Wood Products

This category includes manufactured wood products such as lumber, plywood, OSB, furniture, engineered panels, crates, pallets, and veneer.

Relatively small quantities of trees harvested in Arizona are processed into lumber, wood chips, wood pellets, pallets, crates and furniture. These wood products are consumed within Arizona, with some limited movements to neighboring states and Mexico (as described in more detail in 2.3).

The vast majority of manufactured wood products consumed in Arizona are imported from outside of the state for three reasons. First, the domestic logging industry and associated sawmill sector is relatively small and cannot meet demand within Arizona. Second, due in large part of a limited and unreliable timber supply, existing sawmills in Arizona have largely not been able to invest in upgrading equipment to process small-diameter logs into higher value added products in demand by consumers (in contrast to California and Oregon sawmills, for example). Third, as ponderosa pine is a softwood, it is appropriate for furniture and industrial applications (wood pellets, crates, pallets, etc.), but is not appropriate for major building projects where stronger hardwood is preferred (and often required under building codes).

Major import markets include lumber from the Pacific Northwest, California and Canada, and manufactured wood products (OSB, plywood, engineered panels) from the Pacific Northwest, Texas and Oklahoma. Most of these products are destined to Phoenix.

⁵ In 2014, a 4FRI contract, covering 300,000 acres over 10 years, was awarded to Good Earth Power (who have contracted the Campbell Group to do the thinning for them).

Figure 2-1: Phoenix Wood Products Terminal



Source: CPCS

Paper Products

The production of paper in Arizona is not directly linked to the forestry sector in Arizona, as the state has no pulp mills and no wood fiber originating from Arizona forests is used in the production of paper products in the state. There are two major firms producing paper products in Arizona, and both specialize in tissue products: SCA Tissues with complimentary facilities in Bellemont and Flagstaff, and Doubletree Paper Mill in Gila Bend.⁶ These firms use a combination of recycled paper and virgin fibre (originating outside of the state) to manufacture their products. Overall, paper products consumed in Arizona are shipped into the state from other parts of the U.S. and Canada.

⁶ The Catalyst paper mill in Snowflake was closed permanently in 2012. Source: Catalyst news release, July 2012.

2.2 Economic Profile and Importance to Arizona's Economy

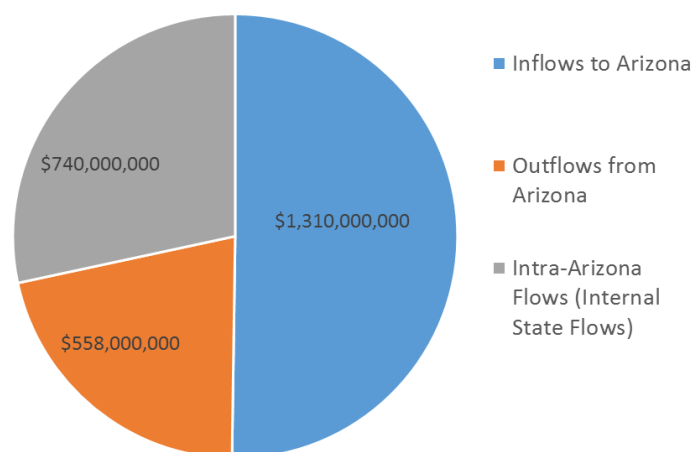
2.2.1 GDP

The wood products sector⁷ in Arizona contributed \$404 million to the State's GDP in 2012, representing .1 percent of the State's total economic output. Since 1997, GDP in the wood products sector has shrunk at a rate of -1.6 percent per annum, underperforming compared to the overall state average of 4.9 percent GDP growth per annum.⁸

2.2.2 Commodity Flows

Overall, \$1.9 billion of goods in the forestry sector travelled into, out of, or within the State of Arizona in the year 2012. Of this, \$1.3 billion of goods originated in other states and were destined to Arizona, \$558 million originated in Arizona and were destined for other states, and \$740 million in goods travelled within the state of Arizona.

Figure 2-2: Value of Flows Into, out of, and Within Arizona in 2012



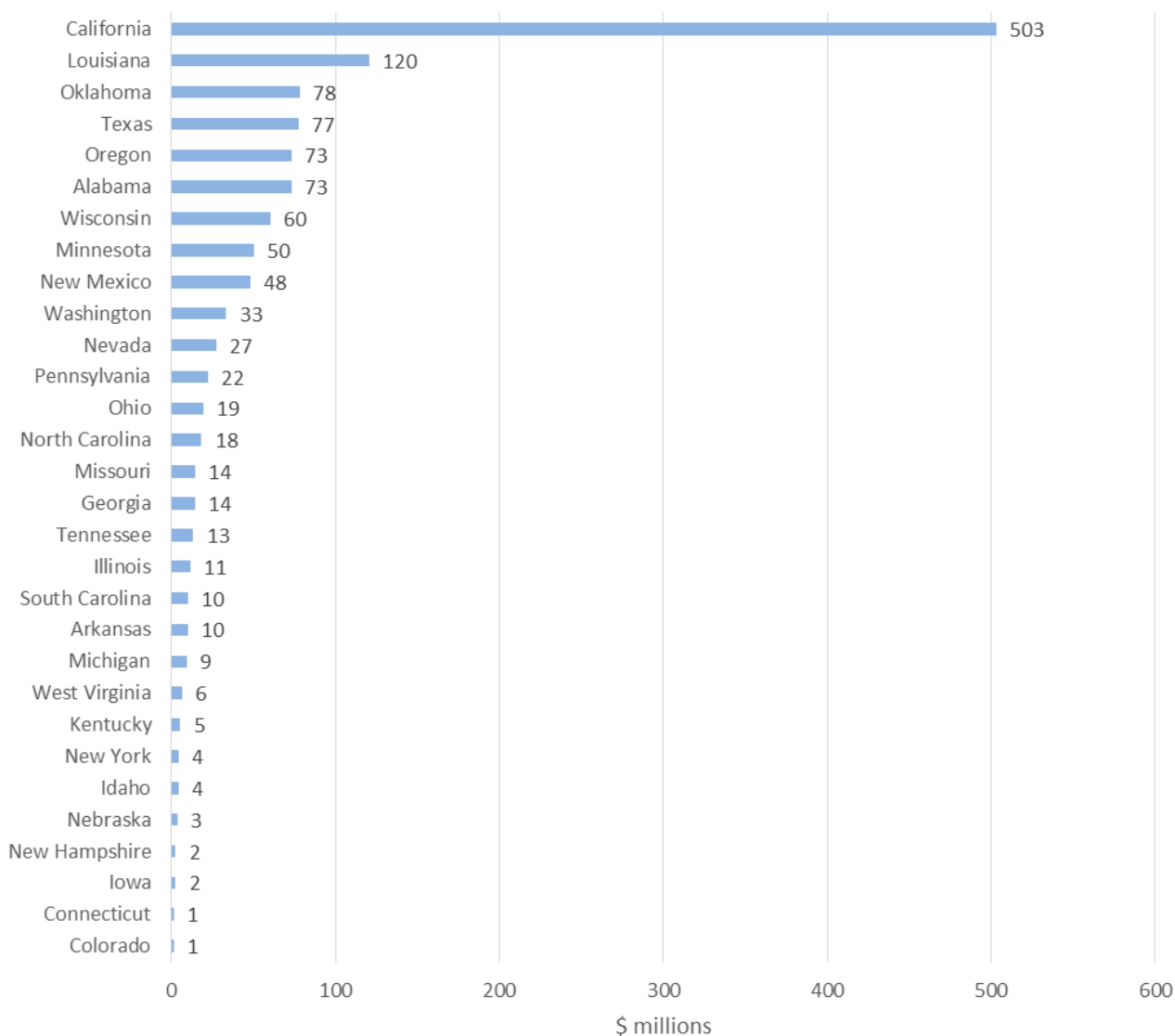
Source: CPCS analysis of Commodity Flow Survey, 2012.

Origins of Inflows to Arizona

The figure below summarizes the origins of forestry products that were shipped to Arizona from other states. California was the largest origin of forestry products destined for Arizona with \$503 million in products shipped to Arizona, followed by Louisiana and Oklahoma at \$120 million and \$78 million respectively.

⁷ GDP data is unavailable for NAICS 113 (forestry), thus GDP data is shown only for the downstream products of the sector including manufacturing of wood and paper products.

⁸ Bureau of Economic Analysis Regional Economic Accounts, GDP by State. GDP in current dollars.

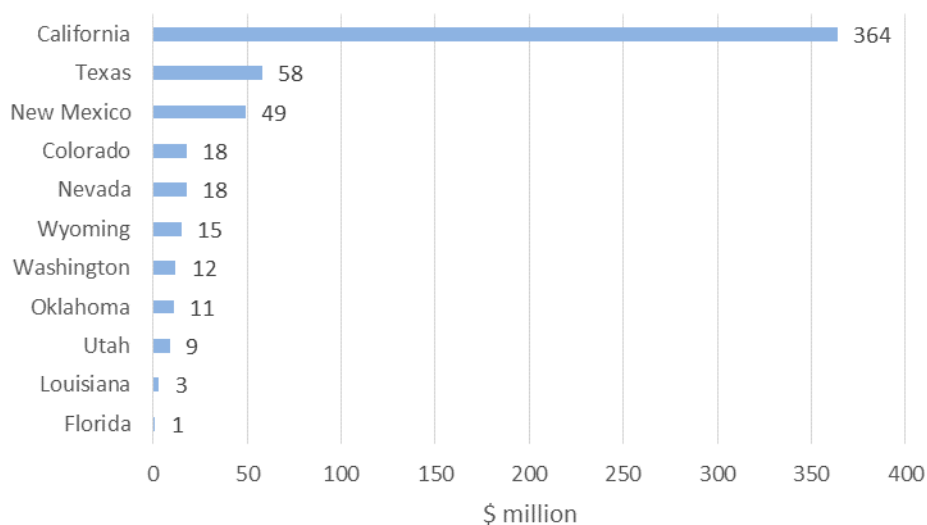
Figure 2-3: Value of Forestry Inflows to Arizona by State or Origin
(2012)

Source: CPCS analysis of Commodity Flow Survey, 2012.

Destinations of Outflows From Arizona to Other States

The figure below summarizes the destination of forestry products originating in Arizona. California was the largest destination of Arizonan forestry products, where \$364 million of products originating in Arizona were destined. Some of these flows may have been subsequently destined for international destinations through ports located in California. A further discussion on international trade flows is included in section 2.2.3.

Figure 2-4: Value of Forestry Outflows from Arizona by State of Destination (2012)

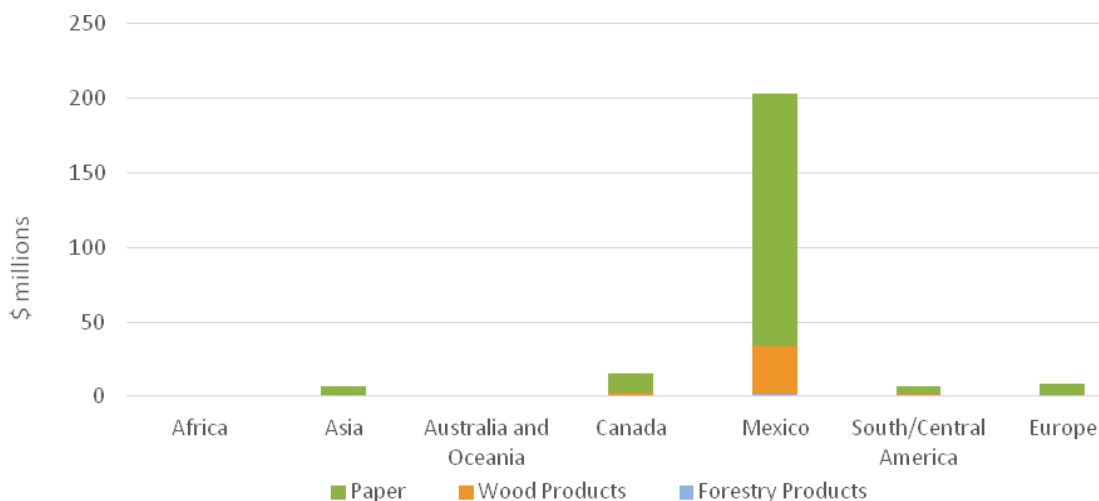


Source: CPCS analysis of Commodity Flow Survey, 2012

2.2.3 International Trade

Exports from Arizona in the forestry and wood products sector totalled \$240 million in 2014⁹, comprising \$201 million (84 percent) paper products, \$37 million (15 percent) wood products, and \$2 million (<1 percent) forestry products. These exports are destined almost exclusively for Mexico, where \$203 million dollars of goods were exported in 2014 (see figure below), of which over 80 percent was paper products.

Figure 2-5: Destinations of Arizona's Forestry Sector Exports (2014)

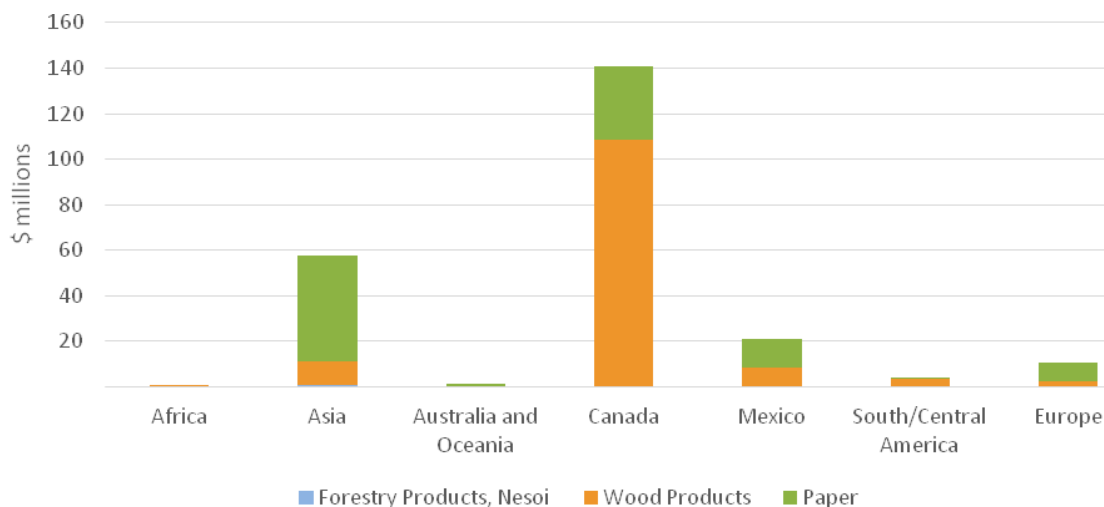


Source: CPCS analysis of United States Census Bureau Electronic Export Information. Accessed April 2015.

⁹ Includes NAICS 113 (Forestry)

Arizona's imports in the forestry sector totalled approximately \$236 million in 2014. Imports of wood products from Canada accounted for \$109 million (46 percent) of this amount.

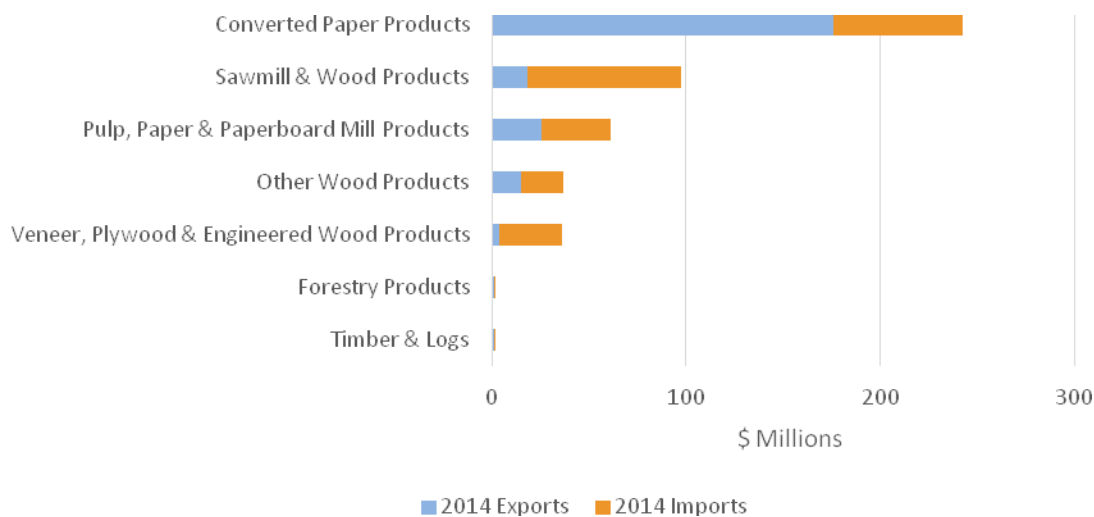
Figure 2-6: Origins of Arizona's Forestry Sector Imports (2014)



Source: CPCS analysis of United States Census Bureau Electronic Export Information. Accessed April 2015.

The converted paper products industry is the largest generator of international trade in the sector to and from Arizona, the majority of which is exports¹⁰.

Figure 2-7: Top Traded Products in the Forestry Sector (2014)



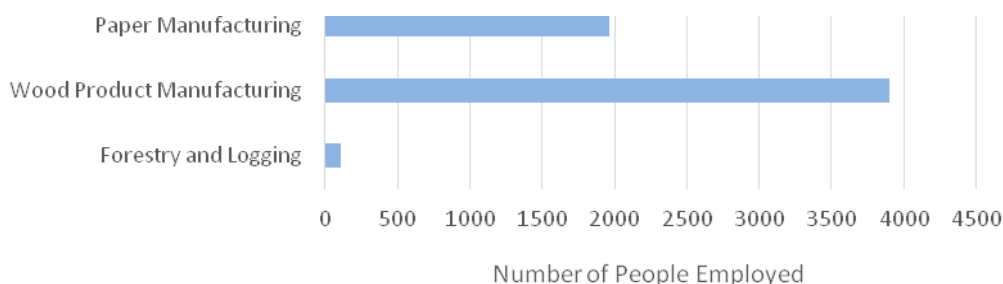
Source: CPCS analysis of United States Census Bureau Electronic Export Information. Accessed April 2015.

¹⁰ Converted paper products manufacturing comprises establishments engaged in manufacturing paper products from purchased paper and paperboard, including cardboard boxes, paper bags, stationery (writing paper) products, food containers, corrugated fibreboard sheets, milk cartons, folding boxes, etc,

2.2.4 Employment and Wages

In 2013 the sector employed 5,702 people, representing .2 percent of total employment in the State.^{11 12} The largest industry generating employment in the forestry and wood products sector is wood product manufacturing. Paper manufacturing is the second most important industry in the sector, which is dominated by converted paper product manufacturing.

Figure 2-8: Breakdown of Employment in the Forestry and Wood Products Sector in Arizona (Q1 2014)



Source: CPCS analysis of Quarterly Workforce Indicators dataset, United States Census Bureau

The total wages and salaries paid to employees in 2013 was \$289 million dollars, making the average annual earnings per employee in 2013 approximately \$50,700 for the sector.

2.3 Locations and Traffic Profile

In volume terms, Arizona generates 2.2 Million tons (Mt) of forest products which is approximately 1.5 percent of the total freight tonnage in the state. Around half of this tonnage (1 Mt) comes into Arizona from other states, some of which likely originates in overseas markets. Less than quarter (0.5 Mt) goes out to other states, and just over a quarter (0.6 Mt) is transported within the state.

The numbers presented here are obtained from Commodity Flow Survey (CFS), 2012. CFS only accounts for domestic movements within the U.S.. These include domestic shipments as well as the domestic components of international supply chains.¹³ The volumes presented below illustrate forestry sector domestic flows (inbound, outbound, intrastate), in comparison to flows from all other sectors of the economy. The forestry sector flows exclude wholesale and

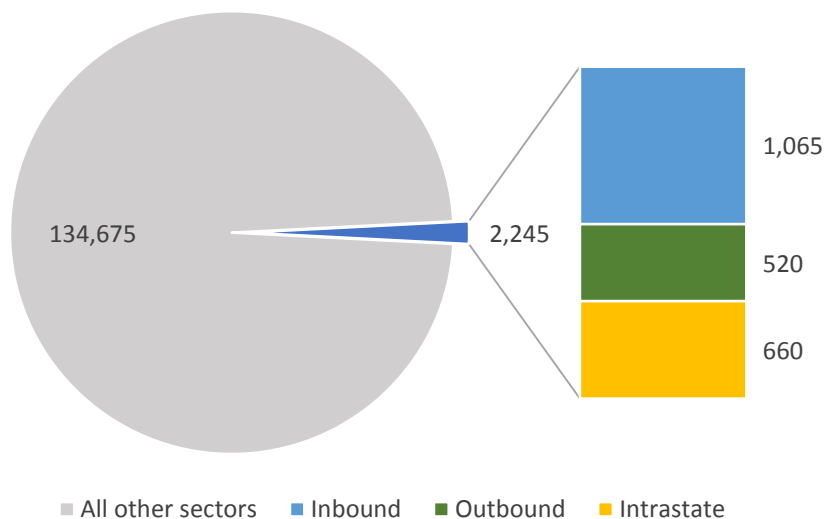
¹¹ Excludes self-employment

¹² Bureau of Economic Analysis Regional Economic Accounts, Personal Income and Employment by State. Wages and Salaries by NAICS Industry.

¹³ In CFS, the sum of individual state volumes is slightly lower than the national volume which is due to data suppression and rounding in individual state-to-state movements. For consistency across all the graphics (maps and charts), this paper presents the total of state level volumes.

retail shipments which are part of a separate working paper on the wholesale and retail sector.

Figure 2-9: Arizona Forestry Sector Flows Relative to Other Sectors ('000 Tons)



Source: CPCS analysis of Commodity Flow Survey, 2012.

2.3.1 Activity Clusters

The map overleaf illustrates employment clusters in the forestry sector. The majority of employment is centred in the hubs of Phoenix and to a lesser extent Tucson. Other activity of note includes logging activities and wood products in the mountainous regions around north and northeastern Arizona. Paper product employment in the Flagstaff and Bellemont area and Gila Bend is likely associated with the tissue production plants in those cities. Employment around Yuma is likely associated with wood pallet manufacturing. Pallets are used by the important agricultural activities in the region and in nearby Mexico, as well as for regional manufacturing and beverage retail companies.

Figure 2-10: Arizona Forestry Sector Employment Clusters

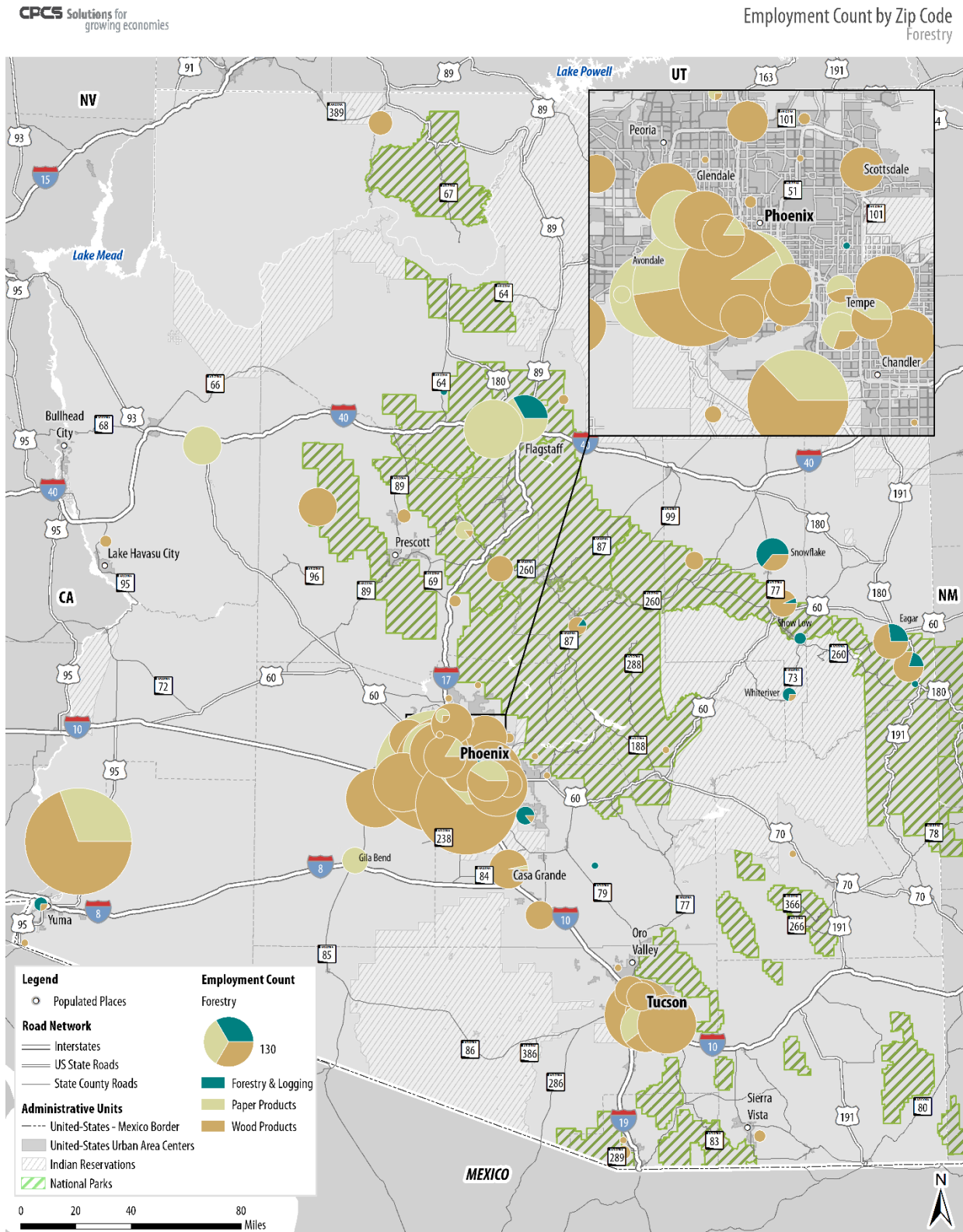
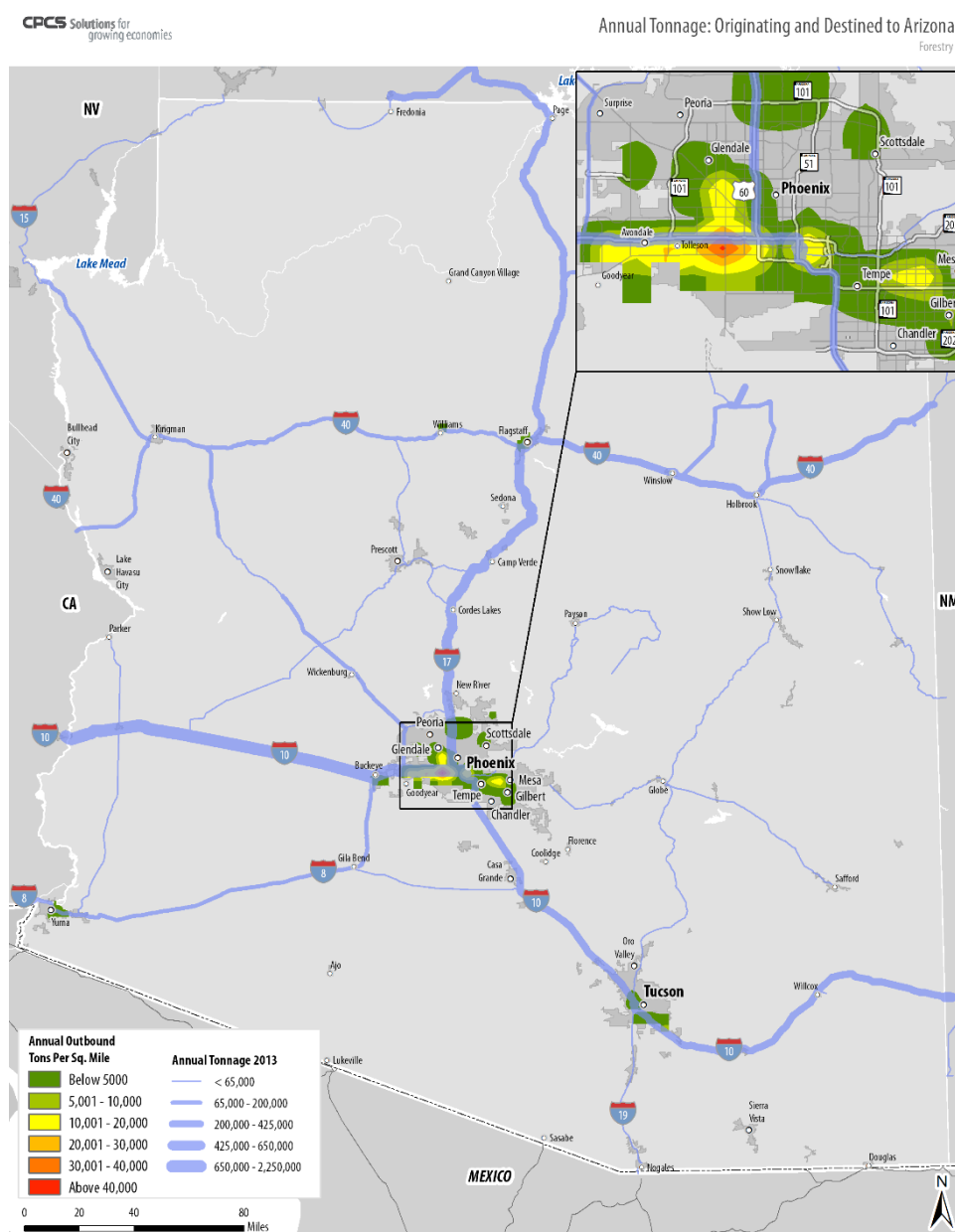


Figure 2-11 below combines forestry sector commodity flows on highways with their areas of production. The clusters were identified from kernel density estimation in ArcGIS using Global Insight's Freight Finder dataset. The estimated outbound volumes produced by this sector are clustered in southern parts of Phoenix, Tucson, Yuma and Flagstaff. In Phoenix, the major concentrations are near Tolleson, Tempe and Mesa.

The commodity flow information was extracted from Global Insight's Transearch dataset for 2013. Only Arizona-generated (originated or destined) flows are shown in the map (e.g. no through traffic). The major corridors used by this sector are I-10, I-17 leading to I-40 eastward and U.S. 89 northbound. I-10 towards California is most used highway since California is the biggest domestic trading partner of forest products.

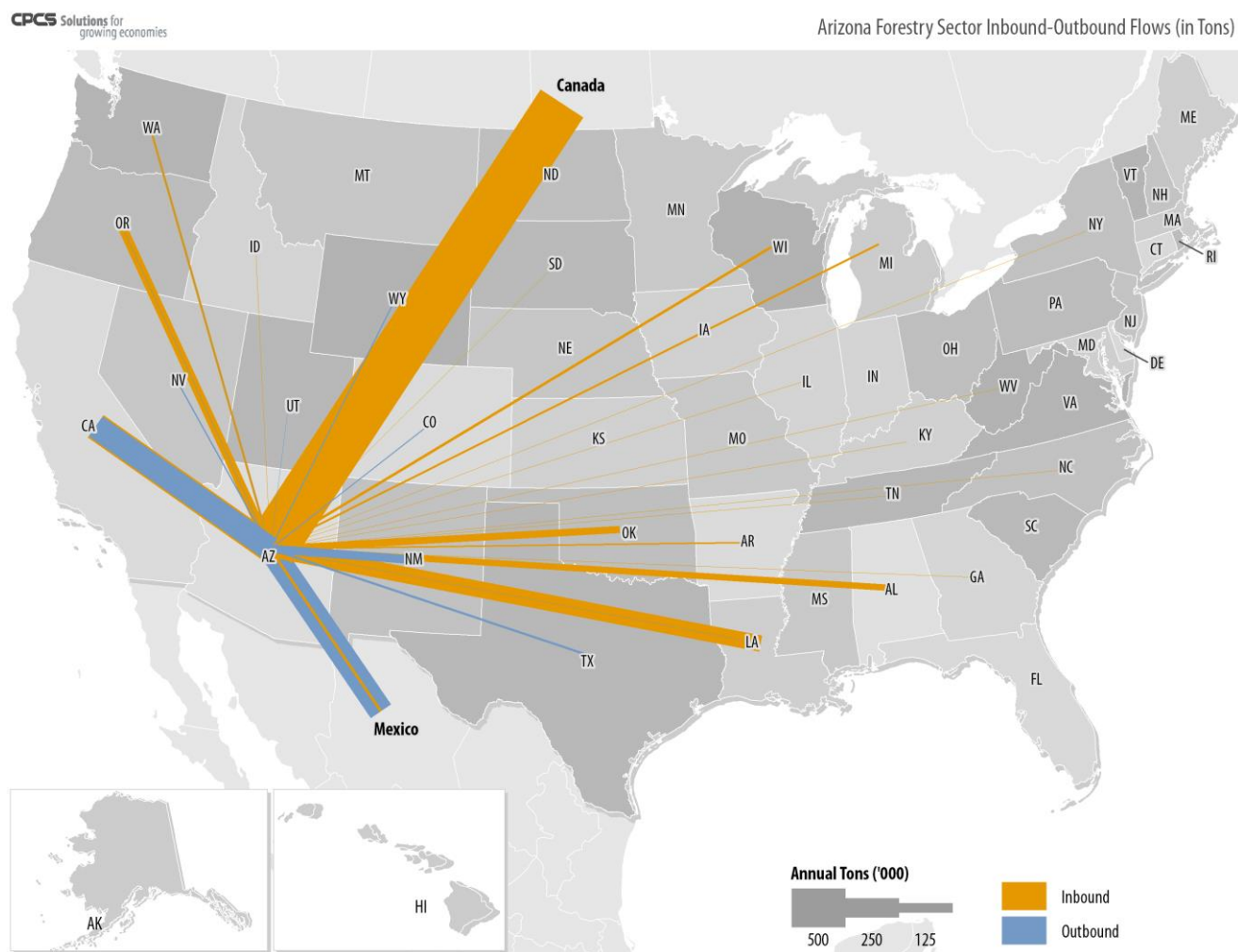
Figure 2-11: Arizona Forestry Sector Freight Cluster and Commodity Flow



2.3.2 Major Origins and Destinations

In the forestry sector, Arizona trades heavily with Canada, Mexico and California. Approximately 1.8 Mt of forestry products are brought into the state from other regions, with 0.8 Mt of outbound forestry products. Canada is the largest single supplier of inbound freight, accounting for 0.7 Mt (37 percent) of all inbound traffic. California is also an important generator of inbound freight (0.4 Mt). In terms of destination traffic, California and Mexico each account for 0.3 Mt of outbound freight, representing approximately 70 percent of all outbound traffic.

Figure 2-12: Arizona Forestry Sector Inbound-Outbound Tonnages

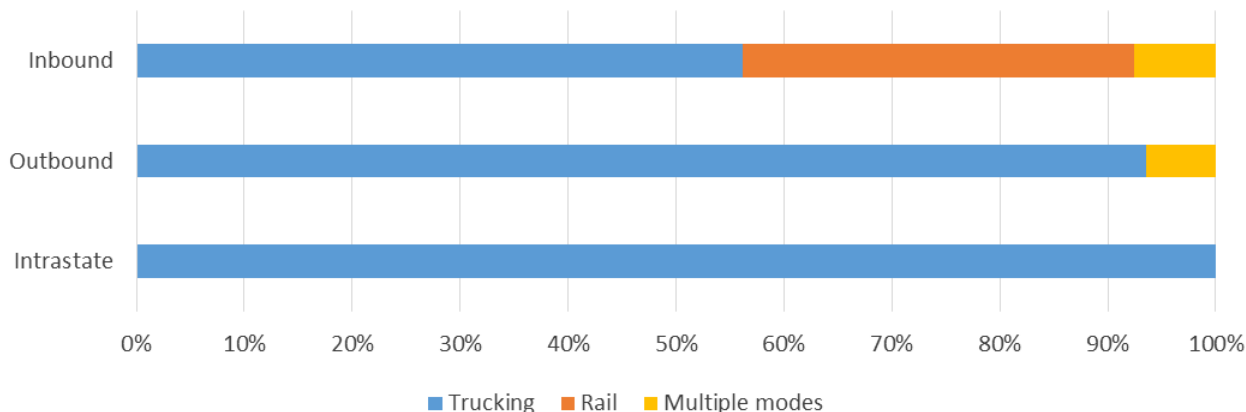


Source: CPCS analysis of Commodity Flow Survey, 2012. The import/export figures were obtained from Freight Analysis Framework 3 estimates for 2012.

2.3.3 Modal Breakdown

Forest products are generally transported by truck, but railroads are also used significantly for inbound shipments.¹⁴ More than 35 percent of the inbound tonnages are shipped by rail and a combination of truck and rail is used to transport approximately eight percent of inbound tonnages. Both truck and rail are used to move some of the outbound freight, but most of it is moved by trucks as this traffic predominantly goes to California and New Mexico. All intrastate shipments are done by truck.

Figure 2-13: Arizona Forestry Sector Volume (Tons) by Mode



Source: CPCS analysis of Commodity Flow Survey, 2012.

¹⁴ In the Commodity Flow Survey (CFS) dataset, the individual mode volumes do not add up to the aggregate “All Mode” which is due to the data suppression and rounding at detailed mode level.

3

Supply Chain Structure and Transportation Performance Parameters

Key Messages

Each of the forestry sub-sectors has a distinct supply chain, with limited linkages between sub-sectors.

From forestry landing sites, logs, wood chips and brush are transported to nearby facilities by truck, typically within 50 to 100 miles.

The primary barriers to transportation performance for the logging and local wood processing industries are high transportation costs relative to the low value of product, as well as a shortage of trucking carriers willing to work in the sector.

Wood products and paper products brought into Arizona from other parts of the U.S. and Canada are railed or trucked into the state, typically to wholesalers in the Phoenix area. There are no major transportation challenges for these sectors.

3.1 Supply Chain Structure

Each of the forestry sub-sectors has a distinct supply chain, with limited linkages between sub-sectors.

Logging

Logs, wood chips and brush are transported by truck from thinning sites (“landings”) on forest roads and state highways to nearby processing facilities. These facilities comprise a handful of sawmills in northeastern Arizona, the Forest Energy Corporation wood pellet plant in Show Low, and the Novo Power biomass power plant in Snowflake. These facilities are typically located within 50 miles to 100 miles of the landing site. Longer distances are generally not commercially viable due to the low value of the small diameter logs. Some logging companies own their own trucks, while others contract owner-operators as needed (and available). Consultations suggest there are fewer than 30 logging trucks currently active in the region. In the case of the current 4FRI thinning contract in northern Arizona (around Williams and Flagstaff), logs are also being moved over longer distances to Southern California where a more developed (higher value-added) processing industry is in place that can pay higher prices for logs.

Wood Products

From regional sawmills, manufactured products (mostly lumber, some fibreboard) are transported by truck to markets within Arizona, and to a lesser extent Mexico and California. One lumber producer is also moving limited product by rail to Oregon, with plans to increase volumes. The residues of sawmills (e.g. wood chips) are transported to nearby customers by truck, including for use as animal bedding and in production of wood pellets.

Relative to local production, much larger volumes of manufactured wood products are transported into Arizona from nearby states and Canada through a combination of truck and rail. Phoenix is the major hub for importing manufactured wood products, with many major firms owning distribution centres connected to rail spurs.¹⁵ Consultations suggest that engineered lumber and plywood originate from across the Pacific Northwest and Canada, while engineered panels and OSB are brought in from Oklahoma and Texas to Phoenix. From Phoenix, products are moved by truck to local and regional consumers (including manufacturers of wood products, e.g. window frames).

¹⁵ For example, a google maps search indicates that the following major companies have access to a rail spur: Capital Lumber, Universal Forest Products, Weyerhaeuser, Boise Cascade, Trio Forest Products.

Paper Products

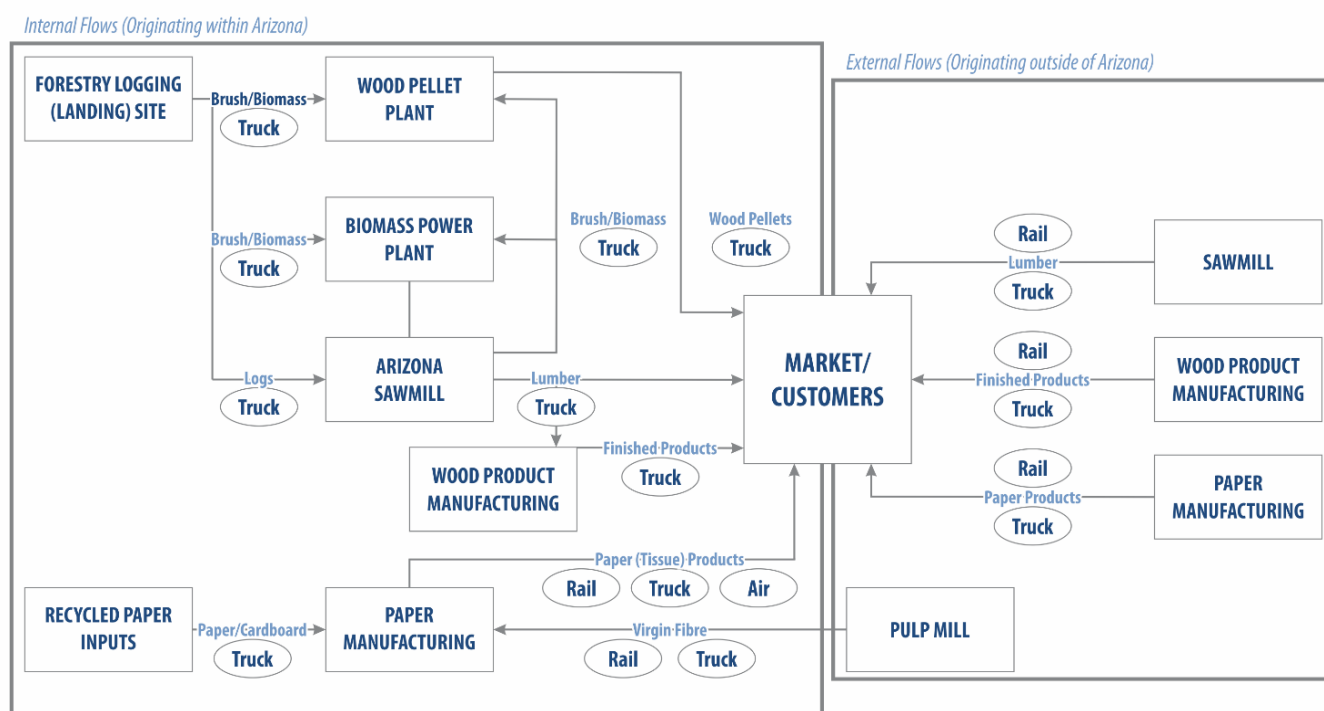
There is a large paper recycling sector in Arizona (concentrated in Phoenix). However, our consultations suggest that the vast majority of paper and cardboard collected for recycling is bundled and shipped outside of Arizona (including internationally) to be produced into paper products outside of Arizona. The two paper mills in the state (SCA Tissues and Royal Paper Converting Inc.) only produce tissue-based products such as bath tissue, kitchen towels and napkins (from recycled and virgin fibre). This suggests that all printed paper products consumed in Arizona are brought into the state from outside of the state. Key import countries for paper products are Asia, Canada and Mexico.

The forestry sector supply chain is presented in the diagram below. The vast majority of internal transportation flows between processing facilities in Arizona are done by truck. Rail is used primarily for shipment of finished products (lumber, wood products, paper) into Arizona from other parts of the U.S. and Canada.

Figure 3-1: Supply Chain Diagram Forestry Sector

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Forestry Supply Chain



3.2 Transportation Performance Parameters

The value of the product being transported determines the degree to which transportation costs are important relative to transit time, service level and reliability.

The costs associated with harvesting and transporting logs and biomass to regional sawmills and processing facilities exceeds the prices obtained for these very low value products for all but the shortest journeys (less than 100 miles, or less than 50 miles for biomass). Consultations suggest that the cost of transportation (trucking) is overwhelmingly the most important factor affecting competitiveness of the sector. As one stakeholder put it: “We have to accept poor reliability because we can’t pay higher prices for transportation”.

In the case of the current 4FRI contract in northern Arizona, transit time and service levels are also important, but primarily because there are relatively few trucks, trailers and drivers available and willing to work in the area. Maximizing the use of available assets (through quick turnaround) is important.

Producers of higher value products (wood products, paper products) place relatively more importance on reliability, service levels and transit time than on transportation costs. In particular, for industries where trucking companies have head-haul and back-haul opportunities (e.g. tissue production), transportation costs are not a major challenge. For products which are exported by container (e.g. paper and cardboard bailed for recycling), transit times becomes particularly important as exporters using containers can be penalised for delays if a container is left waiting.

3.3 Barriers to Transportation Performance

In the logging sector, there are a number of barriers to transportation performance.

There is a relative shortage of available logging trucks, trailers and truck drivers willing and able to work in the logging industry, located largely in northeastern Arizona and now in the first 4FRI contract area around Williams and Flagstaff. The work conditions are challenging, hauls are only in one direction, and the value of product is low meaning shippers cannot pay premiums to carriers.

Furthermore, the logging and wood processing regions in northeastern Arizona are located relatively far from commercial hubs (Phoenix) and the Interstate Highway System, and attracting carriers to the region is difficult. In the case of the 4FRI contract area in northern Arizona, the challenge of finding carriers is exacerbated as there was no log hauling industry to speak of prior to the recent contract award. In addition, unlike typical stewardship (logging) contracts, the 4FRI contract requires that all biomass be removed from the forest,

which requires significantly more trucks and trailers than would be required than to simply move logs¹⁶.

Finally, as noted above, the low value and heavy weight of logs makes transporting them over distances greater than 100 – 150 miles commercially challenging (closer to 50 miles for biomass), given existing weight restrictions.

These challenges have resulted in limiting logging taking place which results in ongoing wildfire risk. To address this risk and increase the speed and volumes of logs and brush cleared from forests, ADOT is piloting a “Healthy Forest Initiative” program in northeastern Arizona which increases the weights that can be loaded on logging trucks moving from landing sites to processing facilities (see text box below). This has been widely praised by industry as an extremely helpful program.

ADOT Healthy Forest Initiative

In November 2014, ADOT launched the two-year Healthy Forest Initiative pilot program in an effort to aid forest recovery efforts, improve commerce and reduce the risk of future wildfires. The initiative eases weight restrictions on several highways in the White Mountains region of northeastern Arizona (see map). Under the agreement, the gross weight limit for carriers moving forestry products between landing sites and processing facilities has been increased to 90,800 lbs (from 80,000 lbs). Timber haulers wishing to use the program file an application for a 30-day, \$75 per vehicle permit that allows them an unlimited number of loads on designated roads. In the first six months of the program, nearly 800 loads were hauled, illustrating the significant uptake by industry.



Source (information and map): Consultations and ADOT New Release (May 14, 2015)

Arizona logs are currently moving exclusively by truck to nearby processing facilities. Historical processing facilities located in northeastern Arizona do not have the volumes to move processed products by rail, and most are located some distance from a rail connection making such moves commercially unattractive. The first 4FRI contractor is thinning forests near Flagstaff and Williams, which are located in the vicinity of the Burlington Northern Santa Fe (BNSF) mainline. Wood products and logs have previously been loaded onto rail in Flagstaff. For the time being, rail companies are not interested in hauling products from the region as existing sidings in the region are largely at capacity on the very busy east-west corridor connecting southern California to Chicago and other key Mid-West markets.

Stakeholders moving products for recycling (inputs for recycled paper) noted there can be challenges securing truck transportation in the peak produce season, when many carriers are lured away to haul Mexican produce from Mexico or border entry points to markets across

¹⁶ Good Earth Power, 2015.

the southern U.S.. According to one stakeholder, truckers would rather deadhead to Nogales and bring produce back up to Phoenix than headhaul to Southern California, even if they can get a return load.

No other challenges in the shipping of wood or paper products into Arizona from other parts of the U.S., which is done through a combination of truck and rail, were noted during the consultations. Most inbound forest products are destined to Phoenix.

3.4 Trends and Implications

In principle, the 4FRI initiative has the potential to jump-start the local forestry sector in Arizona, and with it, the downstream wood processing industry. The initiative provides logging companies with long-term contracts, which in turn provides a stable timber supply to local sawmills who can then invest in upgrading processing equipment to manufacture higher value products.

Unfortunately, the location of the first major 4FRI contract (around Williams and Flagstaff in northern Arizona) is over 150 miles from the few remaining processing facilities (sawmills) largely located in northeastern Arizona which has not been good for either sub-sector. The 4FRI contractors do not have affordable access to well-established trucks, truck drivers and equipment which is concentrated in northeastern Arizona, while processors in northeastern Arizona face a shortage of cheap inputs to become more commercially viable. In the future, this situation should improve – and regional freight flows increase – as more 4FRI contracts are awarded in northeastern Arizona (approval for contracts in the region are under environmental review). **When a major long-term 4FRI contract is awarded in Eastern Arizona, it should provide a major boost to the local industry and result in larger truck freight flows in the region, and from the region to Phoenix. Long-term contracts and stable traffic volumes for sawmills will also contribute to attracting more trucking carriers, easing some of the commercial challenges faced by regional producers.**

Though the wood pellet industry is still relatively small in Arizona¹⁷, the market for wood pellets internationally is growing, particularly in Asia and Europe. In the case of the latter, demand is expected to grow to meet the European Union (EU) “20-20-20” climate change targets, which include raising the share of EU energy consumption from renewable resources to 20 percent. If and when future 4FRI contracts are awarded in northeastern Arizona, significantly more supply of inputs could be available for the existing wood pellet plant which could result in increased freight flows. Shipping large volumes of wood pellets overseas by marine mode would likely require use of bulk port facilities (as opposed the existing containerized option out of the Port of Long Beach).

¹⁷ There is currently one producer, Forest Energy Corporation, in Show Low.

It is unlikely that additional biomass power plants will be established in Arizona as the economics of the industry are extremely tight. Even with a larger supply of biomass inputs (from future 4FRI contracts) the price per kilowatt/hour paid to renewable energy suppliers as set out in their Power Purchase Agreements is likely to drop in Arizona in the future. This is because solar power generation technology has become significantly cheaper in recent years.

The paper recycling industry is expected to grow in line with environmental stewardship considerations (with recycled inputs replacing virgin fiber). It is not clear what impact this would have on the existing producers of tissue products in the state, though it would likely mean more business (and freight flows) for the companies which collect and ship products to be recycled outside of the state.

4

Sector Priorities for Transportation System Performance Improvement

Key Messages

Our research and stakeholder consultations identified the following priorities for transportation system performance improvement in the forestry sector:

- Make ADOT Healthy Forest Initiative permanent and expand the geographic area it covers
- Enable more flexibility in loading weights for forestry vehicles
- Indirectly address shortages in trucking availability by continuing to expand and increase weight load limits
- Continue to keep regulations minimal to maintain competitiveness

4.1 Priority Improvements Needs

The priority transportation improvement needs as described by forestry sector stakeholders are summarized below.

Make ADOT Healthy Forest Initiative Permanent

The logging and downstream wood products industry has benefitted tremendously from the ADOT Healthy Forest Initiative which increases truck weight limits to 90,800 pounds (described in section 3.3). Stakeholders overwhelmingly stated that this program should be made permanent at the end of the two-year pilot phase (November 2016). It was also pointed out that many other states have even higher weight limits in place for the forestry sector, including Utah and Washington (both 105,000 lbs)¹⁸.

Expand Geographic Area of ADOT Healthy Forest Initiative

It was also recommended to extend the boundaries of the initiative to include additional roads outside of northeastern Arizona. Extending the program to the northern region of the state would significantly benefit the current 4FRI contractor thinning forests around Flagstaff and Williams as they could potentially move their products commercially over longer distances to existing processing facilities in northeastern Arizona. This would likely require collaboration with the Federal Highway Administration (FHWA) as travel on the Interstate Highway System would be required.

The initiative could also be extended to “first mile” (or more miles) of transportation along the forest roads which connect forest landing sites to state roads (typically maintained by the U.S. forest service or county governments). Currently, carriers are not permitted to load up to 90,800 lbs along these portions of road, which reduces the overall benefits of the program. For example, Forest Service Road # 300 (Rim Rd) runs over 40 miles across the White Mountains and is heavily used by logging industry. Such changes would require collaboration with the U.S. forestry service, as ADOT does not have the jurisdictional authority to permit travel on forest roads.

Enable More Flexibility in Load Weights

The loading of logs and brush is done in challenging conditions on landing sites and roads that are often bumpy and uneven. It can be difficult to accurately weigh loads under these conditions which can result in slight under or overloading. ADOT could consider options that would provide carriers with some flexibility to account for these challenging conditions, for example, through allowing a variance of up to 10 percent above the limit under a limited set of conditions (one stakeholder mentioned such a program exists in Montana).

¹⁸ Eastern Arizona Counties Organization, “ADOT Healthy Forests Pilot Project Proposal”, Update from August 15, 2014 Meeting.

Indirectly Address Shortages in Truck Availability

There is a shortage of trucks, trailers and truck drivers willing to work in the logging industry in Arizona (northern and northeastern Arizona). The low value of products does not permit shippers to pay the necessary premium to attract carriers to the region, in part due to limited opportunities to haul in both directions and other factors mentioned previously in the report. One means for ADOT to support industry in attracting additional trucking companies is to continue to expand and increase weight load limits (per the Healthy Forest Initiatives). Increased weight limits enable shippers to load more product and thereby pay a higher price to the carrier.

Consider Support and Partnerships to Enhance Rail Shipment of Forestry Products

The current 4FRI contractor is eager to use rail as a shipment option from Flagstaff, and is confident in having enough product to create at least one unit train per week to load onto the BNSF railroad. However, new rail loading facilities and a rail siding would need to be built for this new traffic, as existing BNSF loading facilities in the area are already at capacity. Given that the current contractor is 30 percent of the way through a 10 year contract (with no guarantee of securing future contracts in the area), it is difficult for them to justify such an investment (between \$5 - \$8 million). To support the current and long-term forestry industry in the region (and speed with which forests can be thinned, given finite trucking capacity), it has been suggested that ADOT could consider approaching BNSF to discuss potential for partnership and funding of a rail loading facility in the Flagstaff region, which could be used by the 4FRI contractor and other forestry and wood product companies in the region.

Continue to Keep Regulations Minimal to Maintain Competitiveness

Most stakeholders consulted felt that the transportation system in Arizona functioned well, infrastructure was well maintained, and that regulations were reasonable and fair. A number of stakeholders mentioned how the relatively low levels and ease of compliance with transportation regulations in Arizona gave them a competitive edge over similar companies operating in neighboring California where such regulations are much higher (e.g. air quality standards, licensing, permitting, fuel costs, etc.).

Addressing Traffic Congestion in Downtown Phoenix

The interview process identified an area of concern in the downtown Phoenix area. While traffic congestion at the “tunnel” (I-10 tunnel between 7th Avenue and 7th Street) was identified as possibly severe enough to impact business operations, the commentary regarding congestion actually comes from multiple areas. To the east and west of the downtown area multiple freeway mergers occur that significantly impact traffic flows in the area. Some eventual relief may come in the form of a broader regional effort to divert commercial “pass through” traffic around the city center, with projects such as the planned Loop 202 South Mountain Freeway.

Appendix A: List of Stakeholders Consulted

Name	Title	Organization
Alan Gomez	Logistics Manager	Arizona Pacific Pulp and Paper Inc.
Allen Ribelin	Secretary / Treasurer	Northern Arizona Loggers Association
Brad Worsley	President / CEO	Novo Power
Christina Goodfellow	Inbound/Outbound Transportation Planner	SCA Americas (Tissues)
Frank Shean	President and CEO	Valley Pallets
Gary Cantrell	Chairman & CEO	Affiliated Timber Investment Conversion Advisors Inc.
Gary Moore	Director of Operations	Forest Energy Corporation
Jennifer Cannon	Manager, Maintenance Permits Services	Arizona Department of Transportation
Keith Watkins	Senior VP, Economic / Rural Development	Arizona Commerce Authority
Nick Hoffman	General Manager, Operations	Universal Forest Products
Patrick Rappold	Wood Utilization & Marketing Specialist	Arizona State Forestry Division
Steve Horner	Area Manager	Campbell Group (sub-contractors for Global Earth Power 4FRI contract)