



Port Authority Advisory Committee

TEXAS PORTS STRATEGIC MISSION PLAN

85th Legislative Session

Port Authority Advisory Committee

Texas Ports Strategic Mission Plan

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Port Authority Advisory Committee

Texas Ports Strategic Mission Plan

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Appendices

Appendix A: Strategies and Objectives

Texas Ports - An Indispensable Asset to the Nation

1. Introduction

1.1. Texas Maritime Ports Strategic Mission Plan Overview

The Port Authority Advisory Committee's (PAAC) Strategic Mission Plan (SMP) provides a call to action for Texas maritime ports. It identifies barriers that inhibit growth and identifies specific strategies to remove these barriers. The Texas Port System (**Exhibit 1**) is a critical resource that must be protected and maintained to enable continued economic growth. The economic benefit of Texas ports to the state is highlighted to emphasize what is at risk and what can be gained from strategic capital investments, which ultimately results in continued growth for the state's economy. The SMP identifies new strategies to assist ports with much-needed port capital improvements which enable short and long-term downstream benefits for the regional and state economy. The SMP includes a review of:

- The PAAC Mission, Goals, and Strategies
- The Economic Value of Texas Ports
- Texas Cargo Flows
- Future Opportunities for Texas Ports
- Challenges Texas Ports Must Overcome
- Port Capital Investments 2010 – 2015

1.2. The Texas Maritime System

Texas has the most robust maritime port system in the United States. In 2015, Texas was ranked second in the nation for total tonnage and number one in total imports and exports. The state's maritime system is a critical gateway to international trade and provides the residents of the state with a multitude of economic opportunities through the movement of waterborne commerce and trade. Texas ports help create well-paying jobs that generate consumer spending and provide significant state and local tax revenues.

Texas Ports in 2015:

- Moved 563 million tons of cargo, including over 350 million tons of international tonnage and over 200 million tons of domestic cargo¹
- Handled over 1.8 million containers²
- Served over 1.6 million passengers
- From 2010 – 2015 Texas ports completed \$1.1 billion in capital improvements to grow and capture new business³

1.3. The Texas Transportation System

The Texas transportation system provides the state with critical linkages to the global supply chain through an integrated road, rail, and waterway network. This system accounts for Texas ports' ability to move enormous amounts of cargo each year. **Exhibit 2** illustrates the extent of this intermodal infrastructure network for one channel and demonstrates the scale of effort required to maintain and expand this transportation system. **Exhibit 3** shows, in a broader context, the connectivity of all Texas ports. Each of these ports has a similar local infrastructure system, as shown in **Exhibit 2**, with varying levels of complexity. The success of port infrastructure strategic enhancements is dependent upon the ability of the road and rail networks to maintain pace with port improvements and vice versa.

Exhibit 1: Texas Port System

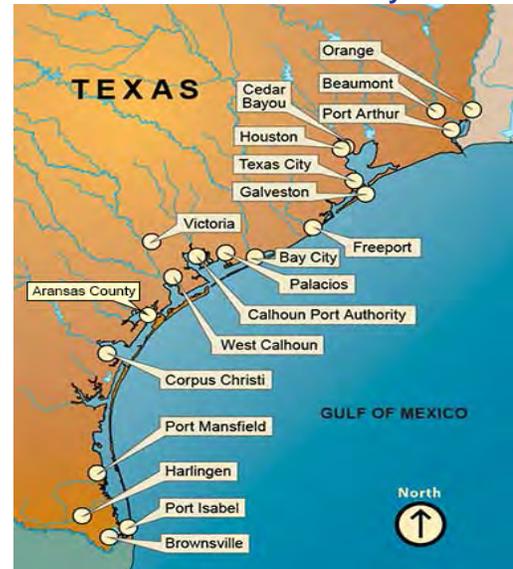


Exhibit 2: Port Access Infrastructure



¹ Source: Domestic cargo from U.S. Army Corps of Engineers and includes intraport and internal domestic moves as well as domestic shipments and receipts. International cargo data from USA Trade-OnLine, U.S. Bureau of the Census

² Source: USA Trade-OnLine, Port specific container moves from individual Texas ports

³ Source: U.S. Army Corps of Engineers, Navigation Data Center, and includes intraport and internal domestic moves

Exhibit 3 also highlights the significance of the Gulf Intracoastal Waterway (GIWW), which serves as a maritime highway for barges. Recently, the GIWW from Brownsville to Port Arthur was designated by the U.S. Secretary of Transportation as Marine Highway-69 (M-69). This designation allows TxDOT and Texas ports to develop projects along the waterway that will help relieve roadway congestion along the Gulf Coast by allowing more freight to be waterborne and clears the way for seeking federal grant funding. M-69 connects all Texas ports together and provides a critical linkage to other ports along the Gulf of Mexico.

Optimizing the statewide transportation system should consider the different priorities of Texas ports, big and small. Based on interviews with the ports, larger Texas ports tend to need less external support for infrastructure projects *within* their port boundaries. Larger ports tend to prefer support for major capital dredging and rail and road access projects. Smaller ports share this need for deeper channels; however, they also noted the need for financial assistance with a variety of projects that are smaller in scope, such as:

- Master planning
- Access improvements to roads and rail spurs
- New dock facilities
- Economic development projects

In summary, Texas ports require advocacy and financial assistance for both access infrastructure and internal port infrastructure. Investments in these types of projects will enable Texas ports to grow and enable both regional and statewide economic growth. Solutions must be tailored to the individual characteristics of each port area to support business development in underserved areas, promote efficient growth where needed, and sustain the current client base.

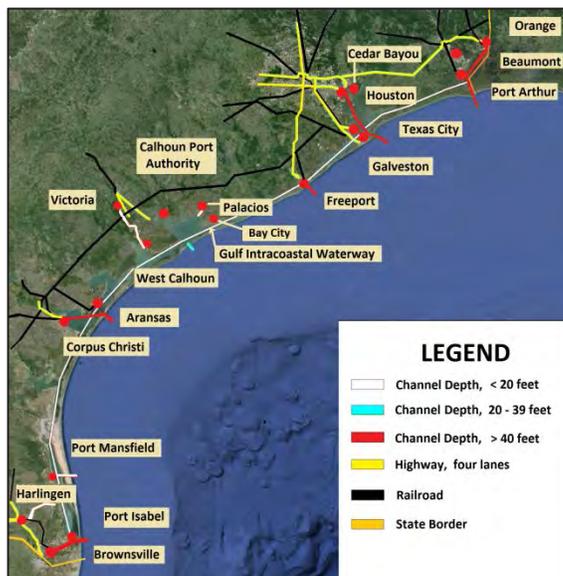
1.4. Port Authority Advisory Committee (PAAC)

The PAAC consists of seven committee members appointed by the Texas Transportation Commission. The PAAC advises the Commission and TxDOT on matters relating to port authorities. The PAAC regularly updates plans and establishes goals, strategies, and objectives to address the forecasted needs and identifies port capital improvement projects requiring immediate investment.

1.5. The Strategic Mission Plan

The Texas Transportation Code requires the PAAC to develop a Strategic Mission Plan on a biennial basis before the start of the legislative session. The SMP outlines the trends and issues impacting Texas ports at a system-wide level, identifies the key challenges and opportunities, and provides critical strategies that the state and the ports must pursue to improve their competitive position. Together, the SMP and the TxDOT Freight Mobility Plan are important communication tools that will be used to advise state and federal agencies, impacted industry, and the public of critical transportation needs that could potentially affect the statewide supply chain and economic growth.

Exhibit 3: Extent of Access Infrastructure, Texas Ports



PAAC Mission, Goals, and Strategies

PAAC Mission:

"Elevate port issues as vital components of the Texas Transportation System and advise the Texas Transportation Commission and TxDOT on matters relating to maritime transportation."

In pursuit of this mission, the PAAC will work towards the following goals:

- Identify high-priority strategic port projects and make recommendations to TxDOT for investment
- Incorporate maritime interests in TxDOT planning activities and documents
- Promote Texas ports for economic development opportunities
- Identify federal, state, and other funding opportunities for maritime investment

The PAAC will support the following strategies as key to meeting the above goals:

- Secure a recurring state general revenue funding source that supports the growth and development of the Texas maritime system
- Optimize the statewide intermodal transportation system to streamline the movement of freight and passengers
- Develop and maintain state of the art port systems that will strengthen Texas ports' global competitiveness
- Identify and capitalize on key market opportunities that will increase exports to the Americas, Asia, and Europe
- Advocate to secure resources for smaller regional ports so they can continue to exist and grow
- Develop a communications strategy to engage state agencies and the federal government

2. Economic Value of Texas Ports

The Texas marine ports are a powerful economic engine for the state of Texas, as demonstrated by **Exhibit 4**.⁴

In 2015, 563 million tons of cargo and 1.6 million cruise passengers were handled by the 18 ports of the Texas Ports Association. These Texas marine ports supported \$368.7 billion in output to the state's economy, which equated to 23 percent of the state's total gross domestic product (GDP).⁵

These ports supported 1.6 million jobs in the state in 2015. Of these:

- Marine port activity directly generated 116,175 jobs. On average, these jobs pay 30 percent more than the typical Texas wage.⁶
- Another 143,169 induced jobs were created to supply goods and services to those directly employed.
- Cargo and cruise industry firms providing direct services to marine ports generated \$9.7 billion in purchases which created another 94,807 jobs.
- The remaining jobs, about 1.2 million, were with related users that ship and receive cargo through Texas marine ports.

The activity at the Texas marine ports also generated over \$6.9 billion of state and local tax revenues.

The ability of the marine ports to support high-paying jobs across various skill level positions further underscores the importance of the Texas marine ports in providing a diversified set of jobs. **Exhibit 5** presents the types of jobs generated directly by the cargo and cruise activity at the Texas marine ports.

As gateways to the world, Texas ports support commerce, which in turn provides jobs and improved living standards for millions of state residents. The commodities handled by the state's marine ports demonstrate this link to specific job sectors. As shown in **Exhibit 6**, petroleum and liquid bulk cargoes account for 55 percent of the total direct jobs generated by marine port activity in the state. The handling of containerized cargo generates the second largest job impact, followed by the movement of other dry bulk cargo such as fertilizer, aggregates, and cement. The handling of steel products related both to construction activity as well as the oil/energy sector creates the next largest impact.

Exhibit 4: Economic Impact of Texas Ports to the State of Texas

1,561,870 jobs in the state supported by maritime activity

- Direct Jobs: 116,175
- Induced Jobs: 143,169
- Indirect Jobs: 94,807
- Related Users: 1,207,720

\$368.7 billion of total economic value supported in the state, 23% of state GDP

- \$46.7 billion revenue to businesses supplying cargo and vessel handling services
- \$303.5 billion of related users output
- \$18.6 billion of re-spending of direct income and personal consumption

\$92.2 billion total personal income and local consumption

- Direct: \$7.0 billion
- Re-spending/personal consumption: \$18.6 billion
- Indirect: \$4.3 billion
- Related Users: \$62.2 billion

\$6.9 billion of state and local taxes

- Direct, Induced and Indirect: \$2.2 billion
- Related Users: \$4.7 billion

Exhibit 5: Direct Jobs by Job Category (full-time equivalent jobs)

IMPACT CATEGORIES	DIRECT JOBS
Surface Transportation	
Rail	1,851
Truck	17,194
Maritime Services	
Terminal	39,491
ILA	5,160
Tug Assist	641
Pilots	283
Agents	1,010
Maritime Services/Construction	12,609
Freight Forwarders	2,363
Warehouse	2,284
Container Repair/Storage	491
Government	4,364
Barge/Bunkers	2,416
Chandler/Surveyors	1,946
TENANTS	22,839
PORT AUTHORITY	1,233
TOTAL	116,175

Source: Martin Associates

⁴ *Economic Impact of the Texas Ports on the State of Texas, 2015, prepared by Martin Associates for the Texas Ports Association, August 3, 2016.*

⁵ *U.S. Bureau of Economic Analysis, 2015*

⁶ *United States Bureau of Labor Statistics, March 2015*

It is necessary to identify market growth opportunities to sustain and grow the economic value of the Texas marine ports, as well as to maintain the current market positions of the ports. An understanding of the trade lanes and commodities in which Texas ports have a competitive advantage is required to grow market opportunities. Opportunities could be maximized by identifying those markets underserved by Texas ports. It is necessary for the Texas ports to compete with other non-Texas ports regarding surface transportation access, terminal operations and productivity, and navigational access to maintain and grow existing markets and penetrate new markets. These factors, which drive the competitive position of the Texas ports, require capital investment, not only to maintain the current landside, terminal, and navigational infrastructure but to enhance this infrastructure to provide the Texas ports with the necessary competitive advantage. Typical funding sources for these projects will vary from port-generated internal funds to federal funds and grants. A dedicated source of state funding for the Texas maritime system will help stimulate economic growth through the enhancement of critical infrastructure at port facilities.

Exhibit 6: Direct Port Generated Jobs by Commodity

Commodities	Jobs	Percentage
Other Liquid Bulk	34,155	29.40%
Petroleum	29,729	25.59%
Containers	12,726	10.95%
Other Dry Bulk	6,914	5.95%
Steel Products	5,141	4.43%
Misc. Break Bulk	4,543	3.91%
Autos/RoRo	2,323	2.00%
Bulk Grain	1,152	0.99%
Bagged Cargoes	514	0.44%
Forest Products	282	0.24%
Not Allocated	18,694	16.09%
TOTAL	116,175	100.00%

Source: Martin Associates

Not only are the Texas ports a critical economic engine for the state of Texas, but this port system also supported a total of 5.1 million jobs nationwide in 2015 and created \$1.2 trillion dollars of economic activity in the U.S. economy, or about 6.4% of the total U.S. gross domestic product in 2015.⁷

In summary, the marine cargo and vessel activity at the public and privately owned marine terminals located in the state of Texas are a major asset to the state's economy. In 2015, the 563 million tons of cargo moving via these terminals supported \$369 billion of economic activity in the state of Texas – about 23 percent of the total state gross domestic product.⁸ It is essential that the capital infrastructure supporting the terminals continues to be a key priority in state and national policy to maintain and grow the economic contribution of the state's marine terminals. Shipping channels must be maintained at their authorized water depths by the federal government and capital projects that enhance the state's ports' competitive position must be a priority for the state legislature. The demonstrated economic dividend that results from maritime trade underscores the overall importance of the continued growth of the state's port and maritime transportation system.

3. Regional Maritime Cargo Flows Analysis

3.1. International Trade

International trade is a key component of the U.S. economy, and since 2003, it has been growing at a rate of 5.4 percent annually. This equated to \$3.75 trillion, or about 20 percent of the \$18.1 trillion U.S. GDP in 2015. **Exhibit 7** shows Texas has experienced even stronger growth in international trade, increasing by 8.3 percent annually since 2003. In 2014, the nearly \$700 billion value of international trade in Texas accounted for about 43 percent of the \$1.6 trillion state of Texas GDP.⁹

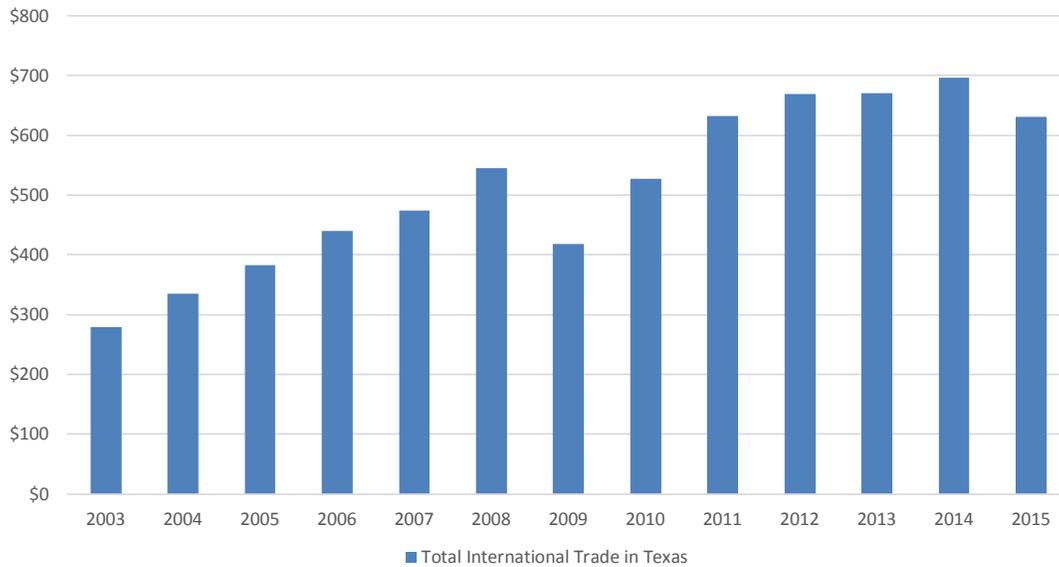
⁷ *Economic Impact of the Texas Ports on the State of Texas and the United States, 2015, prepared by Martin Associates for the Texas Ports Association, August 3, 2016*

⁸ *The most recent state data published by the U.S. Bureau of Economic Analysis is for the fourth quarter of 2015. Based on this data, the state GDP for Texas was \$1.6 trillion.*

⁹ *Gross Domestic Product Data from U.S. Bureau of Economic Analysis. Value of International Trade from USA Trade-Online, US Bureau of the Census*

Exhibit 7: International Trade in the State of Texas

Billions of Dollars

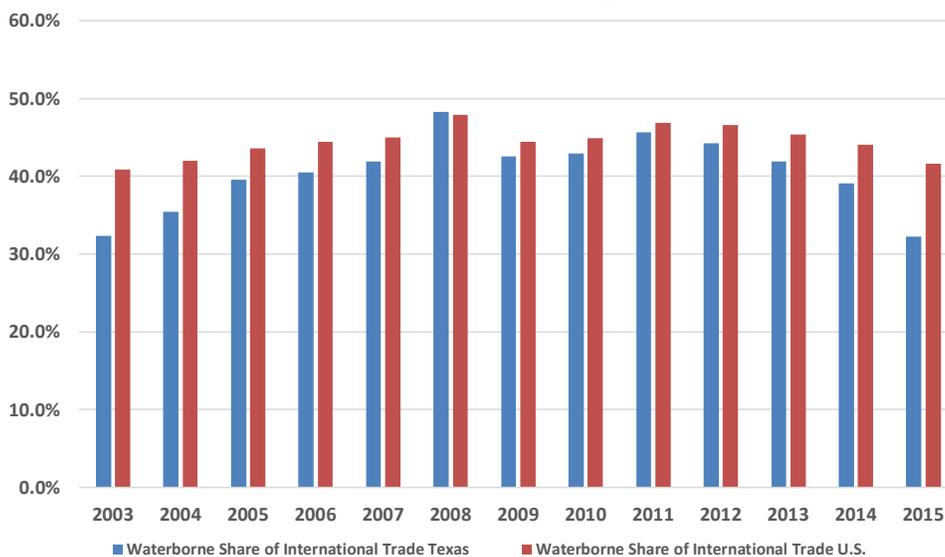


Source: USA Trade-Online

3.2. International Waterborne Trade

Approximately 45 percent of U.S. international trade moves by water and through the marine ports of the United States. In 2008, the share of total international trade moving to and from the United States by water reached a high of 48 percent. This share declined to 41.7 percent in 2015. By contrast, **Exhibit 8** shows that the share of international trade moving by water in Texas has declined from a high of 48 percent in 2008 to 32 percent in 2015. This suggests that the Texas ports are losing market share to other modes of international trade, namely rail, truck, and air to a greater extent than at the national level. This reflects the increased growth in Mexico as a source of international cross-border trade, as well as a potential decline in the value of commodities handled by Texas ports, in particular petroleum and petroleum products.

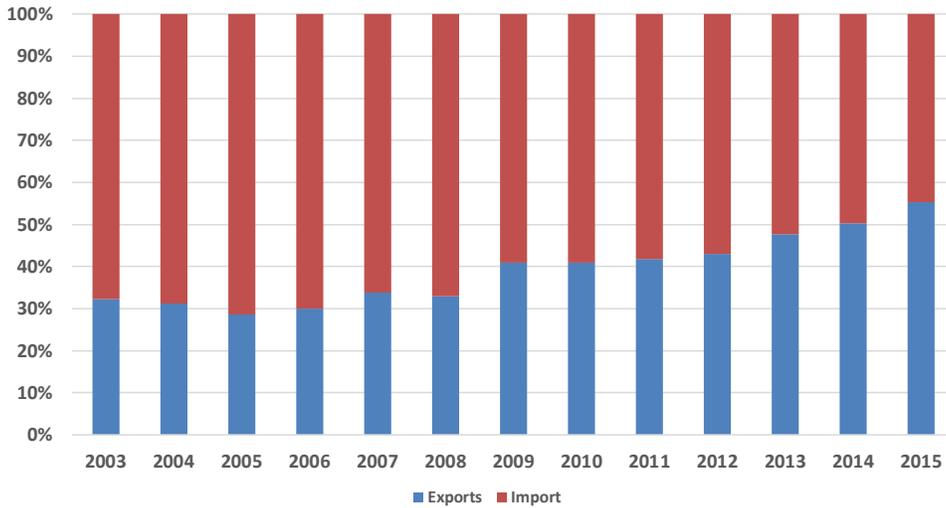
Exhibit 8: Share of International Trade Moving via Water, U.S. vs. Texas



Source: USA Trade-Online

This decrease also correlates with the increase in domestic oil production from 2012 to 2014, which reduced the need to import foreign oil for Texas-based refineries. In fact, the reduction in the value of imports, most notably crude oil, has led to a nearly equal balance of waterborne trade imports and exports. This balance of imports and exports allows for balanced ocean carrier capacity for importers and exporters using Texas ports, as shown in **Exhibit 9**. By balancing imports and exports, ocean carriers can better maximize the control over assets, such as containers, while providing backhaul opportunities for various bulk commodities.

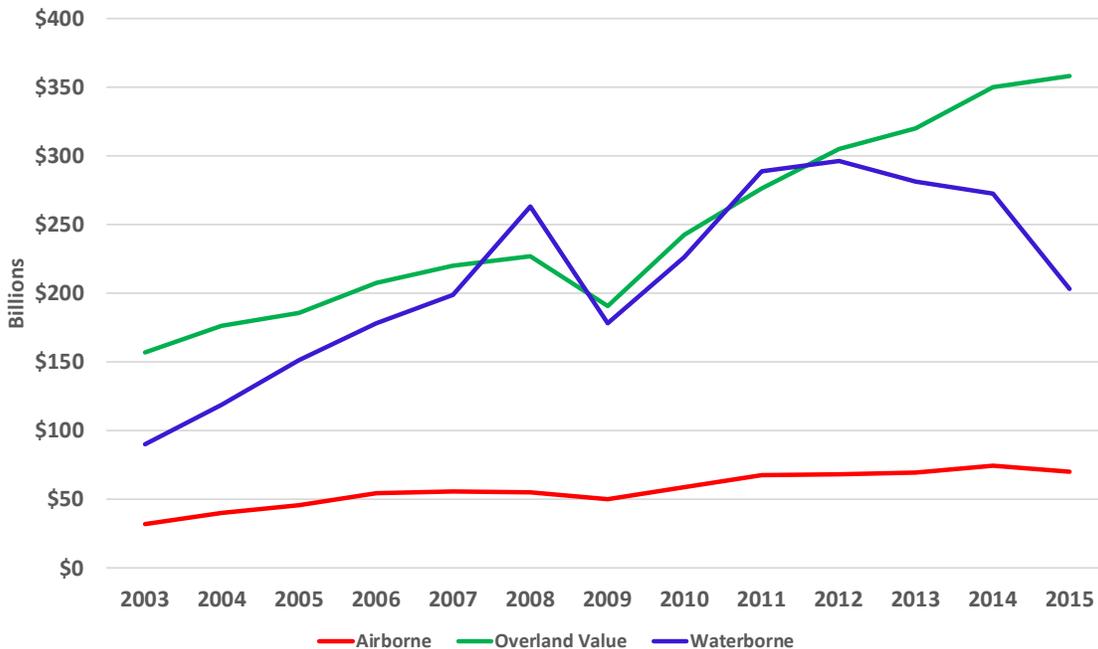
Exhibit 9: Share of Texas International Waterborne Imports and Exports



Source: USA Trade-Online

As the share of waterborne commerce decreased, the share of overland trade continued to increase (Exhibit 10). This increase in the value of international trade moving via truck and rail is the result of increased manufacturing activity in Mexico due to near-market sourcing.

Exhibit 10: Value of International Trade Moving by Mode, Texas

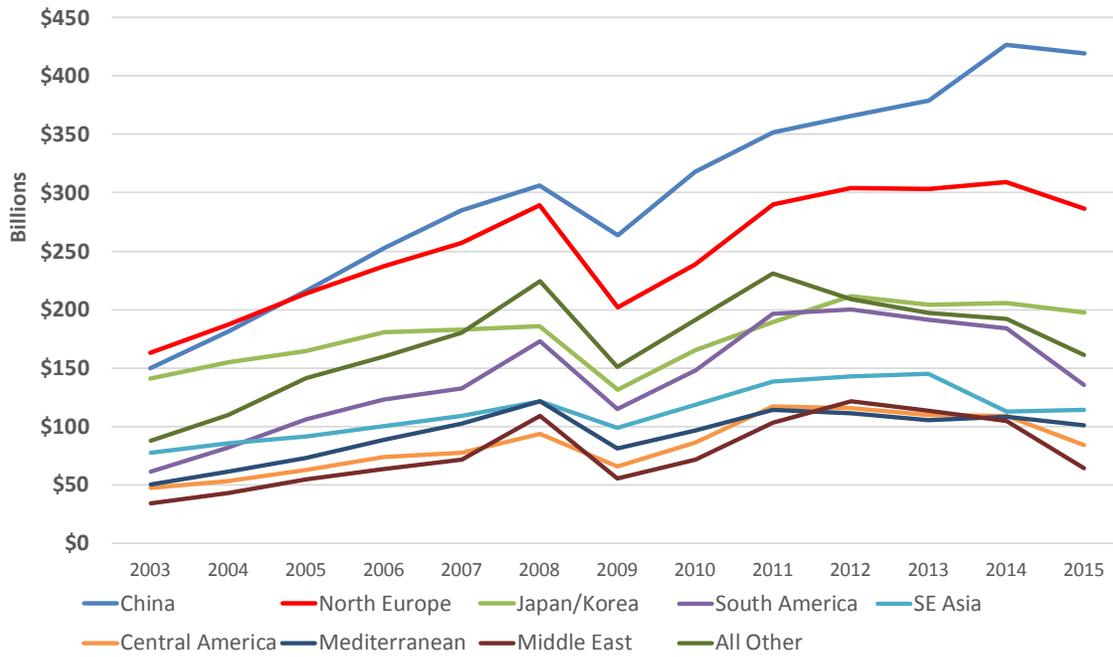


Source: USA Trade-Online

3.3. International Waterborne Trading Partners

China is the largest trading partner with the United States in terms of international trade, and the value of trade with China represents the strongest growth market. Europe and Japan/Korea are the other key maritime trading partners for the U.S. (Exhibit 11).

Exhibit 11: Key International Waterborne Trading Partners for the United States



Source: USA Trade-Online

By contrast, Texas's largest international trading partners are South America, Northern Europe, and Central America. The value of waterborne trade on all these largest trade lanes has declined significantly since 2014. Texas ports waterborne trade with China and other Asian nations is not as well developed as other U.S. ports, and likely represents an opportunity for Texas ports to increase cargo volumes (Exhibit 12).

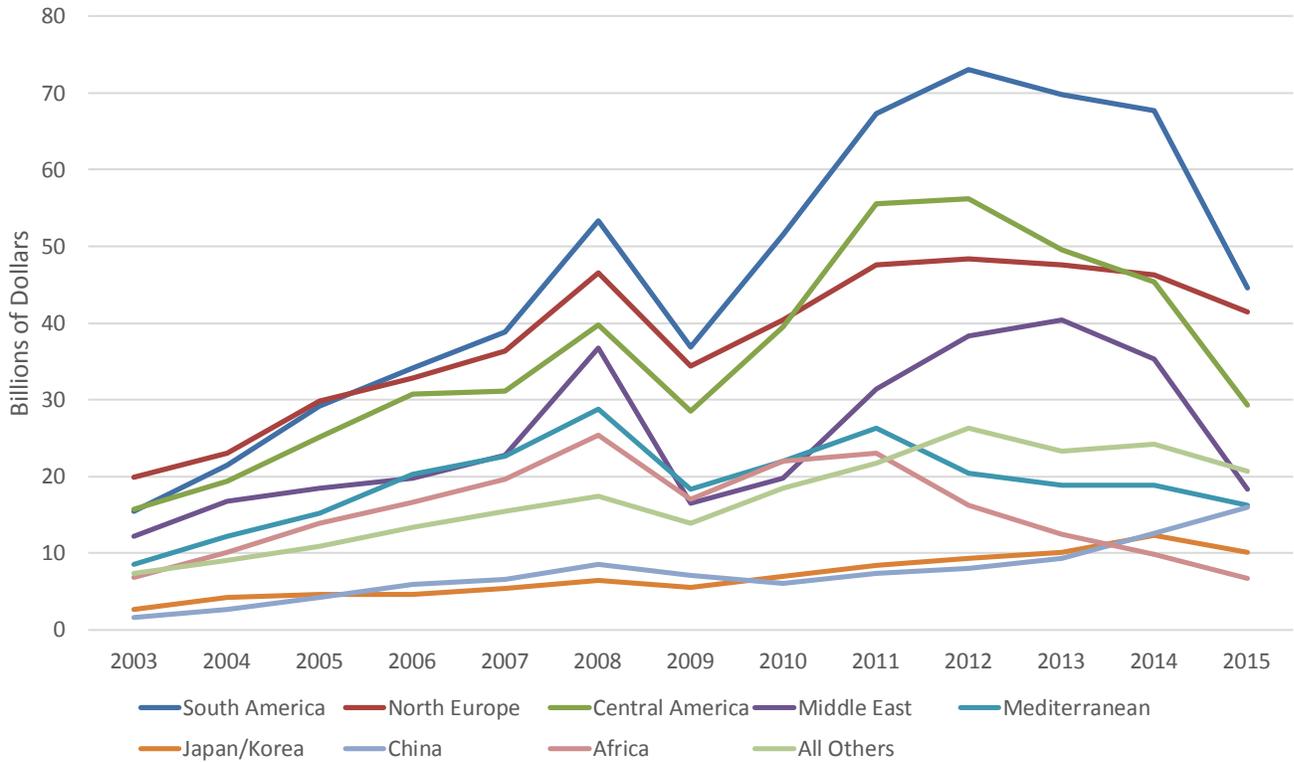
Texas ports waterborne trade with China and other Asian nations is not as well developed as other U.S. ports, and likely represents an opportunity for Texas ports to increase cargo volumes.

Venezuela and Brazil account for more than 50 percent of the waterborne trade with Texas ports. Trade with Venezuela alone accounts for nearly 30 percent of the value of international waterborne trade with Texas and consists primarily of crude oil. As crude oil imports decline due to the growth in domestic oil production, Venezuela's dominance in trade with Texas will also decline. Brazil is the state's next largest trading partner, accounting for about 25 percent of international waterborne trade in Texas. However, economic conditions in Brazil have impacted the flow of waterborne cargo between Texas ports and Brazil. The World Trade Organization projects the continued poor economic performance of Brazil through 2016, further impacting the volume and value of international trade between Texas and its second largest waterborne trading country. The degradation of trade with these South American countries suggests that Texas ports need to diversify their trading partners.¹⁰

As noted, Texas ports have not participated with Asia - particularly China - to the same degree as other U.S. ports. While China has experienced economic issues, it remains the dominant trading partner with the United States. To offset the decline in trade with the South American countries such as Venezuela and Brazil, it should be a goal of Texas ports to increase trade with China and the Asian economies. The expansion of the Panama Canal will enhance the ability to trade with China and Asia. Larger ships from Asia will now be able to transit the canal and bring cargo to the Gulf that once went to West Coast ports. Texas ports must be prepared to accommodate these vessels by having adequate channel depths, terminal operations, and inland infrastructure to capture these new markets and opportunities.

¹⁰ "Trade Statistics and Outlook", World Trade Organization, April 14, 2015

Exhibit 12: Key International Waterborne Trading Partners - Texas



Source: USA Trade-Online

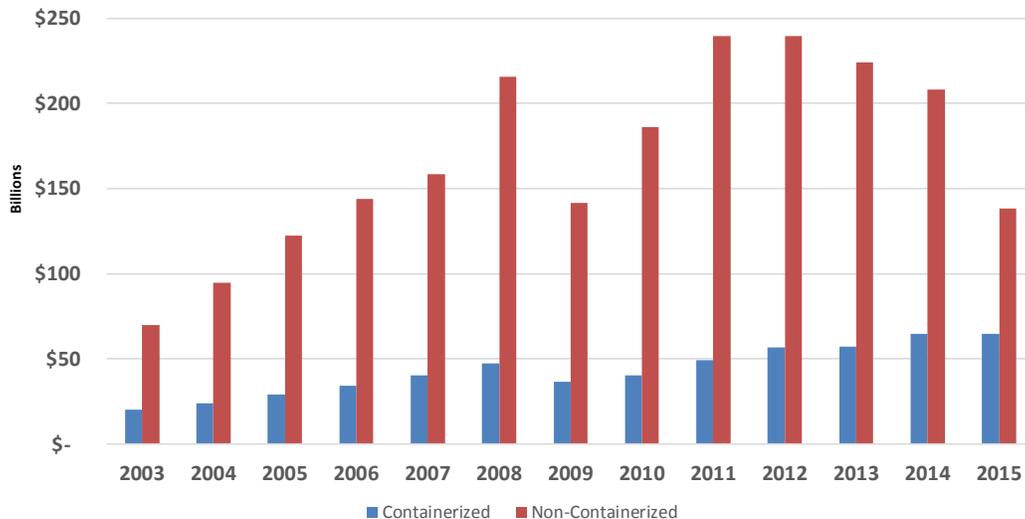
3.4. Key Waterborne Commodities

International waterborne imports and exports are largely driven by the petrochemical sector in Texas. In terms of imports, 63 percent of the value of waterborne imports in Texas in 2014 were petroleum and petroleum products, followed by industrial equipment and chemicals. However, the value of imported petroleum and petroleum products has fallen consistently since 2012, reflecting lower dependence on foreign imported petroleum and petroleum products and the growth in domestic energy resources.

Exports of petroleum and petroleum products reflect the increased export of domestic petroleum (to qualifying nations) and petroleum products supplied by domestic oil fields such as the Eagle Ford reserves. Exports of vehicles and parts reflect the growth in exports of Roll-on /Roll-off equipment and project cargo to support construction and mining projects in South America and the Middle East.

Exhibit 13 shows that despite the decline in overall value of international trade at Texas marine ports, containerized cargo handled at these ports is increasing. Infrastructure investments at Texas ports will be required, focusing on the growing size of vessels being deployed on the container trade, to participate in this growing market.

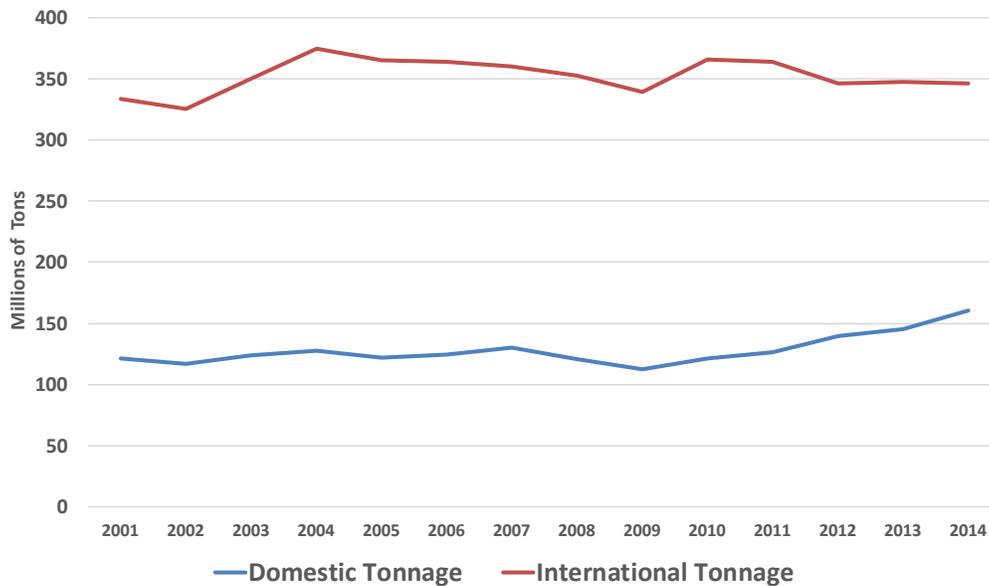
Exhibit 13: Containerized vs. Non-containerized Waterborne Trade in Texas



3.5. Domestic Waterborne Trade

In 2014, domestic cargo shipments and receipts exceeded 160 million tons, which accounted for 32 percent of the total waterborne trade at Texas ports.¹¹ Texas domestic waterborne trade is dominated by the petrochemical industry. The majority of these shipments originate from private terminals that typically move commodities to the east coast via deep-draft vessels and to neighboring Gulf Coast states via barge along the Gulf Intracoastal Waterway (GIWW). The GIWW is a critical asset to all Texas ports and annually moves over 86 million tons of cargo. Cargo carried on the GIWW reduces congestion and maintenance costs on highways and rail lines and extends the life of these systems. Domestic tonnage was stable until 2009 but has shown consistent growth since then (**Exhibit 14**). Any capital investments into port infrastructure to benefit international cargo flows will also benefit domestic cargo.

Exhibit 14: International and Domestic Cargo Handled at Public and Private Marine Terminals in the State of Texas



Source: U.S. Army Corps of Engineers, Waterborne Commerce of the U.S.

¹¹Domestic shipments and receipts excludes intraport and internal cargo movements, as reported by the U.S. Army Corps of Engineers

4. Opportunities

4.1. Energy Sector

The leading commodities handled by Texas ports are associated with the energy sector, and the changing price of oil can cause major ripples in international markets. **Exhibit 15** shows active oil and gas wells in Texas as of January 2016. Since 2008, oil and gas development activity in Texas has contributed more than \$300 million in economic activity for the state. The abundance of oil and low-cost gas has become the primary feedstock to the petroleum and chemical industries located along the Texas Gulf Coast. Low-cost gas has also driven down utility costs, which have attracted new manufacturing facilities to the region. Private investment along the Texas Coast from 2010 - 2020 is projected to be over \$100 billion. Key projects include:

- Golden Pass LNG expansion - \$10 billion
- Freeport LNG expansion - \$14 billion
- Cheniere LNG, Corpus Christi - \$12 billion
- Dow Chemical expansion, Freeport - \$4 billion
- ExxonMobil expansion, Baytown - \$6 billion
- Three new steel production facilities all under construction (\$3.5 billion)
- Seven new LNG export terminals planned for the Texas Coast

These facilities produce commodities that are in demand in Asia and Europe and are expected to increase exports from Texas ports significantly as early as 2018.

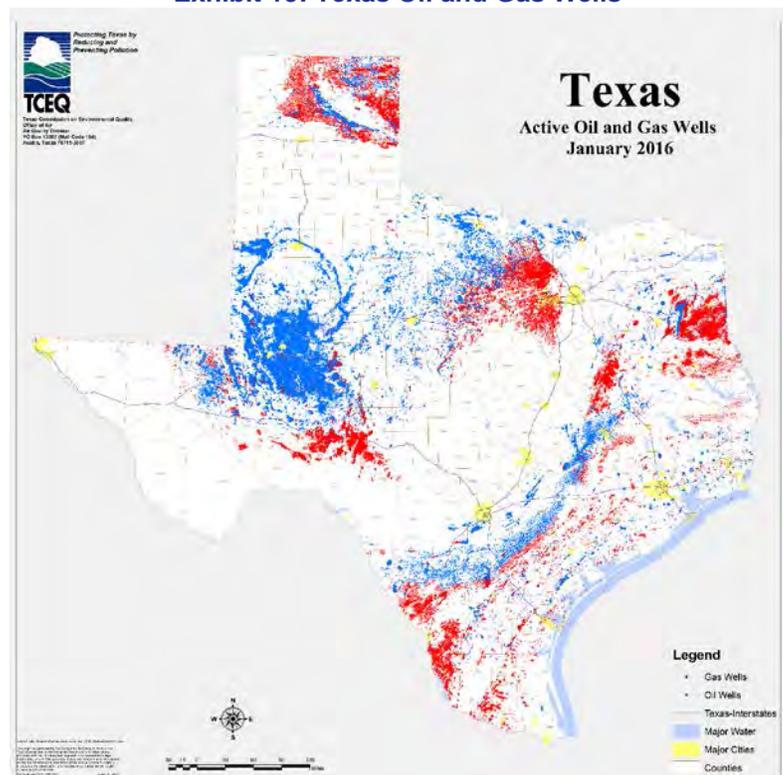
The changes in Mexican law governing oil and gas development now permit the state-owned petroleum company PEMEX to partner with international companies that have the capital and the expertise in exploring shale and deepwater oil and gas reserves. This development creates an opportunity for Texas ports to become the major distribution hub for project-related cargo and future oil and gas to be shipped across the border via pipeline for processing and subsequently exporting these products through Texas ports.

Recent changes in U.S. law governing the export of domestic crude oil and condensate have created even more export opportunities. The lifting of the ban on the export of crude oil makes 1.3 million barrels per day (bpd) of crude available for export. This number is expected to increase within the next six to twelve months as new infrastructure comes online. Although current market conditions do not support large-scale exports of domestic crude oil, longer-term price changes could create opportunities at several Texas ports while also stimulating demand for tank barge shipments along the GIWW. For example, U.S. exports of condensate (a type of ultralight oil) have doubled since the beginning of 2015, increasing from 60,000 bpd to over 120,000 bpd in June and are expected to continue to rise. The new laws will help further stimulate the U.S. economy, energy production, industrial investment, and job growth. These are all positive factors for the Texas economy and Texas ports.

4.2. Bulk/Container Cargo

Bulk/container cargo imports and exports are also rapidly increasing. Project related cargo, steel pipe, and aggregate for industrial expansion, fracture sand for the oil sector, and agricultural products are steadily increasing to meet existing demands. Container volumes continue to rise at Texas ports due to recent investments to expand facilities and shippers seeking to move goods closer to the large consumer population in the Midwest. As shown in **Exhibit 16**, the completion of the Panama Canal expansion project is expected

Exhibit 15: Texas Oil and Gas Wells



Source: Texas Commission on Environmental Quality

to improve Gulf and East Coast port access to the battleground region of the country that is currently more efficiently served by West Coast ports. Prior to the expansion project, West Coast ports were the only ports that could handle the larger bulk/container vessels coming from Asia which provided those ports and shippers a competitive advantage based on the economies of scale. The new Panama locks now allow the passage of these larger vessels to the Gulf and the East Coast. Moving the goods via water closer to the consumer population is expected to reduce shipping cost, marginalize the West Coast port advantage and increase bulk cargo and container volumes at Texas ports.

Exhibit 17 shows the location of retail distribution centers within the state, which are highly dependent upon containerized cargo. The exhibit does not include the numerous warehouse facilities located along the Texas - Mexico border associated with the maquiladora industry or warehousing in support of Texas-based manufacturing.

The ability to serve the distribution centers via Texas ports is dependent upon several factors:

- An efficient highway and rail system linking the ports to the distribution centers
- Highly productive marine terminals able to move cargo efficiently and promptly from the ship to the distribution centers
- A navigation system able to handle the increasing size of the vessels now calling U.S. ports

To date, the majority of these distribution centers are served by cargo from Asia that is imported via West Coast ports and then moved via truck or rail to the distribution centers. This results in a loss of potential jobs, income, and taxes to the state of Texas. Future investments in rail and highway connectivity between ports and distribution centers, efficient and cost effective marine terminals, and channel deepening to accommodate the growing size of vessels will be required to increase the ability of the Texas ports to serve the local and regional distribution and consumption centers.

Exhibit 16: Midwest Consumer Market

A Battleground Region Representing 15 Percent of GDP Will Be in Play Between West Coast and East Coast Ports

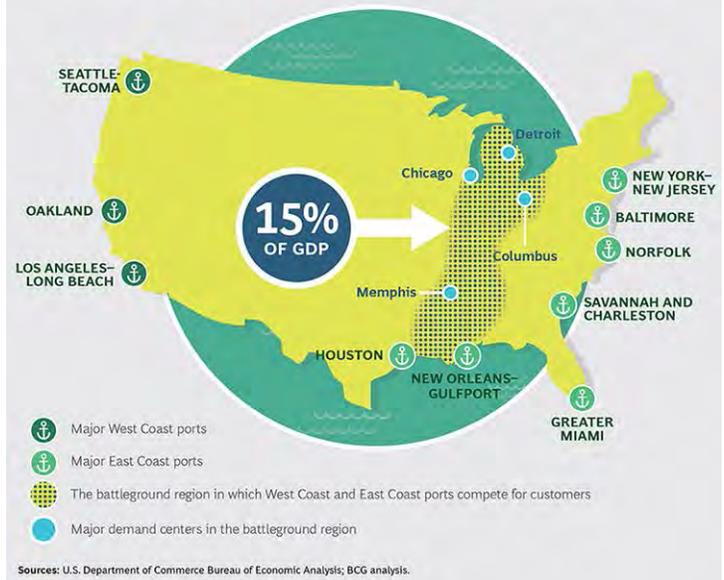
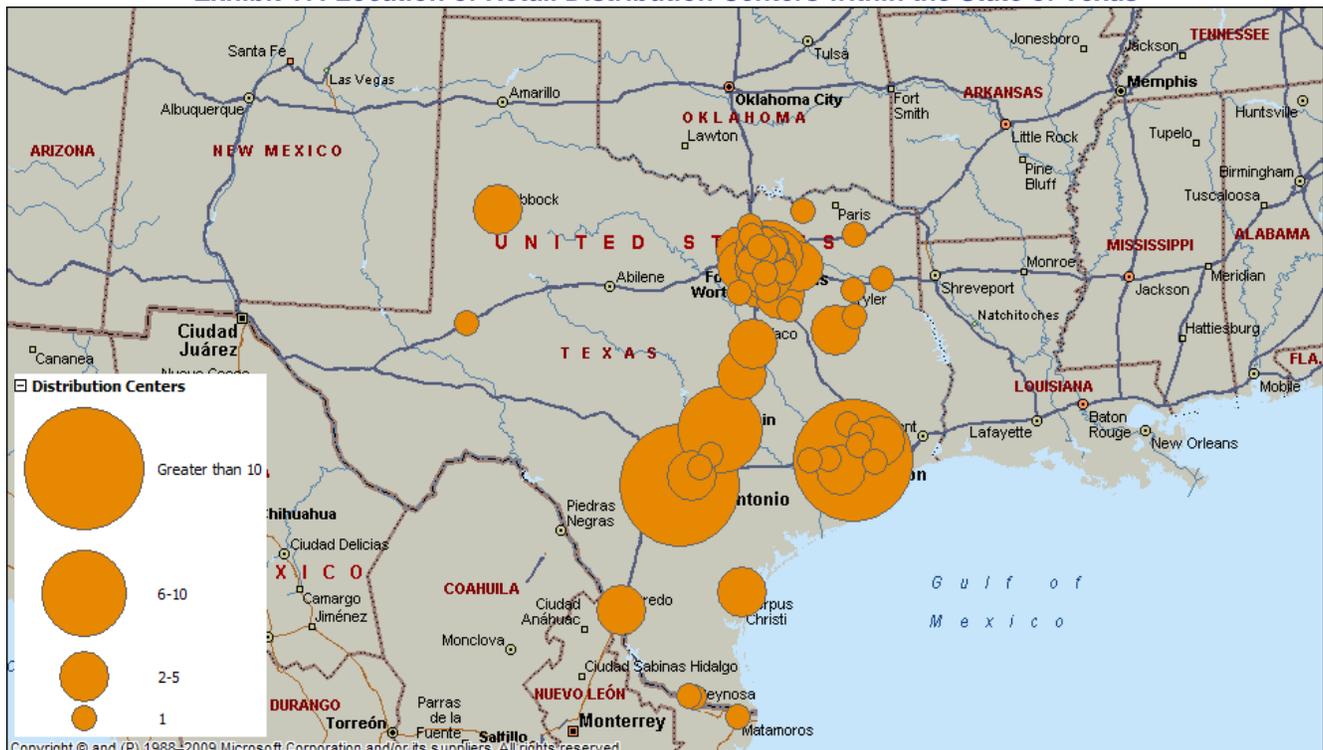


Exhibit 17: Location of Retail Distribution Centers within the State of Texas



Source: Chain Store Guide

4.3. Cruise

In 2015, 1.6 million cruise passengers sailed via Texas ports compared to 13.5 million for Florida ports, the leading state in terms of cruise passenger services. The cruise business has been growing at Texas ports, increasing by 13 percent between 2013 and 2014. This compares to a seven percent growth in cruise passengers at Florida ports. According to one industry report, cruising generated over \$1.3 billion for the Texas economy in 2014, a 5.6 percent increase over 2013. As the state's population and personal income continue to grow, more residents are expected to seek cruise services for personal leisure. Investments in wharf improvements to accommodate larger cruise ships are needed to retain and grow this business. The Texas Legislature's Joint Interim Committee on Cruise Ship Development is currently reviewing potential benefits of expanding the cruise ship industry in South Texas.

4.4. Panama Canal

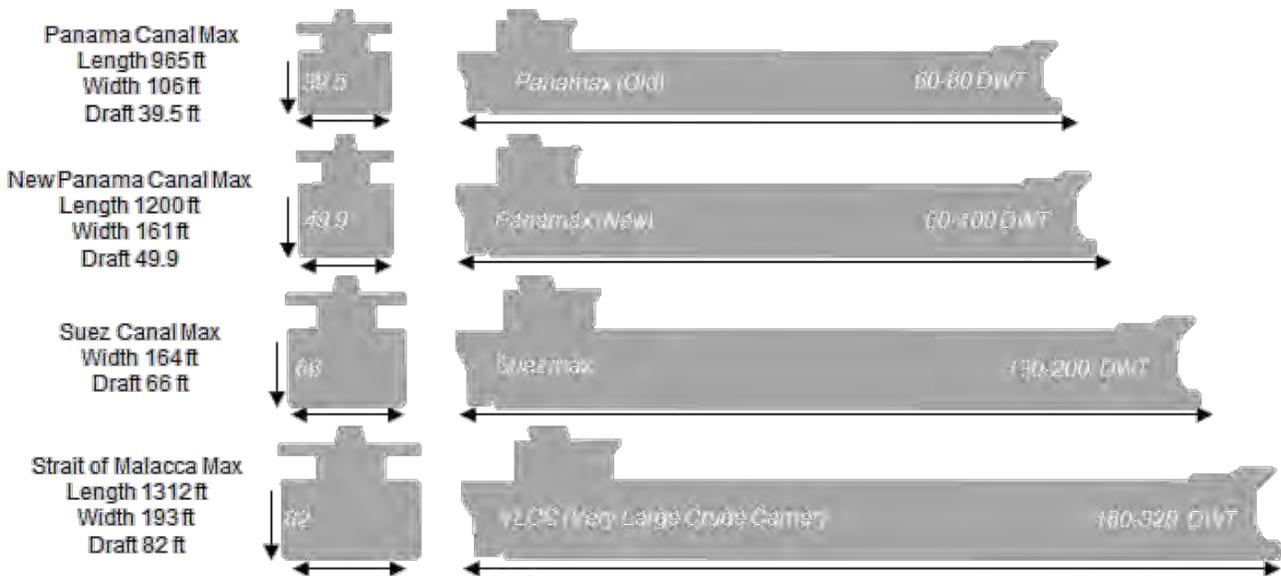
The \$5.25 billion expansion of the Panama Canal will significantly increase the opportunity for trade with Asia, a market currently underserved by Texas ports. As economic activity and trading with South America declines, Texas ports need to increase their focus on trade with China and Asia. The new locks now enable larger container ships, bulk vessels, LNG, and the new fleet of LPG vessels to transit the canal as shown in Exhibit 18. Texas ports can expect to see larger vessels calling in the future and export markets with Asia growing significantly, especially for LNG products.

To take advantage of the economies of scale resulting from the larger vessels, it will be critical that investments continue in the following:

- Channel deepening and widening projects at the Texas ports
- Marine terminals to handle the larger vessels and associated larger volumes of cargo
- Rail, highway, and pipeline infrastructure to provide efficient connectivity between the marine terminals and the inland production and consumption centers

Exhibit 18: Maximum Ship Sizes

Maximum ship sizes for the Panama and Suez Canals, Strait of Malacca



Source: Energy Information Administration; Surveyor (2002); Maritime Connector

4.5. Water Resources Reform and Development Act 2014

The passing of the Water Resources Reform and Development Act (WRRDA 2014) in 2014 was critical to the strategic future of Texas ports. The law authorized new channel deepening projects for Port Freeport and the Sabine Neches Waterway and reauthorized the deepening project for the Corpus Christi Ship Channel (**Exhibit 19**). The Port of Houston channel deepening study was also funded. Recently, the Port of Brownsville deepening study was completed successfully, and it is currently awaiting authorization in the next Water Resources Development Act expected in 2016. All these projects and studies come at a critical time and set the stage for Texas ports to fully take advantage of the expansion of the Panama Canal, the emerging developments in the energy sector, and the shipping industry's decision to move to larger vessels requiring deeper drafts.

Exhibit 19: WRRDA 2014 Impacts on Texas Ports

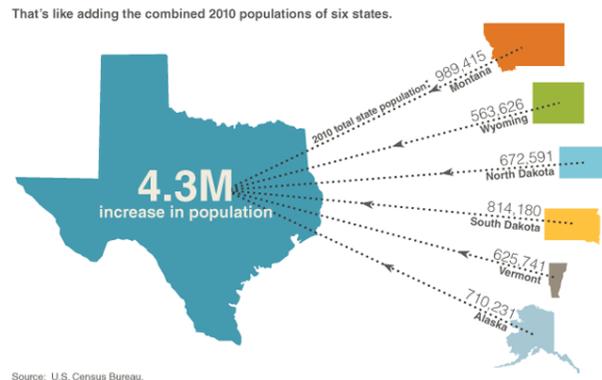
Channel Name	Current Channel Depth (ft.)	New Channel Depth (ft.)	Federal Cost (000)	Non-Federal Cost (000)	Total Cost (000)
Sabine Neches Waterway	40	48	\$748,070	\$365,970	\$1,114,040
Freeport Harbor	45	55	\$121,000	\$118,300	\$239,300
Corpus Christi Ship Channel	45	52	\$182,582	\$170,649	\$353,231

4.6. Texas Population Growth 2000 – 2014

Texas accounted for 15.7 percent of the nation's total population growth from 2000 to 2010. In all, the state's population increased by 4.3 million, or 20.6 percent, from 2000 to 2010. This is more than twice the U.S. rate of 9.7 percent, as shown in **Exhibit 20**. This rapid growth is expanding the demand for consumer goods. With proper infrastructure investments, the Texas port system will allow shippers to deliver the goods closer to the consumer, in turn cutting supply chain costs.

Exhibit 20: Texas Population Boom 2000 – 2010

The state's population increased 4.3M since 2000.



5. Current and Future Challenges

Texas ports will face significant challenges in the future as they seek to optimize their growth potential. None of these challenges are insurmountable. Future success will be achieved by working closely with the state and the federal government to prioritize projects and ensure there is a steady stream of funding available to leverage opportunities. Channel deepening and widening projects will require a long-term financial commitment by the federal government. The reduction in terminal congestion will require commitments by the ports to improve their waterside infrastructure and by the state to execute connectivity projects promptly. These commitments will be difficult given the inconsistency in federal funding, other regional transportation priorities, and the financial gap many of the ports are experiencing. Investments are being made by competing ports with assistance from their states but not in Texas. Texas ports require a consistent general revenue funding stream to support their growth and to optimize future opportunities and economic benefits.

5.1. Inconsistent Federal Funding

The lack of federal investment associated with new channel deepening and widening projects and channel maintenance dredging is limiting the growth of Texas deep and shallow-draft ports. Texas has three authorized deep-draft channel deepening projects that have yet to be funded. These projects must be completed to expand capacity, reduce future channel congestion, and fully capture the economic benefits associated with changes in the energy market, the size increase in the worldwide vessel fleet (requiring channel depths of 47-50 ft.), and the expansion of the Panama Canal.

Although the GIWW is authorized to a depth of 12 feet, it is currently draft-restricted to 10 feet due to insufficient federal funding for dredging. Outdated and aging infrastructure at the Colorado River Locks and the Brazos River Floodgates along the GIWW are causing shipping delays, which reduce the economic value of the waterway. The Texas maritime system, including the GIWW, requires \$275 million annually in federal funding for channel dredging and maintenance. Texas receives, on average, \$110 to \$120 million, which

leaves a maintenance backlog that erodes economic benefits. To overcome these hurdles, Texans need to work together to ensure their requirements are recognized by the federal government and if necessary, develop strategies for advancing state and local funds instead of federal funds to ensure continued growth.

5.2. Transportation Connectivity

Waterside connectivity relates to a port's ability to access multiple domestic and international trade routes and shipping services that drive the global maritime supply chain. Each Texas port has successfully developed marketing strategies to attract new clients and shipping lines which have led to growth in freight. Waterside connectivity is expected to increase now that the expansion of the Panama Canal is complete. Texas ports will need to continue investing in channel improvement projects to prepare for these opportunities.

Inland connectivity relates to the ports' ability to move freight efficiently through the intermodal transportation system and the supply chain to distribution centers and the consumer. As maritime trade continues to grow in Texas, inland connectivity from the port to the state's transportation system will need to be enhanced to ensure freight moves efficiently and limit congestion. The state has established goals and identified congested freight corridors in the TxDOT Freight Mobility Plan to address this issue. The TxDOT Maritime Division recently commissioned a Port Connectivity Study to review the existing and future challenges with moving freight via road and rail to and from the seaports and to identify projects for future implementation.

The ports, railroads, and the state need to work together to ensure the priority road and rail projects that are identified in the plan are funded and completed before the congestion problem worsens. Improvements to road and rail networks will need to be synchronized with port projects to ensure the most efficient supply and distribution chain is achieved.

Port connector projects that deliver economic benefits associated with job creation and efficient freight movement need to be prioritized within the transportation project planning and selection process to avoid disruption within the supply chain. Public investments by the state and ports in pivotal infrastructure projects that support entire transportation corridors and integrated supply chains optimize the benefits to the state economy.

5.3. Terminal Congestion

Larger container ships are already calling on Texas ports and container volumes have increased. This combined with the continued flow of bulk and break bulk cargo has resulted in a proportional increase in rail and truck traffic. As more of these vessels arrive in the future, ports will need to invest in port, landside, and transportation infrastructure to maintain cargo velocity and avoid terminal congestion. In addition to infrastructure, the ports will also need to invest in new larger cranes as well as technologies such as Radio Frequency Identification and expanded entry and exit points to reduce truck waiting times in and out of the port. In some cases, ports will also need to acquire more land to facilitate their projected growth.

5.4. Financing Capital Improvements

Texas ports have always financed their capital improvements through internal revenue generated from their operations, local taxing authority, and/or bonds. All of the major ports have been heavily investing since 2010 to meet the demands of the energy sector and to be ready for the expanded Panama Canal, which opened in 2016. Many of the ports are heavily leveraged and will have to reduce infrastructure investments in the coming years to maintain appropriate revenue-to-debt ratios. Smaller regional ports that do not generate much revenue have infrastructure and dredging needs that are not being met, but these ports are critically important to their regional economies. Future opportunities for all ports to enter new markets and engage new clients will be lost if the ports cannot secure financing. A consistent, recurring, and flexible funding source from the Texas State Legislature will help alleviate this financing gap and assist ports with overcoming their financial challenges.

5.5. Investments at Competing Ports

The competition among ports both regionally and internationally is very intense. Internationally, Texas competes with ports in Mexico, the Caribbean, and Central America. Regionally, the competition is mainly centered on the Gulf Coast ports for bulk and liquid bulk commodities and with East and West Coast ports for container traffic. Many of the ports that Texas competes with receive state government funded subsidies in the form of grants or low-interest loans for their capital improvement projects. These programs provide investment capital to ports through various programs such as economic development funds, general revenue, or transportation programs. These subsidized port enhancements make non-Texas ports more attractive to shippers and potential tenants, luring business away from Texas. **Exhibit 21** lists the types of funding programs made available by Gulf Coast states for port infrastructure. Texas currently has no direct mechanism to fund seaport capital investments, although navigation districts can provide tax abatements to encourage industrial development.

Exhibit 21: Port Funding Programs by State

State	Grants	Low-Interest Loans	Motor Vehicle Registration Fees	Tax Incentives	Transportation Program	Economic Development Program	General Revenue
Alabama	****						X
Florida	X	X	X		X		X
Louisiana	X					X	X
Mississippi	X	X			X	X	X
Texas				X	*		

****-Alabama provided a one-time grant from their general revenue funds for \$10 million; they do not have a formal program.

*-Texas authorized \$20 million from the Texas Mobility Fund for port road connectivity projects during the 84th Legislative Session. However, this is not a recurring program, and funds could only be used for public road connectivity projects off port property.

Exhibit 22 lists examples of capital investments planned or recently completed at ports along the Gulf Coast.

Exhibit 22: Port Investments Made by Competing Gulf Coast States

STATE	INVESTMENTS
Alabama	<ul style="list-style-type: none"> \$36 million Alabama Steel Terminal \$68 million Choctaw Container Terminal
Florida	<ul style="list-style-type: none"> \$77 million Port of Miami dredging ¹² \$78 million Port Everglades FEC Yard \$24.4 million Port Canaveral dredging \$22.5 million Port Tampa Petroleum Terminal Complex
Louisiana	<ul style="list-style-type: none"> \$26 million Mississippi River Intermodal Terminal \$36.5 million TCI Plastics facility \$4.4 million Chiquita Bananas-facility¹³
Mississippi	<ul style="list-style-type: none"> \$26.6 million allocated to fund 88 port projects from 2005 - 2012¹⁴

¹² <http://www.flgov.com/governor-scott-calls-for-state-investment-of-24-4-million-for-port-canaveral-project-2/>

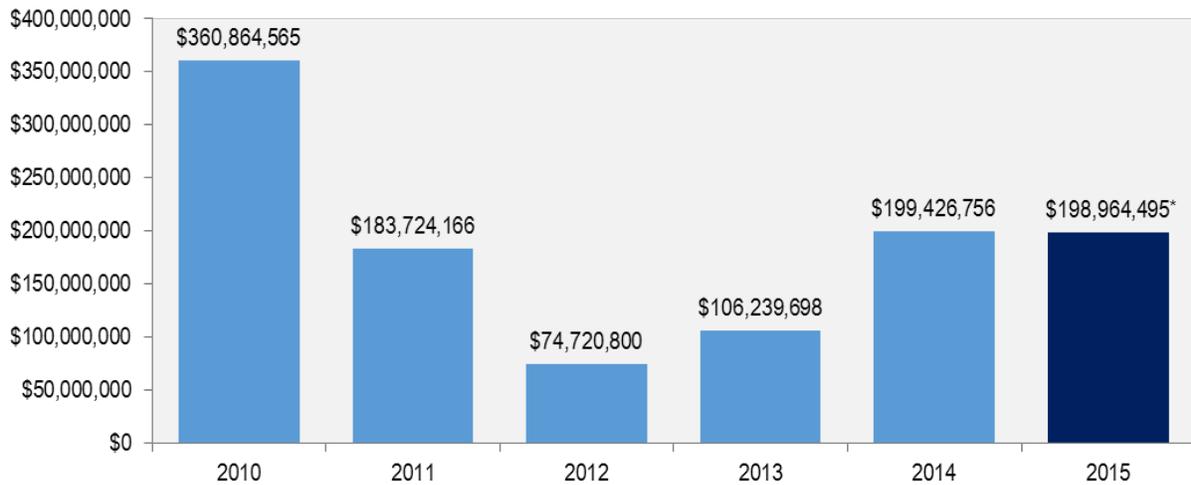
¹³ http://portno.com/Chiquita_returns

¹⁴ http://mdot.ms.gov/documents/intermodal%20planning/ports_waterways/Programs/Multimodal%20Transportation%20Improvement%20Program.pdf

6. Port Capital Investments 2010-2015

Since 2010, Texas ports have invested over \$1.1 billion for capital improvement projects (Exhibit 23).

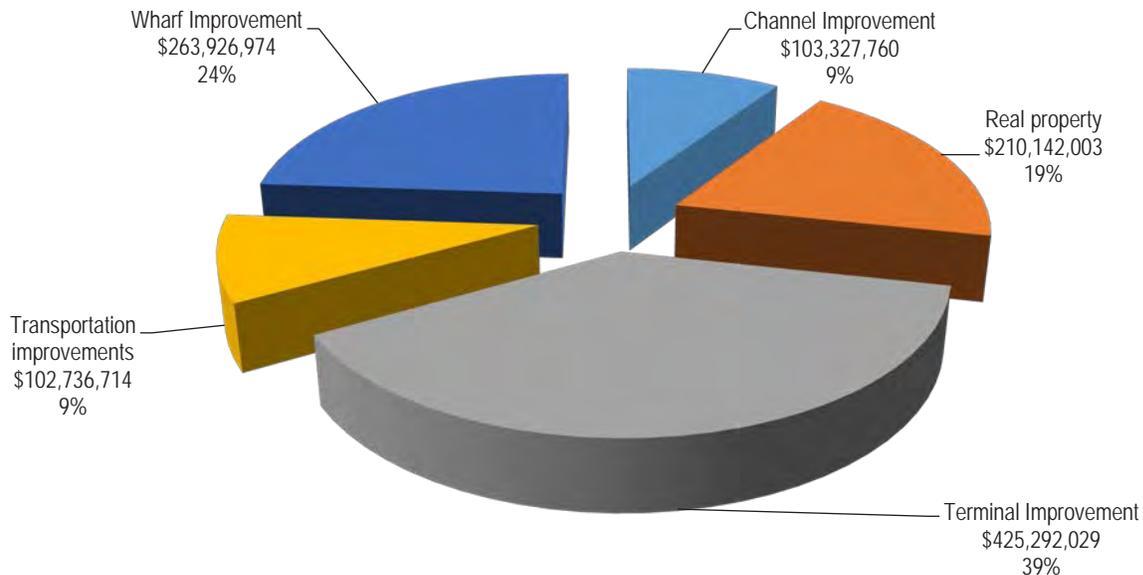
Exhibit 23: Collective Texas Marine Port Capital Improvement Program FY 2010 – 2015



* August 2015 year to date

Exhibit 24 shows the total Texas maritime port capital improvements by project type from 2010 to 2015. Texas ports' investments into channel improvement include deepening and widening projects to accommodate large vessels that are calling on the ports now and in anticipation of future requirements. Wharf improvements are focused on new construction and restoration to meet current demands and future requirements for larger vessels. Real property expenditures are primarily focused on the purchase of land for expansion, Post-Panamax cranes, and safety and security improvements. Terminal improvements include the construction of new warehousing facilities, back lands development, cruise terminals, and utility upgrades to accommodate new and existing clients as well as prepare for increased cargo movements in the future. Transportation improvements are mainly focused on construction and restoration of rail systems to enhance future intermodal connectivity.

Exhibit 24: Collective Texas Marine Port Capital Improvement Program by Project Type FY 2010 – 2015



These improvements are being driven by the new opportunities that have been created by the expansion of the Panama Canal, the new developments in the energy and manufacturing sectors, and the need to modernize all facilities as the world vessel fleet gets larger. Texas ports need to expedite their infrastructure projects now to capture new markets and business before it is locked in elsewhere.

6.1. Future Investments

None of the newly authorized federal channel deepening projects has been constructed. Construction of these projects will require the sponsoring ports to provide matching funds, which is more than \$1 billion for all projects combined. Additionally, many of the major terminal development projects have been phased by the ports over the next 10 to 15 years. In short, Texas ports must maintain a steady flow of revenue and capitalize on new funding sources for years to come to stay competitive in world markets and maximize economic benefits. A flexible and recurring funding source would allow Texas ports to compete more effectively with other states, take advantage of emerging opportunities, and stay ahead of expected demand growth with targeted capacity enhancements.

7. Looking Towards the Future

The future growth and potential for increasing economic benefits to Texas from its robust maritime system are very encouraging. The opportunities created by the expanding petrochemical and manufacturing industries, the expansion of the Panama Canal, and the potential for a larger share of the Asian and European markets will require continued investment from the state and the ports in strategically important intermodal infrastructure.

As the population in the state continues to grow, there will also be a need for Texas to continue investing in the development of the road and rail transportation network. These investments are required now to move cargo efficiently through the supply chain and relieve congestion on city streets and state highways. Port connector projects need to be better synchronized and prioritized with other regional transportation requirements to optimize economic returns.

Texas ports have already identified over \$1 billion in capital improvement projects that are required to upgrade wharfs, terminals, and for the acquisition of more Post-Panamax capable cranes. The three newly authorized channel deepening and widening projects will require another \$1.2 billion in non-federal matching dollars. These requirements are coming at a time when ports are challenged with limited bonding capacity and high debt-to-revenue ratios and are in an environment where local support for new bonds or tax increases is lacking.

The lack of local support for new taxes and bonds is particularly detrimental to the smaller ports that do not have the revenue stream to finance the projects they need to stay in existence. These ports are critical to their respective regional economies, as most are located in areas with limited jobs and high unemployment rates. In many cases, small ports are enablers to the larger ports by handling business that is not economical for the larger ports to serve. Small regional ports need a dedicated revenue stream to execute projects and remain a viable component of their region's economy.

Overall, Texas could benefit by following the example set by other states who have recognized the linkages created in the supply chain between the transportation system, distribution centers, industrial manufacturers, and consumers. These states view their road, rail, and water transportation systems as a synchronized network and provide dedicated funding streams for capital improvement projects. These projects create statewide economic benefits in the form of long-term well-paying jobs with benefits, short-term construction jobs, enhanced consumer spending, and increased tax revenue.

The PAAC has already started engaging the Governor's Office of Economic Development and Tourism, and the entire maritime system will benefit from this collaborative partnership to promote and market the Texas ports. This partnership will provide a new venue for the ports to educate other state and federal agencies on the benefits of transportation infrastructure investments. The development of a communications strategy will enable the state to present a unified message to the federal government, advocating for their investment into channel deepening and widening projects and recurring funding for channel operations and maintenance requirements.

The PAAC has established a vision for the Texas port system through this SMP and the conditions are ripe to leverage the opportunities identified in the SMP now. Future strategic investments into capital improvements, channel projects and landside connectivity projects will allow Texas ports to seize these opportunities, continue to grow and maximize economic benefits. The PAAC recently completed the Texas Ports Capital Program for 2017-2018 which identified nineteen high-priority capital improvement projects for Texas ports. Each of these projects is a high value project that will enhance port efficiency, improve the movement of freight through the intermodal system, create new jobs and stimulate economic growth within Texas. The PAAC knows that these windows of opportunity are closing fast and they are ready to capture these benefits for Texas before they are gone.

Appendix A: Strategies and Objectives

STRATEGIES	OBJECTIVES
<p>Secure a recurring State General Revenue Funding Source that supports the growth and development of the Texas Maritime System</p>	<ul style="list-style-type: none"> • Secure general revenue from the legislature to fund seaport capital improvements as outlined in Chapter 55 of the Texas Transportation Code on a recurring basis • Fully integrate maritime ports into the statewide transportation mobility funding plan • Explore innovative financing solutions for funding the federal cost share of channel deepening projects (Public-Public and Public-Private Partnerships) • Use the Port Authority Advisory Committee to screen, evaluate, and identify high priority projects for state funding • Establish criteria for project matching funds
<p>Optimize the statewide intermodal transportation system to streamline the movement of freight and passengers</p>	<ul style="list-style-type: none"> • Enhance road and rail connectivity to and from the ports • Partner with the regional Metropolitan Planning Organizations, local governments and state agencies to prioritize and fund port related intermodal transportation improvements • Work with state agencies to identify and remove impediments to freight movement • Identify opportunities for increasing freight movement by alternative modes • Seek funding for projects that move freight from ports to distribution points without using highways (e.g. rail and barge)
<p>Develop and maintain state of the art port systems that will strengthen Texas port’s global competitiveness</p>	<ul style="list-style-type: none"> • Renovate, build and expand cargo and cruise terminals to meet future demand • Improve and maintain channels, including the Gulf Intracoastal Waterway, to support larger vessels and safe barge operations • Acquire land for future growth and the expansion of port and freight facilities • Improve critical infrastructure to support the increasing size of the worldwide vessel fleet
<p>Identify and capitalize on key markets to increase exports to the Americas, Asia and Europe</p>	<ul style="list-style-type: none"> • Grow the existing base cargo: liquid, bulk, and container • Leverage the growing energy sector and the foreign demand for refined products • Support future free trade agreements • Explore new trade lanes not presently served by Texas ports • Maximize use of Texas ports to handle cargo consumed or manufactured in Texas but using non-Texas ports • Develop a distribution center strategy to identify new opportunities for ports and leverage the existing inland distribution capacity • Develop coastwise short sea shipping opportunities
<p>Advocate to secure resources for smaller regional ports to continue to exist and grow</p>	<ul style="list-style-type: none"> • Provide funding for small ports to use for planning and executing essential projects • Advocate for incentives that assist regional ports with securing new business opportunities
<p>Develop a communications strategy to engage State agencies and the Federal government</p>	<ul style="list-style-type: none"> • Work jointly with the Governor’s Office of Economic Development and Tourism to promote and market the maritime system • Advocate for economic development funding and private investment in the Texas Maritime System • Educate state and federal leaders and the public on the benefits of infrastructure investment • Advocate for a Federal investment in authorized channel deepening and widening projects • Advocate to increase federal funding for channel operations and maintenance • Advocate for TxDOT support of federally funded port transportation projects

