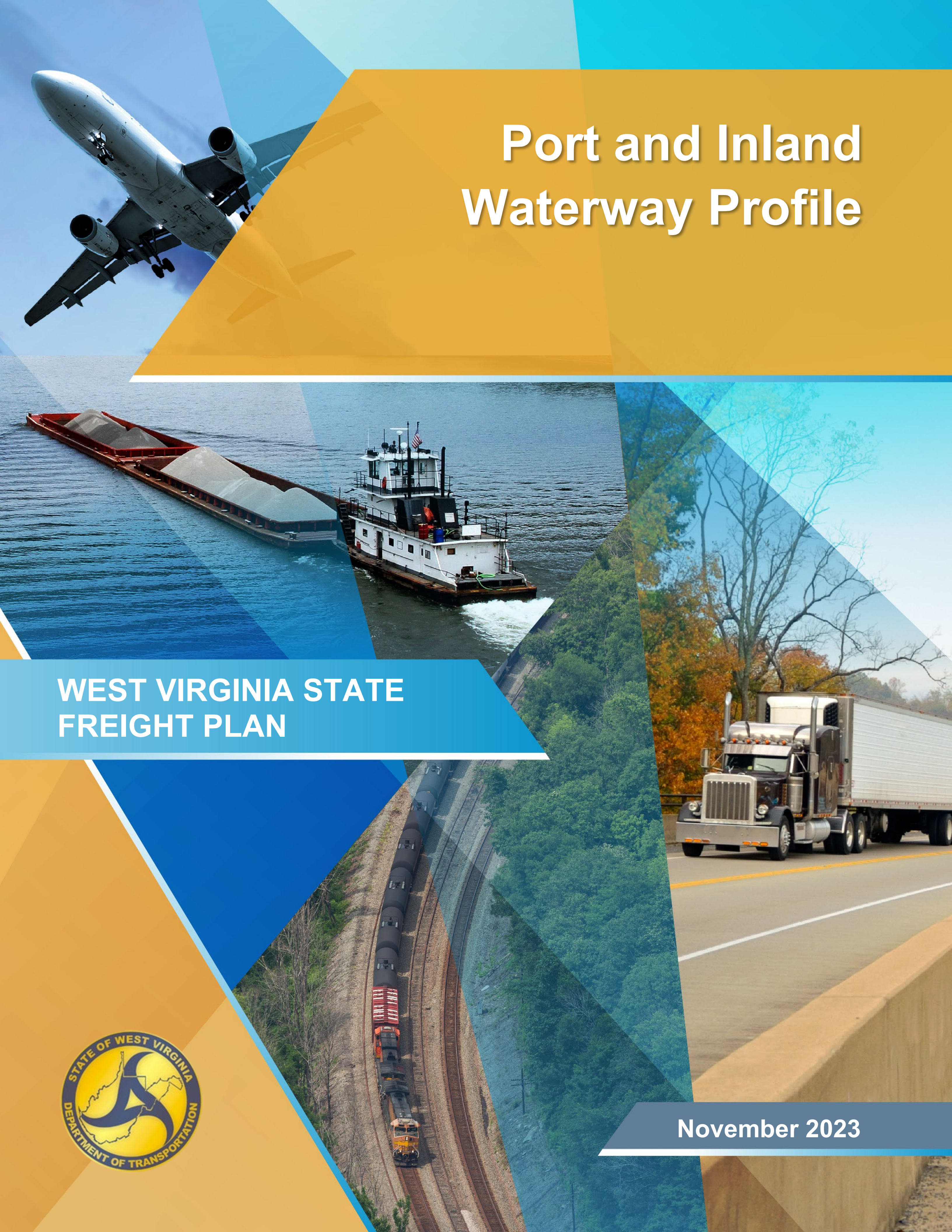
Port and Inland Waterway Profile



WEST VIRGINIA STATE FREIGHT PLAN

November 2023

Tech Memo

West Virginia State Freight Plan

Port and Inland Waterway Profile

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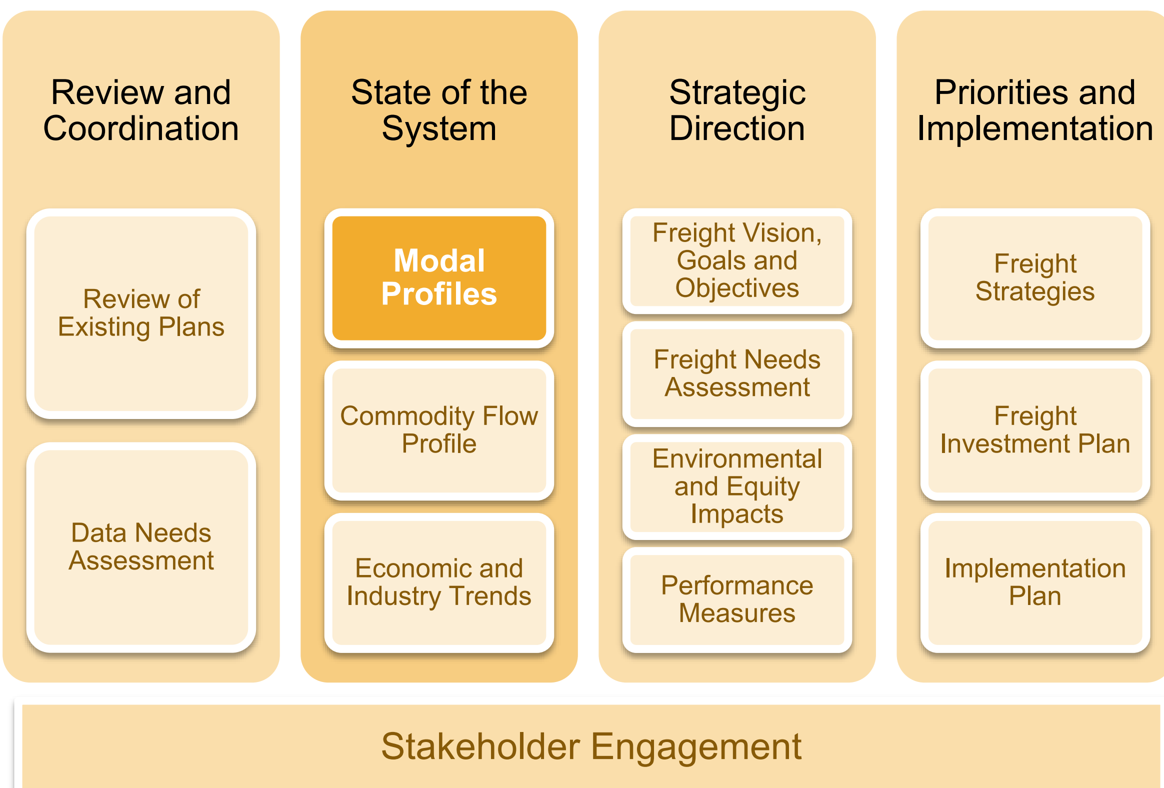
1.0 INTRODUCTION

1.1 Overview of the Plan

In 2022, the West Virginia Department of Transportation (WVDOT) began its update of the West Virginia State Freight Plan. This Plan will fulfill federal requirements for state freight planning, identify opportunities for West Virginia to invest in its freight system, and position WVDOT to take full advantage of federal formula and discretionary funding programs for freight transportation investments. Additionally, the Plan will detail freight activity, needs, and priorities, and support WVDOT in meeting the agency's overall goals as well as those of this Plan.

The purpose of this *Port and Inland Waterway Profile* is to identify West Virginia's existing port and inland waterway assets and freight demand, and assess their performance and condition. Documenting existing challenges helps identify strategies and solutions to aid the state going forward and is one of many complementary technical activities that will be developed as part of this planning process. The overall process is shown in Figure 1.1 and will be developed in conjunction with a robust stakeholder engagement effort that will support the data driven aspects of this Plan.

Figure 1.1 West Virginia State Freight Plan Technical Activities



1.2 West Virginia Freight Transportation Vision and Goals

The vision of the West Virginia State Freight Plan is as follows:

THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION'S MISSION IS TO RESPONSIBLY PROVIDE A SAFE, EFFICIENT AND RELIABLE TRANSPORTATION SYSTEM THAT SUPPORTS ECONOMIC OPPORTUNITY AND QUALITY OF LIFE.

The WVDOT will achieve their vision through the following goals:

- **System Condition, Efficiency, and Fiscal Sustainability:** Maintain multimodal and intermodal freight transportation infrastructure in a state of good repair and manage lifecycle costs; efficiently deliver projects, programs and services supporting goods movement; and work to maintain existing funding mechanisms while exploring new alternative and sustainable funding mechanisms.
- **Safety and Security for All Users:** Reduce transportation fatalities and serious injuries involving freight vehicles, improve the safety and security of drivers, cargo, and intermodal facilities, and improve the resilience of the freight system particularly to severe weather events and other disruptions.
- **Economic Vitality:** Strengthen the ability of communities and industries to access national and international trade markets, retain and grow existing WV statewide and regional economic focus sectors, and support regional economic development that will diversify WV's economy.
- **Multimodal Mobility, Reliability, and Accessibility:** Facilitate freight mobility and connections for on-demand and reliable goods delivery across all West Virginia communities, including critical services such as health care and emergency management.
- **Livable and Healthy Communities:** Create freight transportation systems that operate efficiently and cleanly, protect the natural environment and maintain access for residents and visitors to experience WV's natural and cultural destinations.

1.3 Port and Inland Waterway Profile Overview and Organization

The following sections of this technical memorandum include the following:

- Section 2.0 – Port and Inland Waterway Network Inventory
- Section 3.0 – Inland Waterway Transportation Demand
- Section 4.0 – Port and Inland Waterway Infrastructure Condition and Capacity

2.0 PORT AND INLAND WATERWAY NETWORK INVENTORY

Waterway freight transportation supports the resiliency of the nation's supply chain through the creation of jobs as well as the ability to meet consumer needs. Ports that provide access to navigable waters allow freight to be transported by barge or ship. This method of transportation has low emission levels and comparatively low costs. Additionally, because it has a dedicated throughway, water transportation is an attractive alternative for the movement of goods compared with highways and rail for many commodities. To highlight the importance of port and inland waterways to the nation's economic health and resiliency, this section provides an overview of the U.S. Inland Waterway network, the critical infrastructure that makes up West Virginia's port and inland waterway network and the role intermodal facilities provide to the state's port and inland waterway network.

2.1 U.S. Inland Waterway Network

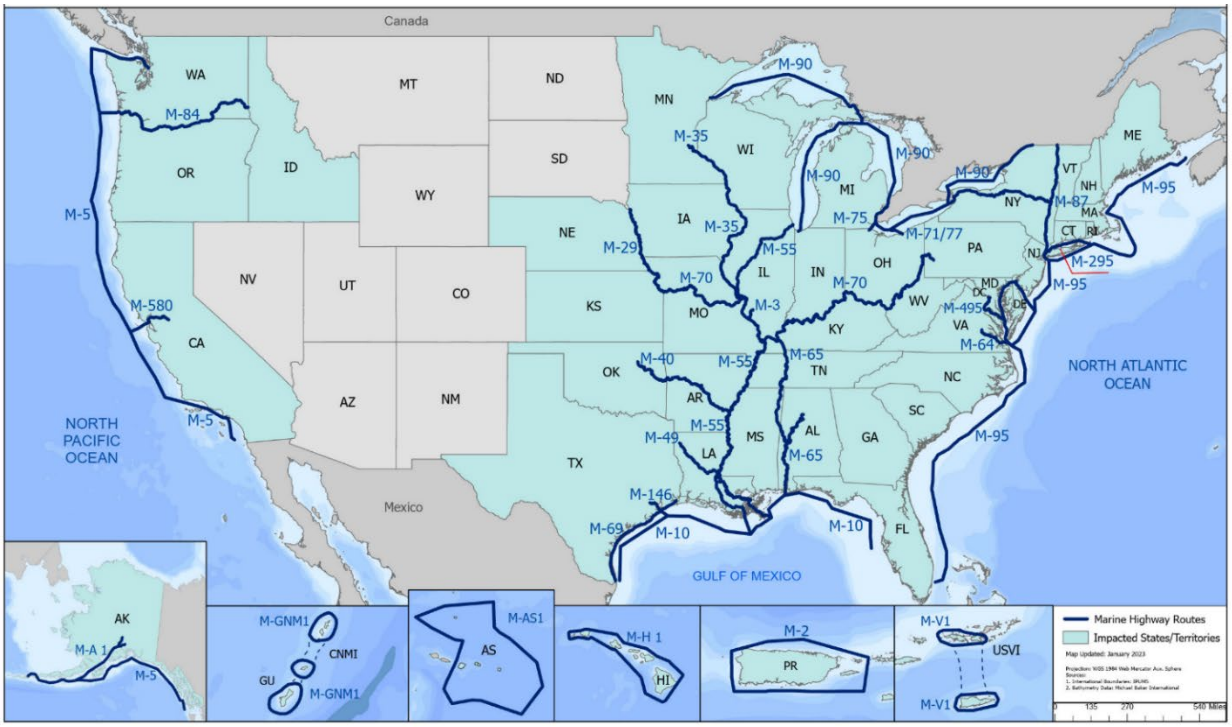
The waterway network is comprised of approximately 12,000 miles of inland navigation channels as well as an additional 11,000 miles of intracoastal waterways owned and operated by the U.S. Army Corps of Engineers (USACE).[1] The nations inland waterway system or marine highway network provides opportunities for freight services for the country and connects port facilities. The most significant routes of waterway freight movement happen on Marine Highway Routes, as designated by the U.S. Department of Transportation Maritime Administration (MARAD). Set up in 2007, these routes are a network of maritime expressways that provide an alternative to the highway and rail networks. They add another layer of redundancy to America's freight network and allow movement by vessels that use less energy and reduced air emissions (including greenhouse gases) per ton-mile of freight moved than by other modes.

As illustrated in Figure 2.1, the U.S. Marine Highway Network includes 29 Marine Highway Routes. These routes include coastal ports and facilities including along the Atlantic and Pacific coasts, the Great Lakes, inland rivers including the Mississippi, Missouri, Ohio, and Illinois rivers, and the Gulf Coastline. The M-70 Route connects commercial navigation channels, ports, and harbors, from Pittsburgh to Kansas City and spans Pennsylvania, Ohio, West Virginia, Kentucky, Indiana, Illinois, and Missouri, connecting to the M-55 Route at St. Louis. West Virginia marine highway routes are designated under route M-70, the Ohio, Mississippi, and Missouri Rivers. In 2023, the Port of Pittsburgh and the City of Morgantown worked together to develop an application, cosponsored by the Morgantown Monongalia MPO, for the Monongahela River to be designated as part of the Federal Marine Highway System as M-79.

Public benefits of the marine network include landside congestion relief, reduced wear and tear on the highway system, increased freight system capacity, reduced energy usage and air emission per ton of freight moved, and improved system resiliency through redundancy.

[1] https://infrastructurereportcard.org/cat-item/inland-waterways-infrastructure/

Figure 2.1 United States Marine Highway Routes



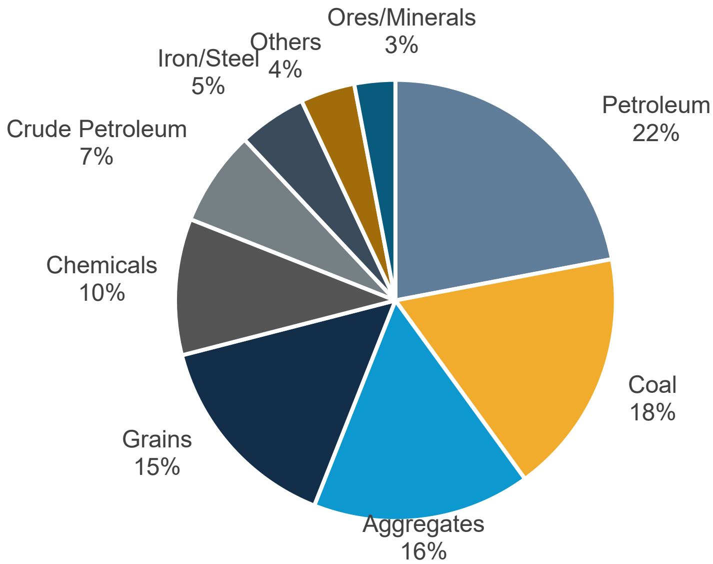
Source: U.S. Department of Transportation Maritime Administration (MARAD)

2.1.1 Inland Waterways Commodities

Inland waterways are an important part of the multimodal freight network, and nearly 830 million tons of cargo are moved on the inland waterways system annually.[2] States on the Gulf Coast and throughout the Midwest and Ohio Valley depend on the inland and intracoastal waterways to move commodities. The key commodities transported on the U.S. inland waterways system include petroleum, coal, aggregates, grains, chemicals, crude petroleum, iron/steel, others, and ores/minerals. Inland waterway movement is ideal for moving the nation's energy commodities. The largest commodity (by tonnage) transported by waterway is petroleum followed by coal, as shown in Figure 2.2.

[2] https://infrastructurereportcard.org/wp-content/uploads/2020/12/Inland-Waterways-2021.pdf

Figure 2.2 U.S. Inland Waterway Traffic by Commodity (2019)

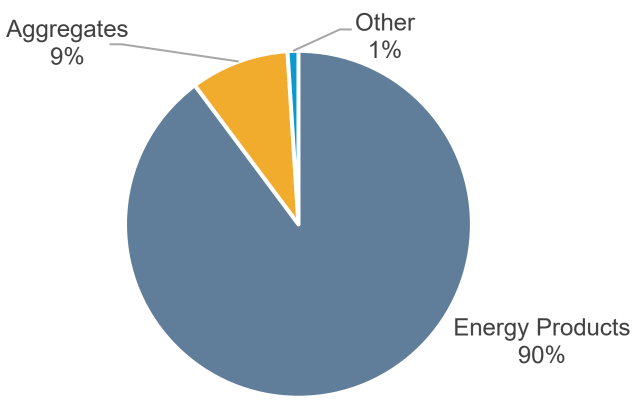


Source: Waterborne Commerce Statistics 2019 | Does not include lake or coastal waterway traffic

2.2 West Virginia Ports and Inland Waterways

Ports and inland waterways serve an essential role in freight movement throughout West Virginia. In West Virginia, more than 72 million tons of freight moved on the state's inland waterways in 2019. Energy commodities comprised 90 percent of those goods, as shown in Figure 2.3. Goods movement activity associated with West Virginia's ports and inland waterways supported 138,200 jobs within the state in 2018.[3] Out of the 680 miles of navigable waterways within the state, these inland waterways contribute significantly to West Virginia's energy market.

Figure 2.3 West Virginia Inland Waterway Commodities (2019)

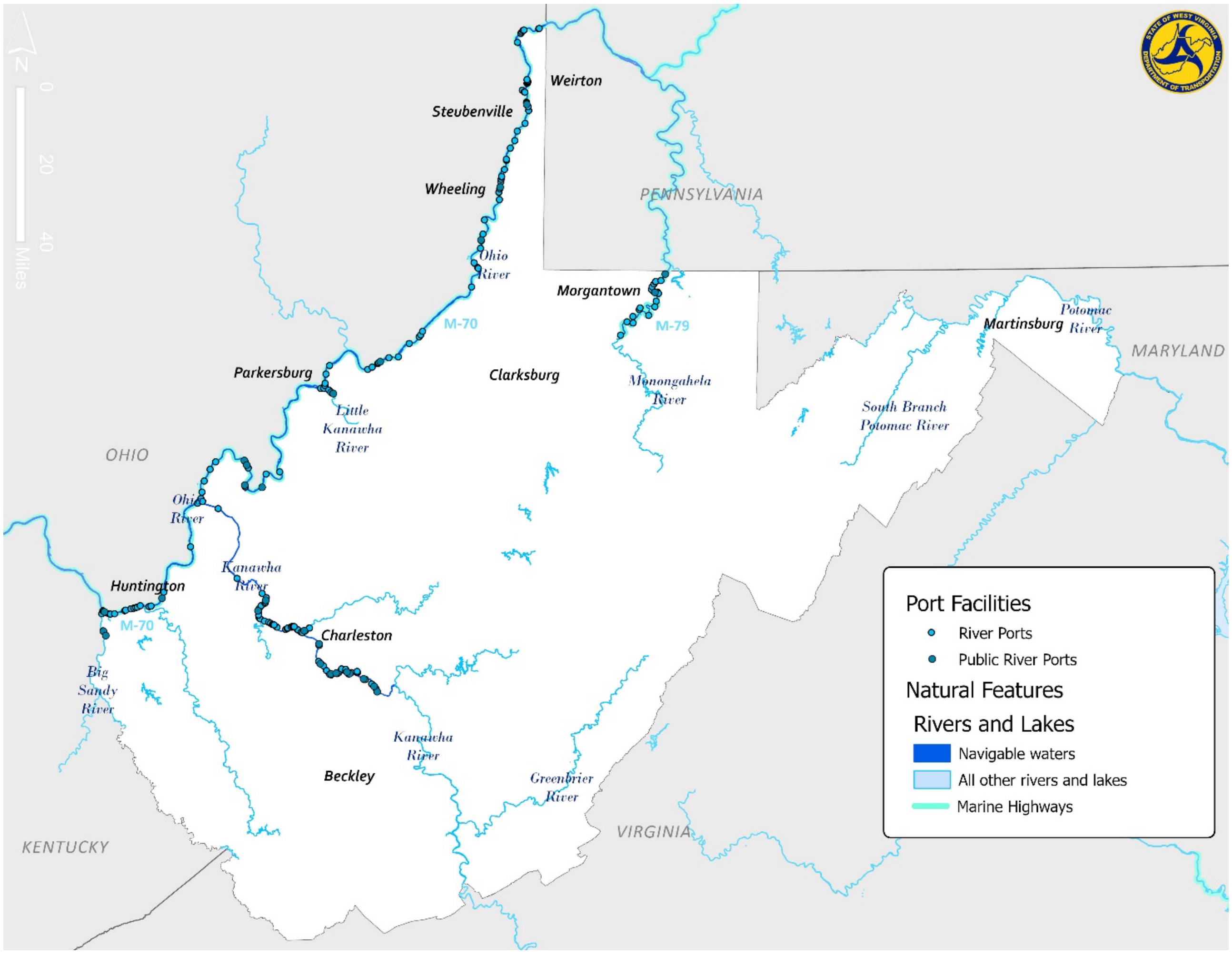


Source: WVDOT's Freight Analysis System Commodity Flow Visualization tool's disaggregated Analysis Framework 5.4.1 (FAF5).

[3] https://www.waterwayscouncil.org/file/302/HO_WaterwaysProfile_WV.pdf

The USACE Waterborne Commerce Statistics Center (WCSC) is responsible for collecting, processing, archiving, and distributing commercial vessel movement and cargo data.[4] The WCSC definition of port and inland waterway inventory has been used to identify ports, navigable waterways, and locks/dams within West Virginia. There are two major ports, three navigable waterways, thirteen locks and dams, and dozens of private port terminals within West Virginia, as shown in Figure 2.4.

Figure 2.4 West Virginia Statewide Port and Inland Waterways Facilities



Source: *gis.transportation.wv.gov/ports*

A **Port** is a designated area where a ship can transfer cargo. WCSC classifies ports into statistical port districts which organizes ports based on the amount of cargo shipped. Each year, WCSC uses statistical port districts to identify the top 50 U.S water ports by tonnage. Currently, the Mid-Ohio Valley Statistical Port District established in 2021 is ranked 17th in the nation and the Port of Huntington Tri-State, established in 2000 is ranked 22nd in the nation. Both the Mid-Ohio Valley Statistical Port District and the Port of Huntington Tri-State are two major public ports.

Navigable Waterways are bodies of water that move with the ebb and flow of the tide and are presently being used or have been used for the transportation of interstate or foreign commerce. Determining

[4] https://usace.contentdm.oclc.org/digital/collection/p16021coll2/id/7555

navigability applies to the entire body of water and the definition is not impacted by events which might "impede or destroy navigable capacity".[5] Within West Virginia there are three commercially navigable waterways, including the Ohio, the Kanawha, and the Monongahela Rivers. Table 2.1 outlines the characteristics of each navigable waterway.

Table 2.1 West Virginia Major Navigable Waterways

Water Body	Marine Terminals	Length	Operational Period	Average Depth
Ohio River	99	981	Year Round	15 ft
Kanawha River	68	97	Year Round	10 ft
Monongahela River	15	130	Year Round	8.5 - 9ft

Source: U.S. Census Bureau | USGS, WV Department of Environmental Protection | WVDOT GTI SECTION

Locks and Dams are engineered structures that control waterborne movements. The purpose of a lock is to raise and lower boats and a dam serves as a barrier to control the flow of surface water or underground streams. Within West Virginia there are 13 locks and dams; seven are located on the Ohio River, three are located on the Kanawha River, and three on the Monongahela River. All these locks and dams are owned, operated, and maintained by the USACE Pittsburgh District and Huntington District. Table 2.2 summarizes all locks and dams in West Virginia and Figure 2.5 depicts the Hildebrand lock and dam in Morgantown.

[5] https://www.nap.usace.army.mil/Portals/39/docs/regulatory/regs/33cfr329.pdf

Figure 2.5 Hildebrand Lock and Dam

Source: USACE, Hildebrand Lock and Dam, Morgantown, WV.

Table 2.2 West Virginia Locks and Dams

Lock and Dam	City	USACE District	Opened	Annual Cargo	Annual Lockages or Visitors	Facilities	Waterbody
New Cumberland Locks and Dam	Stratton, OH	Pittsburg	1959	24.8M tons	4,300 commercial vessels 1800 recreational vessels	2 parallel locks; gated dam	Ohio River
Pike Island Locks and Dam	Wheeling, WV	Pittsburgh	1963	340.8M tons	4,800 commercial vessels 1,200 recreational vessels	2 locks; gated dam	Ohio River
Hannibal Locks and Dam	Hannibal, OH	Pittsburgh	1972	40.3M tons	4,500 commercial vessels 1,000 recreational vessels	High-lift gated dam	Ohio River
Belleville Locks and Dam	Belleville, WV	Huntington	1965	41.8M tons	178,000 visitors	Hydroelectric facility; non-navigable, high-lift, gated dam;2 parallel locks	Ohio River
Racine Locks and Dam	Letart Falls, OH	Huntington	1967	41.8M tons	20,000 visitors	2 parallel locks Hydroelectric generating plant	Ohio River
Robert C Byrd Locks and Dam		Huntington	1993	35.6M tons	6,000 visitors		Ohio River
Willow Island Locks and Dam	Waverly, WV	Huntington	1972	39.6M tons	52,000 visitors		Ohio River
London Locks and Dam	Montgomery , WV	Huntington	1934	1.1M tons	429 visitors	2 parallel lock chambers; non-navigable, gated dam	Kanawha River
Marmet Locks and Dam	Marmet, WV	Huntington	1933	8M tons	62,000 visitors	Non-navigable, gated dam; twin locks	Kanawha River
Winfield Locks and Dam	Winfield, WV	Huntington	1935	11.6M tons	227,000 visitors	Non-navigable, gated dam; twin auxiliary locks; hydroelectric power plant	Kanawha River
Morgantown Lock and Dam	Morgantown, WV	Pittsburgh	1950	0.8M tons	400 commercial vessels 450 recreational vessels	Lock chamber; gated dam	Monongahela River
Hildebrand Lock and Dam	Morgantown, WV	Pittsburgh	1960	0.3M tons	125 commercial vessels 250 recreational vessels	Lock chamber; gated dam	Monongahela River
Opekiska Lock and Dam	Fairmont, WV	Pittsburgh	1964	0.3M tons	125 commercial vessels 550 recreational vessels	Lock chamber; gated dam	Monongahela River

Source: USACE.

2.2.1 Port of Huntington Tri-State

The Port of Huntington Tri-State includes terminals that span over 100 miles of the Ohio River, including counties in Kentucky, Ohio, and West Virginia, that handle dry and liquid bulk commodities, including coal, gasoline, limestone, and crude oil. The Port of Huntington Tri-State was ranked the 22nd largest port in the U.S. by tonnage served and the seventh largest by dry bulk transported in 2020 according to the USACE. Due to impacts of COVID, 2020 was a low tonnage year, but 2020 is the latest data available at the time of writing, with the newest updates to statistical boundaries and definitional updates.

The Port of Huntington Tri-State is overseen by the Huntington District Waterways Association (HDWA), a commercial association that convenes towing companies, shipyards, terminal cooperators, and other entities. The list of member companies for the Port of Huntington Tri-State are:

- AEP River Operations
- Amherst Madison, Inc.
- Campbell Transportation Company, Inc.
- Clark Electronics
- Crounse Corporation
- Docks Creek Coal
- First Energy
- Ingram Barge Co.
- Kanawha River Terminals
- Kokosing Materials Handling
- Marathon Petroleum Company LLC
- McGinnis, Inc.
- Murray American Transportation
- Neale Marine Transportation
- Shamblin Stone
- SMI Marine Transportation
- Superior Marine Way, Inc.

Intermodal connections to the inland waterway system in West Virginia are limited. The FHWA intermodal connector directory identifies two port intermodal connections in the State, located in Huntington and east of Huntington on the Ohio River:

- Cluster of Downtown Huntington Port, located from I-64 (exit 15) to U.S. 60 to U.S. 60 WB (one-way pair) to a cluster of Riverports along the Ohio River in Huntington, WV; return to I-64 on WV 10 and US 60
- Cluster of Ports E of Huntington on the Ohio River, located from I-64 (exit 18) to WV 193 to WV 2 to a cluster of Riverports along the Ohio River in Huntington, WV

2.2.2 Mid-Ohio Valley Statistical Port District

Located along the Ohio River, the Mid-Ohio Valley Statistical Port district is the 17th largest port nationwide by tonnage and 14th by dry bulk served in 2020 according to the USACE Waterborne Commerce Statistics Center. The Mid-Ohio Valley Statistical Port District includes facilities in Columbiana, Jefferson, Belmont, Monroe, Washington, Athens, and Meigs Counties in Ohio, and Hancock, Brooke, Ohio, Wetzel, Tyler, Pleasants, Wood, and Jackson counties in West Virginia.

Table 2.3 Port Marine Terminals within the Mid-Ohio Valley Statistical Port District

River	Marine Terminals
Ohio River	75
Little Kanawha River	4
Total	**79**

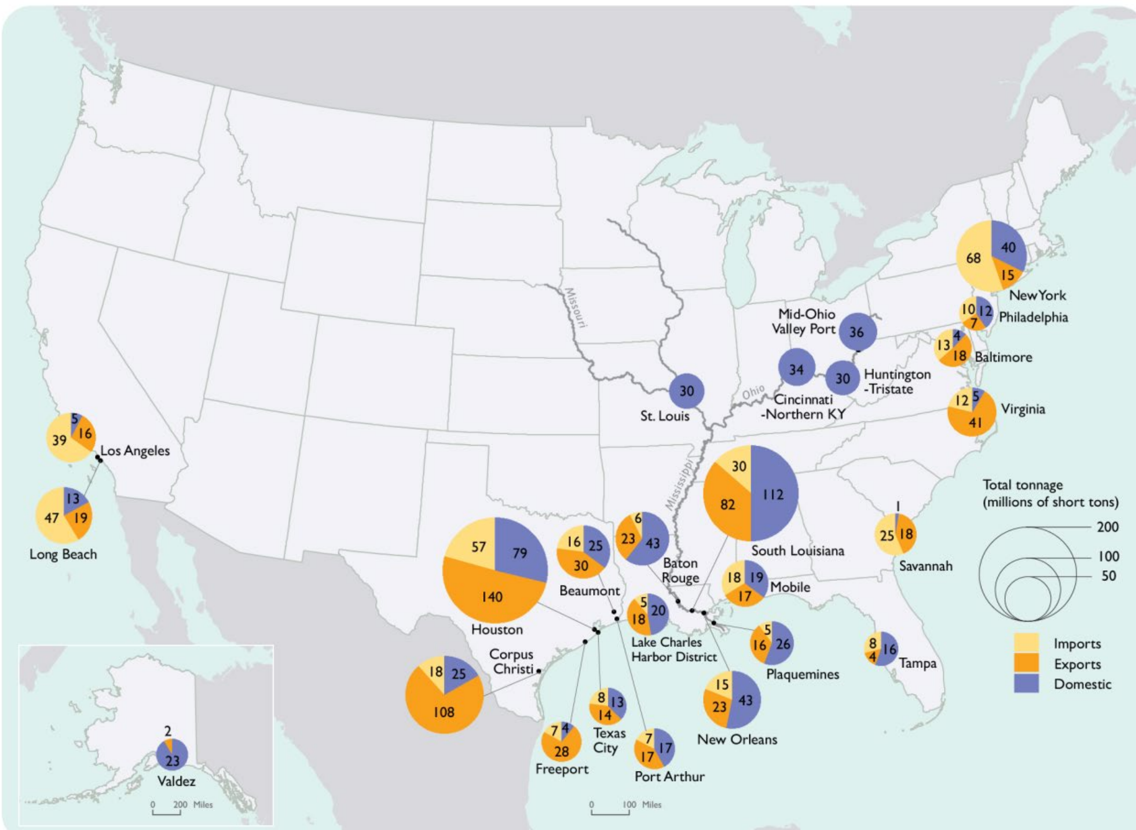
Source: WVDOT Port GIS Data

3.0 INLAND WATERWAY TRANSPORTATION DEMAND

This section describes the capacity, commodity flow, and projected demand for the port districts in West Virginia. Ports serve as an access point for industries and freight producers to move their commodities to and from waterborne transportation. Port users include the transportation providers and port employees who interact directly with ports, and port-reliant industries who use marine transportation for all or part of their supply chain. Port activity also affects port-benefitted users, who use ports and marine transportation to receive commodities necessary to their businesses.

The Port of Huntington Tri-State is among the top 25 ports by tonnage, dry bulk, and container shipping in 2020.[6] Nationwide port throughput is shown in Figure 3.1.

Figure 3.1 Top 25 Ports by Total Tonnage (2020)



Source: U.S. Department of Transportation, Bureau of Transportation Statistics, 2022

3.1 Commodity Flow Analysis

In 2019, 72.0 million tons of freight[7] moved on West Virginia's inland waterways, including 13.0 million tons inbound freight, 14.4 million tons shipped internally, and 44.6 million tons of outbound freight. The following

[6] 2022 Port Performance Freight Statistics Program: Supply-Chain Feature (dot.gov)

[7] All domestic freight

subsections summarize commodity flow activity at the Port of Huntington Tri-State and Mid-Ohio Valley Statistical Port District.

Commodities moving through West Virginia are transported along the Ohio River which feeds into the Mississippi River at Cairo Illinois. More recently, in 2022 low water levels in the Lower Mississippi River due to scant rainfall have severely hampered fall barge shipments, especially on the vital stretch between Cairo, Illinois, and Memphis, Tennessee, resulting in closed sections of the river and halted barge movements for intermittent periods[8].

3.1.1 Port of Huntington Tri-State

Table 3.1 shows the commodities by tonnage for the Port of Huntington Tri-State. Coal and lignite consist of the largest proportion of commodities at 46 percent of the total tonnage in 2020, followed by gasoline at 13 percent, and limestone at 10 percent.

Table 3.1 Port of Huntington Tri-State Tonnage by Commodity, in Millions of Tons (2020)

Commodity	Tonnage (Millions)	% of Total	% Change from 2019 to 2020
Coal & Lignite	13.8	46%	-32%
Gasoline	3.9	13%	3%
Limestone	2.9	10%	10%
Crude Petroleum	2.5	8%	15%
Distillate Fuel Oil	1.9	6%	-16%
All other	4.9	16%	-17%
Total Volume / Short Ton Domestic Total	**29.7**	**100%**	**-19%**

Source: U.S. DOT Port Performance Freight Statistics Program (PPFSP)

Commodity flow traffic at the Port of Huntington Tri-State has fluctuated significantly, both in terms of the number of vessels and tonnage. Vessel traffic in the Port District is limited to Tug assisted barges, classified as other barge calls (dry bulk and liquid bulk barges). Table 3.2 shows the number of vessels per year by type; the number of each type of vessel was down from 2016 figures in both 2019 and 2020. Figure 3.2 and Table 3.3 show the tonnage by commodity over the same period. Notably, 2019 tonnage was close to the peak in 2016, but the number of vessels that year remained significantly under the 2016 total.

Table 3.2 Port of Huntington Tri-State by Number of Vessels (2016-2020)

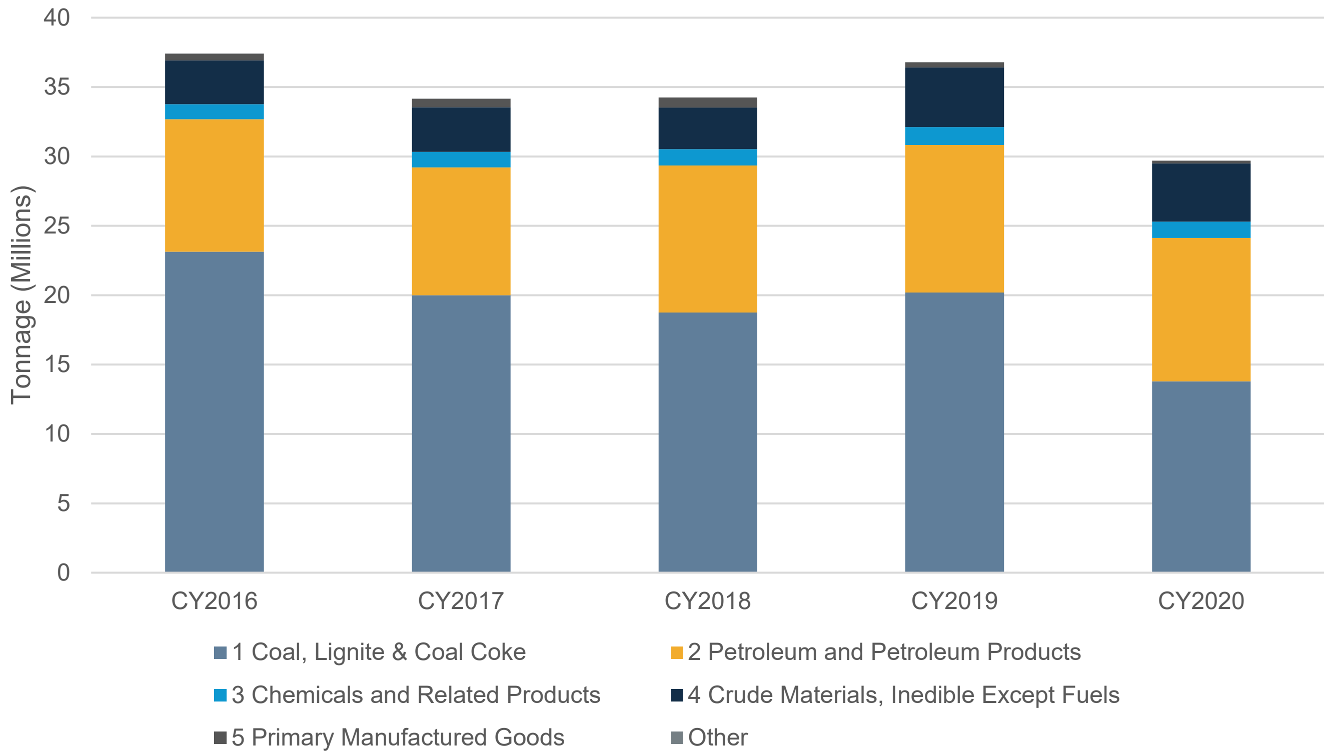
	CY2016	CY2017	CY2018	CY2019	CY2020
All Vessels	66,740	65,439	62,175	55,437	46,857
Towboats	24,993	28,542	25,401	19,904	18,203

[8] https://www.bts.gov/data-spotlight/low-water-mississippi-slows-critical-freight-flows

	CY2016	CY2017	CY2018	CY2019	CY2020
Dry Cargo Barges	28,287	27,143	26,061	27,323	20,719
Liquid Cargo Barges	13,459	9,754	10,713	8,210	7,935

Source: USACE Waterborne Commerce Statistics Center

Figure 3.2 Port of Huntington Tri-State Tonnage by Commodity (2016-2020)



Source: USACE Waterborne Commerce Statistics Center

Table 3.3 Port of Huntington Tri-State Tonnage by Commodity, in Millions of Tons (2016-2020)

Commodity	2016	2017	2018	2019	2020	CAGR* 2016-2019	CAGR* 2016-2020
Coal, Lignite & Coal Coke	23.1	20.0	18,.8	20.2	13.8	-3%	-10%
Petroleum and Petroleum Products	9.6	9.2	10.6	10.6	10.3	3%	2%
Chemicals and Related Products	1.1	1.1	1.2	1.3	1.2	4%	2%
Crude Materials, Inedible Except Fuels	3.2	3.2	3.0	4.3	4.2	8%	6%
Primary Manufactured Goods	0.5	0.6	0.7	0.4	0.2	-7%	-16%
Food and Farm Products	0	<0.01	0	0	0	-	-

Commodity	2016	2017	2018	2019	2020	CAGR* 2016-2019	CAGR* 2016-2020
All Manufactured Equipment, Machinery, and Products	<0.01	0	0	0	0	-100%	-100%
Waste Material; Garbage, Landfill, Sewage Sludge, Wastewater	0	<0.01	0	1,630	0	-	-
Total	**37.4**	**34.2**	**34.2**	**36.8**	**29.7**	**0%**	**-5%**

*Source: USACE Waterborne Commerce Statistics Center | *CAGR: Compound Annual Growth Rate*

3.1.2 Mid-Ohio Valley Statistical Port District

Table 3.4 shows the commodities by tonnage for the Mid-Ohio Valley Statistical Port District in 2020. Coal and lignite consisted of the largest proportion of commodities at 71 percent of the total tonnage in 2020, followed by gasoline at 17 percent.

Table 3.4 Mid-Ohio Valley Statistical Port District Tonnage by Commodity, in Millions of Tons (2020)

Commodity	Tonnage (Millions)	% of Total	% Change from 2019 - 2020*
Coal & Lignite	21.2	71%	N/A
Gasoline	5.1	17%	N/A
Limestone	2.7	9%	N/A
Crude Petroleum	2.2	7%	N/A
Distillate Fuel Oil	0.7	2%	N/A
All other	4.1	14%	N/A
Total Volume / Short Ton Domestic Total	**36.0**		

*Source: U.S. DOT Port Performance Freight Statistics Program (PPFSP) | *No data available for 2019, newer Port*[9]

Commodity flow traffic at the Mid-Ohio Valley Statistical Port District has fluctuated similarly to the Port of Huntington Tri-State, both in terms of the number of vessels and tonnage. Table 3.5 shows the number of vessels per year by type; 2019 was a peak year for vessels in the Port District, but volumes dropped significantly by 2020, reflective of a national decrease in inland waterways tonnage due to the COVID-related supply chain challenges. Figure 3.3 and Table 3.6 show the tonnage by commodity over the same period. 2019 was also a peak year for tonnage, with significant growth in manufactured equipment, petroleum, and crude materials.

Table 3.5 Mid-Ohio Valley Statistical Port District by Number of Vessels (2016-2020)

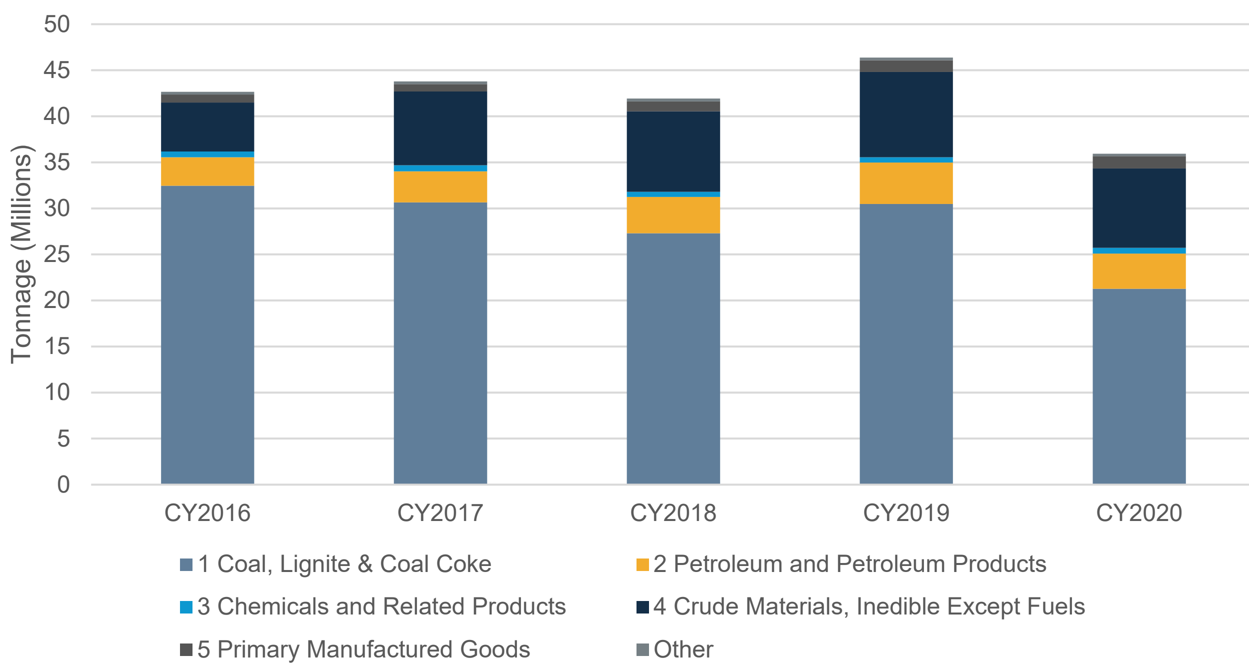
	CY2016	CY2017	CY2018	CY2019	CY2020
All Vessels	56,666	58,003	60,344	67,103	59,267
Towboats	8,447	8,631	13,349	17,579	21,380

[9] https://www.waterwaysjournal.net/2021/04/16/mid-ohio-valley-statistical-port-district-gains-preliminary-approval/

	CY2016	CY2017	CY2018	CY2019	CY2020
Dry Cargo Barges	44,692	45,818	43,503	46,183	34,798
Liquid Cargo Barges	3,527	3,554	3,492	3,341	3,089

Source: USACE Waterborne Commerce Statistics Center

Figure 3.3 Mid-Ohio Valley Statistical Port District Tonnage by Commodity (2016-2020)



Source: USACE Waterborne Commerce Statistics Center

Table 3.6 Mid-Ohio Valley Statistical Port District Tonnage by Commodity, in Millions of Tons (2016-2020)

ID	CY2016	CY2017	CY2018	CY2019	CY2020	CAGR 2016-2019	CAGR 2016-2020
1 Coal, Lignite & Coal Coke	32.5	30.6	27.3	30.4	21.3	-2%	-8%
2 Petroleum and Petroleum Products	3.1	3.3	3.9	4.5	3.8	10%	4%
3 Chemicals and Related Products	0.6	0.7	0.6	0.6	0.6	-2%	0%
4 Crude Materials, Inedible Except Fuels	5.3	8.0	8.7	9.3	8.6	15%	10%
5 Primary Manufactured Goods	0.9	0.8	1.1	1.3	1.3	10%	9%
6 Food and Farm Products	0.3	0.3	0.3	0.3	0.3	-1%	-3%
7 All Manufactured Equipment, Machinery, & Products	7	<0.01	0.02	<0.01	<0.01	390%	264%

ID	CY2016	CY2017	CY2018	CY2019	CY2020	CAGR 2016-2019	CAGR 2016-2020
8 Waste Material; Garbage, Landfill, Sewage Sludge, Wastewater	0	0	<0.01	<0.01	0	-	-
All Commodities	**42.6**	**43.8**	**41.9**	**46.4**	**35.9**	**2%**	**-3%**

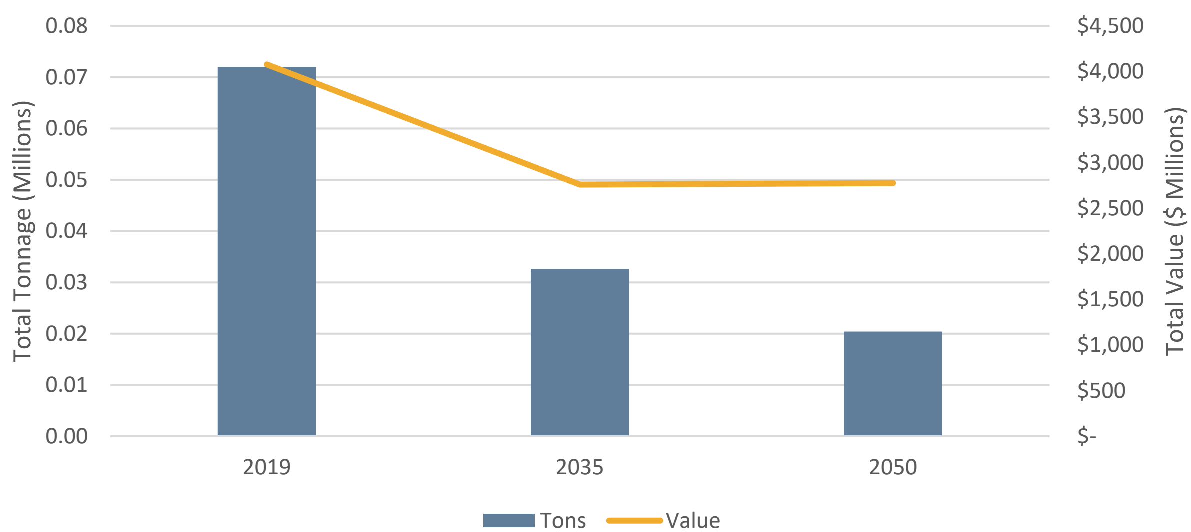
Source: USACE Waterborne Commerce Statistics Center

3.2 Projected Waterborne Freight Demand

The following projections are based on Freight Analysis Framework (FAF) forecast data as provided by the Bureau of Transportation Statistics (BTS) and FHWA, as the USACE does not publish forecasted waterway freight flows.

The FAF estimates that waterborne freight activity in West Virginia is expected to decrease by 72 percent by tonnage from 2019 to 2050. The value of the tonnage is projected to decrease by 32 percent from 2019 to 2035 and remain at the same value till 2050. Figure 3.4 shows this 30-year growth trajectory.

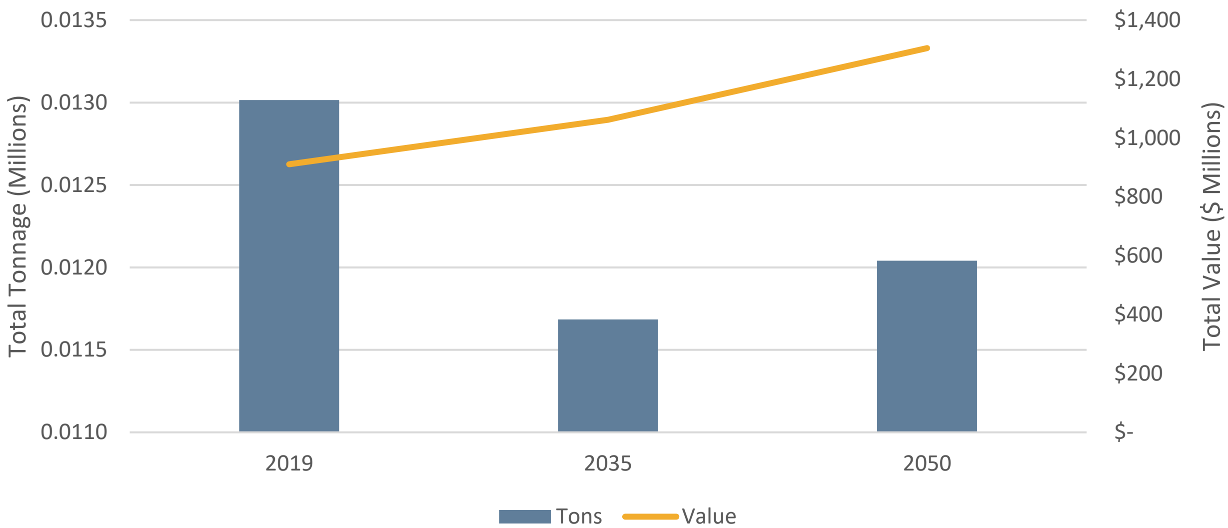
Figure 3.4 Waterborne Freight Demand in West Virginia (2019, 2035, 2050)



Source: FHWA FAF V5, Cambridge Systematics | Note: This table excludes through-state flows.

Figure 3.5 shows inbound waterborne commodities to West Virginia for 2019, 2035, and 2050. Inbound commodities are projected to decrease seven percent from 2019 to 2050 and decrease by ten percent from 2019 to 2035. However, value of tonnage is projected to increase by 43 percent from 2019 to 2050 and by 17 percent from 2019 to 2035.

Figure 3.5 Inbound Waterborne Freight to West Virginia (2019, 2035, 2050)



Source: FHWA Freight Analysis Framework V5, Cambridge Systematics

Table 3.7 shows the top waterborne inbound trade partners to West Virginia in 2019, 2035 and 2050. Ohio is the top inbound trade partner in 2019 accounting for 38 percent of the total tonnage and 46 percent of the total value. In 2050 the top trading partner by tonnage is Indiana at 36 percent of the total volume and Texas and 61 percent of the total value.

Table 3.7 Top Waterborne Inbound Trade Partners to West Virginia (2019-2050)

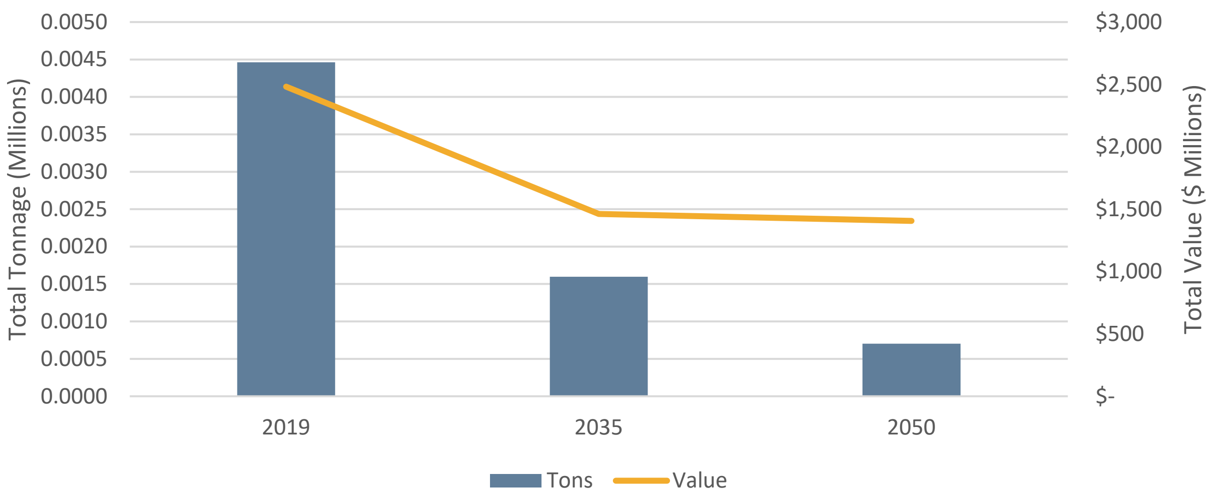
Year	State	Tonnage	% of Total	Value ($M)	% of Total
2019	Ohio	4,928,751	38%	$420	46%
	Indiana	3,823,591	29%	$32	4%
	Kentucky	3,067,480	24%	$94	10%
	Texas	1,005,180	8%	$284	31%
	Louisiana	161,720	1%	$3	0%
2035	Indiana	3,991,390	34%	$33	3%
	Kentucky	3,589,362	31%	$113	11%
	Ohio	2,111,019	18%	$292	28%
	Texas	1,757,665	15%	$521	49%
	Louisiana	217,441	2%	$7	1%

Year	State	Tonnage	% of Total	Value ($M)	% of Total
2050	Indiana	4,285,450	36%	$35	3%
	Kentucky	3,901,721	32%	$134	10%
	Texas	2,559,580	21%	$793	61%
	Ohio	989,240	8%	$207	16%
	Louisiana	281,472	2%	$6	0%

Source: FHWA FAF5, Cambridge Systematics

Figure 3.6 shows outbound waterborne commodities from West Virginia for 2019, 2035, and 2050. Outbound tonnage is project to decrease by 84 percent from 2019 to 2050. Outbound tonnage value is also projected decrease by 43 percent from 2019 to 2050.

Figure 3.6 Outbound Waterborne Freight from West Virginia (2019, 2035, 2050)



Source: FHWA FAF5, Cambridge Systematics

Table 3.8 outlines the top outbound trade partners from West Virginia for 2019, 2035, and 2050. Ohio is expected to comprise of nearly half the waterborne tonnage for 2019, 2035 and 2050 while Texas is projected to grow in value of commodities from 13 percent in 2019 to 50 percent in 2050.

Table 3.8 Top Waterborne Outbound Trade Partners from West Virginia (2019-2050)

Year	State	Tonnage	% of Total	Value ($M)	% of Total
2019	Ohio	25,141	56.4%	$1,166.06	47.4%
	Pennsylvania	16,659	37.4%	$761.43	31.0%
	Kentucky	2,164	4.9%	$149.07	6.1%
	Texas	308	0.7%	$325.59	13.2%
	Tennessee	155	0.3%	$46.23	1.9%

Year	State	Tonnage	% of Total	Value ($M)	% of Total
2035	Ohio	9,083	57%	$434.47	30%
	Pennsylvania	5,118	32%	$424.29	30%
	Kentucky	993	6%	$88.97	6%
	Texas	579	4%	$473.35	33%
	Louisiana	60	0%	$14.85	1%
2050	Ohio	4,019	58%	$201.76	15%
	Pennsylvania	1,306	19%	$397.03	29%
	Texas	769	11%	$699.15	50%
	Kentucky	762	11%	$75.95	5%
	Alabama	62	1%	$0.92	0%

Source: FHWA FAF5, Cambridge Systematics

Table 3.9 shows the projections by commodity in West Virginia for waterborne commodities. Energy products comprise most commodities moved by water, accounting for over 80 percent of commodities in 2019 to 46 percent in 2050.

Table 3.9 Projected Top Waterborne Commodities in West Virginia

Year	Commodity	Tonnage (in thousands)	% Of Total	Value ($M)	% Of Total
2019	Energy Products	64,668	90%	$3,411	83%
	Aggregates	6,617	9%	$55	1%
	Other[10]	735	1%	$667	16%
	Total 2019	**72,020**		**$4,133**	
2035	Energy Products	24,409	75%	$1,740	62%
	Aggregates	7,200	22%	$60	2%
	Other[11]	1,026	3%	$1,020	36%
	Total 2035	**32,635**		**$2,821**	

[10] Includes Nonmetallic Mineral and Base Products, Chemicals, Pharmaceuticals, Plastics and Rubber, Waste and Scrap, machinery, Electric, and Precision instruments, Raw and Finished Wood Products, Vehicles and Transportation Equipment, Textiles and Leather, Food, Alcohol and Tobacco, Mixed Freight, Agriculture and Fish

[11] Includes Nonmetallic Mineral and Base Metal Products, Chemicals, Pharmaceuticals, Plastics and Rubber, Waste and Scrap, Machinery, Electric, and Precision Instruments, Vehicles and Transportation Equipment, Raw and Finished Wood Products, Textiles and Leather, Mixed Freight, Agriculture and Fish, Food Alcohol and Tobacco |

Year	Commodity	Tonnage (in thousands)	% Of Total	Value ($M)	% Of Total
2050	Energy Products	11,307	55%	$1,270	45%
	Aggregates	7,537	37%	$64	2%
	Other[12]	1,584	8%	$1,506	53%
	Total 2050	**20,428**		**$2,841**	

Source: FHWA FAF5, Cambridge Systematics

[12] Includes Chemicals, Pharmaceuticals, Plastics and Rubber, Nonmetallic Mineral and Base Metal Products, Machinery, Electric, and Precision Instruments, Waste and Scrap, Vehicles and Transportation Equipment, Raw and Finished Wood Products, Textiles and Leather

4.0 PORT AND INLAND WATERWAY INFRASTRUCTURE CONDITION AND PERFORMANCE

This chapter describes the condition of the overall port and inland waterway system in the state. The condition and performance of ports and inland waterways in West Virginia is largely context-dependent at the individual port level and can be influenced by a combination of the port's scope of services, user base and weather conditions.

Smaller, inland ports are challenged to maintain their infrastructure and have difficulty competing for federal grants. The West Virginia Port System is managed by the WVDOT Public Port Authority, and the USACE oversees all structures in or over any navigable water of the U.S., per the Rivers and Harbors Act. Both agencies manage port-related data and maintenance.

The port system in West Virginia is made up of 277 miles of the Ohio River and seven navigation locks and dams. These locks and dams provide essential mobility for vessels navigating the Ohio River; therefore, reliability is essential for cargo movement, commerce, recreational vessels, and other stakeholders. Many of the existing facilities are over fifty years old. The American Society of Civil Engineers (ASCE) estimates approximately $120 million of funding would be required over the next 15 years to provide critical maintenance.[13] The states aging infrastructure will challenge the port and inland waterway efficiency and resiliency. To illustrate these challenges the following sections will discuss impacts of flooding on performance, infrastructure and capital improvement opportunities, and the states waterway and port navigation performance.

4.1 Impacts of Flooding on Performance

Flooding within West Virginia is anticipated to have a significant impact on the aging port infrastructure of the state. According to West Virginia University, from January 2007 to March 2022 there were 1,683 floods throughout the state, and since the catastrophic 2016 flood,[14] the state has experienced 968 floods, with these floods taking 34 lives and causing $54 million in damages.[15] The increase in floods has been correlated to an increase in greenhouse gases and warmer temperatures making West Virginia one of the most flood prone states in the nation according to West Virginia University.

Flood can impact barge traffic on navigable waterways. In 2019, hundreds of barges were stalled on the Mississippi River due to flooding impacts, causing barge halts throughout the region in the Arkansas River, the Illinois River, and the Ohio River.[16] High water levels as the result of flooding on navigable waterways causes freight carrying barges to be held at locks until the waterways become manageable for freight movement. The inability for barge traffic to move due to flooding will force grain and fertilizer shipper to find

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[13] Ohio Infrastructure | ASCE's 2021 Infrastructure Report Card

[14] A flood that hit on June 23, 2016, resulted in 23 deaths making it one of the deadliest floods in West Virginia history.

[15] https://wvpublic.org/w-va-among-most-flood-susceptible-in-nation/

[16] https://www.supplychainbrain.com/articles/29816-punched-in-the-face-us-floods-snarl-trucks-trains-barges

alternative, potentially more costly, transportation options via other freight transportation modes.[17] These impacts to shipping by barge throughout the region continues to be a critical issue. Figure 4.1 shows the many barges that move through West Virginia along the Ohio River and are at risk of disruption due to flooding.

Figure 4.1 Barges along the Ohio River Near Huntington West Virginia

Source: *https://wvpublic.org/barge-breakaway-reported-on-ohio-river-near-huntington/*

From 2010 to 2021, there were 1,600 separate flood events in West Virginia. Due to the frequency of severe flooding in the state, the Pew Charitable Trusts has been advising lawmakers and state resiliency officials over the last year on flood mitigation.[18] As a result, Senate Bill 677 (SB 677) was signed into law in March of 2023. SB 677 provides support for a new state flood resiliency plan as well as $40 million to the Flood Resiliency Trust Fund to invest in infrastructure projects that provide flood resiliency to communities throughout the state.

4.2 Infrastructure and Capital Improvement Opportunities

WVDOT's Division of Multimodal Transportation Facilities is responsible for helping private and public entities in developing and operating proposed public port and intermodal facilities throughout West Virginia. As such, they provide an inventory of the states 190 docks which comprise the Port of Huntington Tri-State and the Mid-Ohio Valley Statistical Port District. Currently, there is no publicly available data on the infrastructure and capital improvement needs of the two major port districts within the state. Due to the lack

[17] https://www.reuters.com/world/us/flooding-upper-mississippi-river-halt-barge-traffic-weeks-usda-2023-04-27/.

[18] https://www.wvnews.com/news/wvnews/west-virginia-legislative-committee-hears-plans-for-new-flood-resiliency-law/article_68063318-dca2-11ed-9951-678f2d54adfb.html

of publicly available data this section will discuss potential infrastructure and capital improvement opportunities for the proposed Port of West Virginia as well as funding opportunities from the federal government to help boost capital improvement projects.

4.2.1 Port of West Virginia

The proposed Port of West Virginia is being championed by Empire Diversified Energy to develop a port as a multifunctional, multimodal inland port terminal on the Ohio River in the city of Follansbee. Empire Diversified Energy gained the rights to the name of "Port of West Virginia" after completing a feasibility study with the State of West Virginia. The public port is designed to have 1,000 acres or roughly five miles of rail and more than 8,000 contiguous feet of river frontage. The port is also planned to the have the capability of offloading shipping containers and allow for the ability to move cargo of up to 1,500 tons per lift. Figure 4.2 shows a rendering of the proposed Port by Empire Diversified Energy.

Figure 4.2 Port of West Virginia Rendering

Source: https://www.empirediversifiedenergy.com/

Empire Diversified Energy has already invested $60 million of capital investments for the facility and has identified $42 million in infrastructure upgrades which they have asked the state for help in funding.[19] The $42 million of infrastructure upgrades would include:

- $25 million for initial portions of sheet-pile wall, roll-on/roll-off dock, heavy-lift pad, and apron
- $10 million for a terminal, service road, cranes, and buildings
- $2 million to relocate power lines underground
- $3 million for rail spur design and installation
- $2 million for lighting, fencing and security systems

[19] New Port Of West Virginia Moves Forward - The Waterways Journal

Additionally, the identification of the refurbishment of the Follansbee-Steubenville Railroad is estimated to cost $20 million. The state has received $677 million from the American Rescue Plan that can add in the capital improvement opportunities for the Port of West Virginia.

4.2.2 Ports and Waterways Federal Funding Opportunities

In 2023, MARAD announced $450 million in annual funding via the Port Infrastructure and Development Program (PIDP) to help open opportunities to modernize ports throughout the nation.[20] This funding opportunity prioritizes projects that would improve the safety, efficiency, and reliability of the goods that move through the nation's ports and waterways. Awarded projects could include fast charging stations, port electrification components, developing a scalable plan for transition an existing port terminal to zero-emission technologies, and the modernization of electric and stormwater infrastructure for port facilities. Prioritizing these types of projects would begin the process of identifying the infrastructure and capital improvement opportunities of ports and inland waterways within West Virginia.

4.3 Navigation Performance

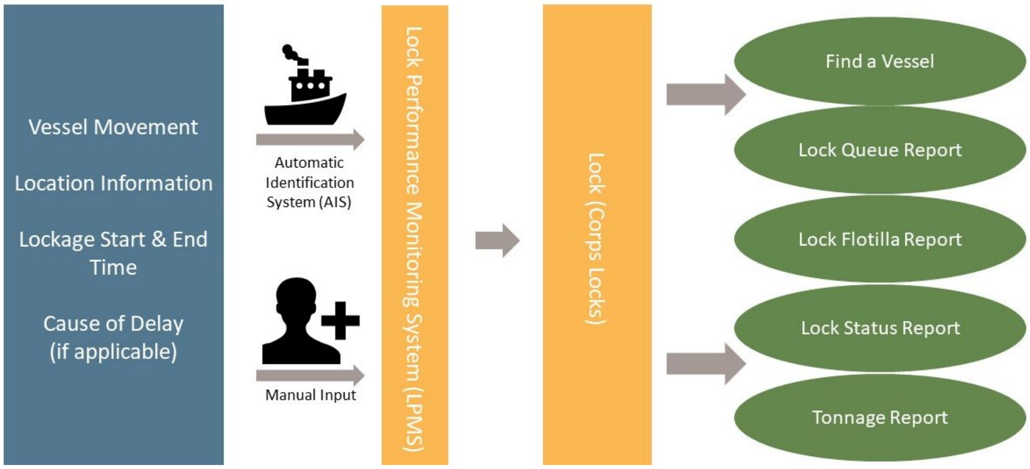
The USACE under the Rivers and Harbors Act is authorized to support navigation performance through the Navigation and Civil Works Decision Support Center (NDC). The NDC is a technical center which provides data on locks and dredging for understanding lock operations and navigation dredging projects. The following two sections provide a summary of lock and dredging performance in West Virginia based on data provided from NDC.

4.3.1 Lock Performance

The NDC provides navigation performance monitoring for locks with the Lock Performance Monitoring System (LPMS), a web-based system that collects data on vessels as they move through USACE-owned or operated locks. The purpose of LPMS is to provide data related to the operations of locks as a planning tool for vessel operations as well as supporting in the tracking progress of goods shipped on U.S waterways. Figure 4.3 outlines the methodology for LPMS data collection and reporting.

[20] https://www.transportation.gov/briefing-room/usdot-announces-more-660-million-available-through-port-infrastructure-development

Figure 4.3 Lock Performance Monitoring System Inputs & Outputs

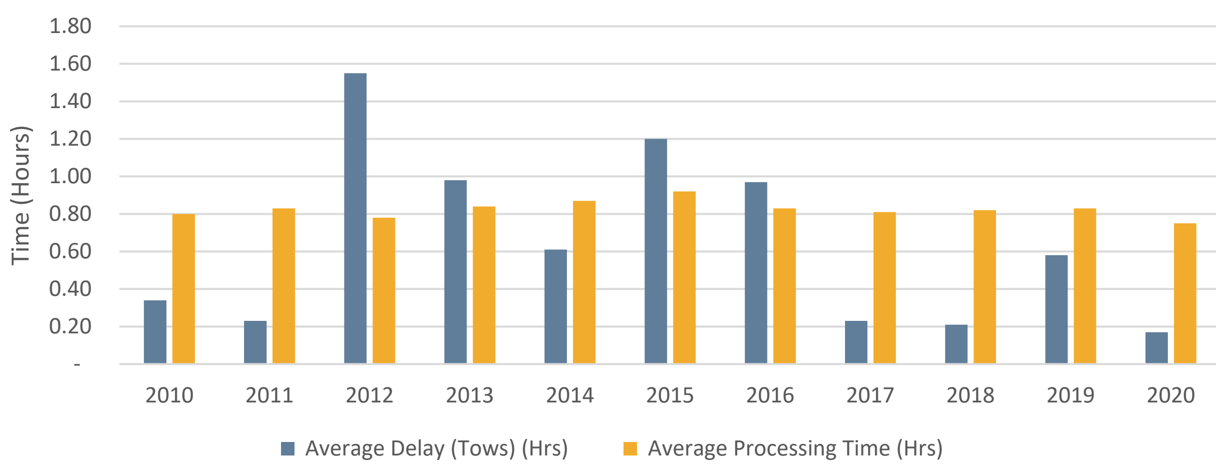


Source: *USACE Lock Performance Monitoring System (LPMS)*

The following figures show data collected at locks within the Ohio, Kanawha, and Monongahela Rivers for a 10-year period from 2010 to 2020.[21] The figures outline the average delay by hours and the average processing time. Lock performance is provided by navigable waterway due to how USACE collects data.

Figure 4.4 shows the average delay and average process time on the Kanawha River from 2010 to 2020. The longest average delay was recorded in 2012 at 1 hour 55 minutes, and the longest average processing time was recorded in 2015 at just below 1 hour. The shortest average delay and average processing time were recorded in 2020, and possibly reflects impacts from the COVID-19 pandemic.

Figure 4.4 Kanawha River Average Delay and Average Processing Time (2010 to 2020)

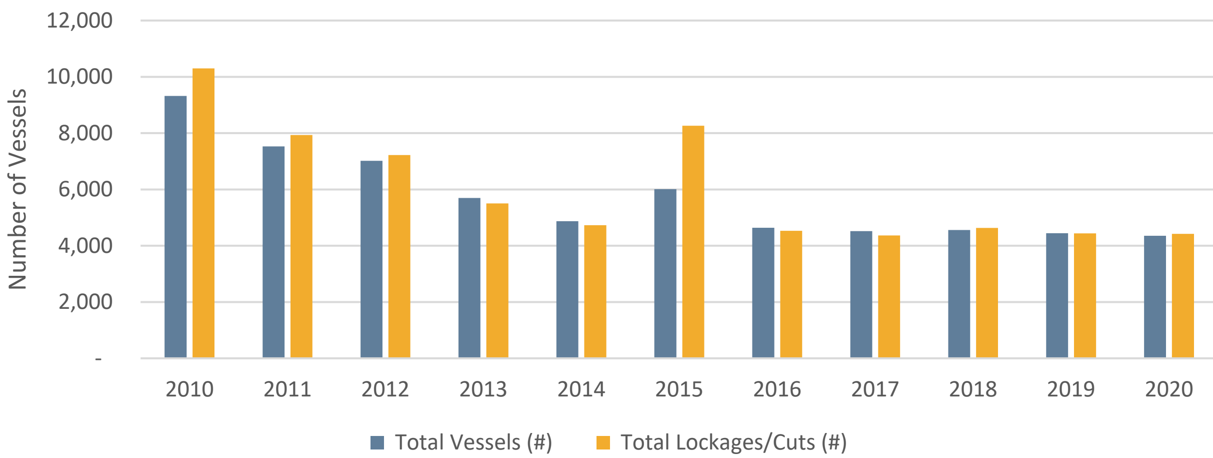


Source: *USACE | Public Lock Usage Report Files 2010 -2020*

[21] 2020 is the latest available year.

Figure 4.5 shows the total vessels and total lockages/cuts on the Kanawha River from 2010 to 2020. There has been a decrease in vessels and lockages/cuts along the Kanawha River since 2010 except for in 2015 when there was a slight increase at 6,011 vessels and 8,260 lockages/cuts.

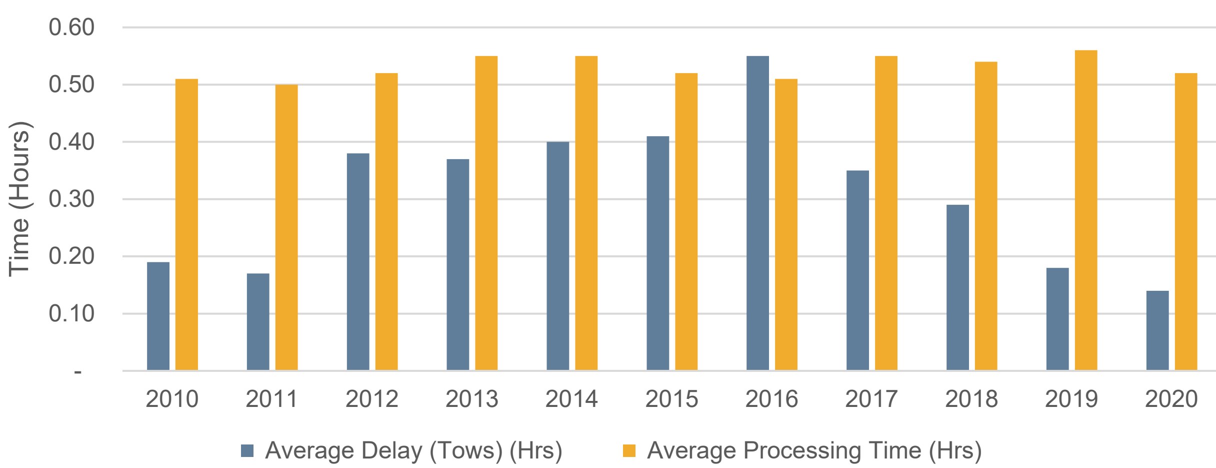
Figure 4.5 Kanawha River Total Vessels and Total Lockages/Cuts (2010 to 2020)



Source: USACE | Public Lock Usage Report Files 2010 -2020

Figure 4.6 shows the average delay and average process time on the Monongahela River from 2010 to 2020. The longest average delay was recorded in 2016 at 55 minutes, and the longest average process time was in 2019 at 56 minutes. The shortest average delay and average processing time in 2020 at 14 minutes and average processing time was recorded in 2011 at 50 minutes.

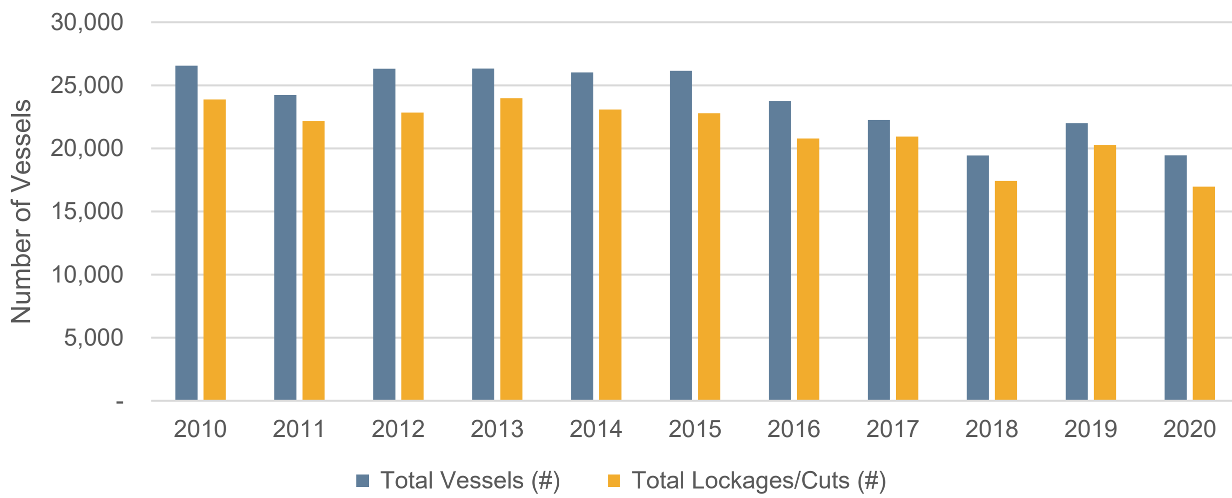
Figure 4.6 Monongahela River Average Delay and Average Processing Time (2010 to 2020)



Source: USACE | Public Lock Usage Report Files 2010 -2020

Figure 4.7 shows the total vessels and total lockages/cuts on the Monongahela River from 2010 to 2020. There has been a decrease in vessels and lockages/cuts along the Monongahela River since 2010 with the lowest number of vessels (19,439 vessels) recorded in 2018, and the lowest recorded lockages/cuts (16,965 lockages/cuts) in 2020.

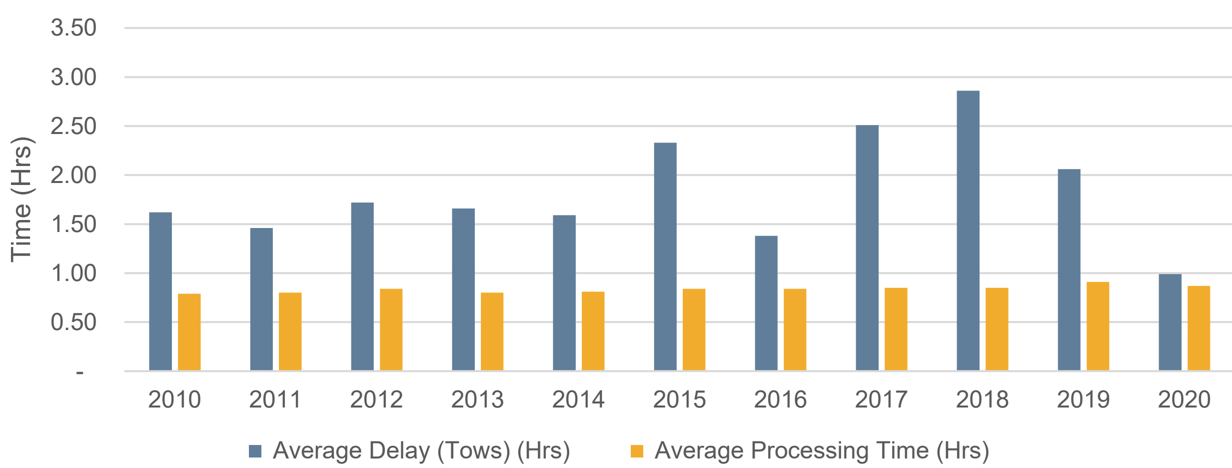
Figure 4.7 Monongahela River Total Vessels and Total Lockages/Cuts (2010 to 2020)



Source: USACE | Public Lock Usage Report Files 2010 -2020

Figure 4.8 shows the average delay and average process time on the Ohio River from 2010 to 2020. The longest average delay was recorded in 2018 at over 2 hours and 50 minutes, and the longest average processing time was recorded in 2019 at nearly 55 minutes. The shortest average delay was recorded in 2020 (just below 1 hours) and the shortest average processing time was recorded in 2010 (47 minutes).

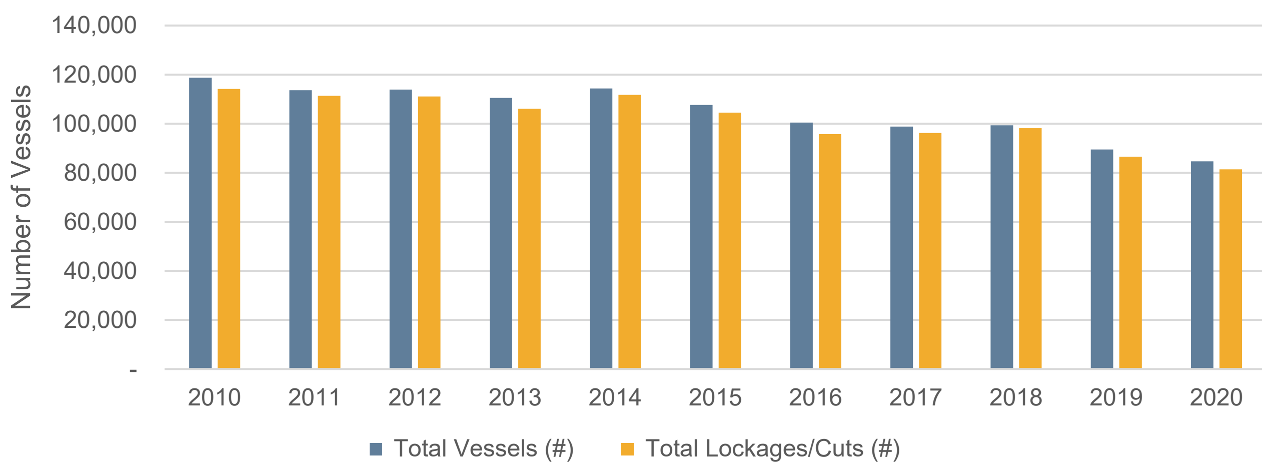
Figure 4.8 Ohio River Average Delay and Average Processing Time (2010 to 2020)



Source: USACE | Public Lock Usage Report Files 2010 -2020

Figure 4.9 shows the total vessels and total lockages/cuts on the Ohio River from 2010 to 2020. There has been a decrease in vessels and lockages/cuts along the Ohio River since 2010 with the lowest number of vessels (84,633 vessels) and lockages/cuts (81,404 lockages/cuts) in 2020.

Figure 4.9 Ohio River Total Vessels and Total Lockages/Cuts (2010 to 2020)



Source: USACE | Public Lock Usage Report Files 2010 -2020

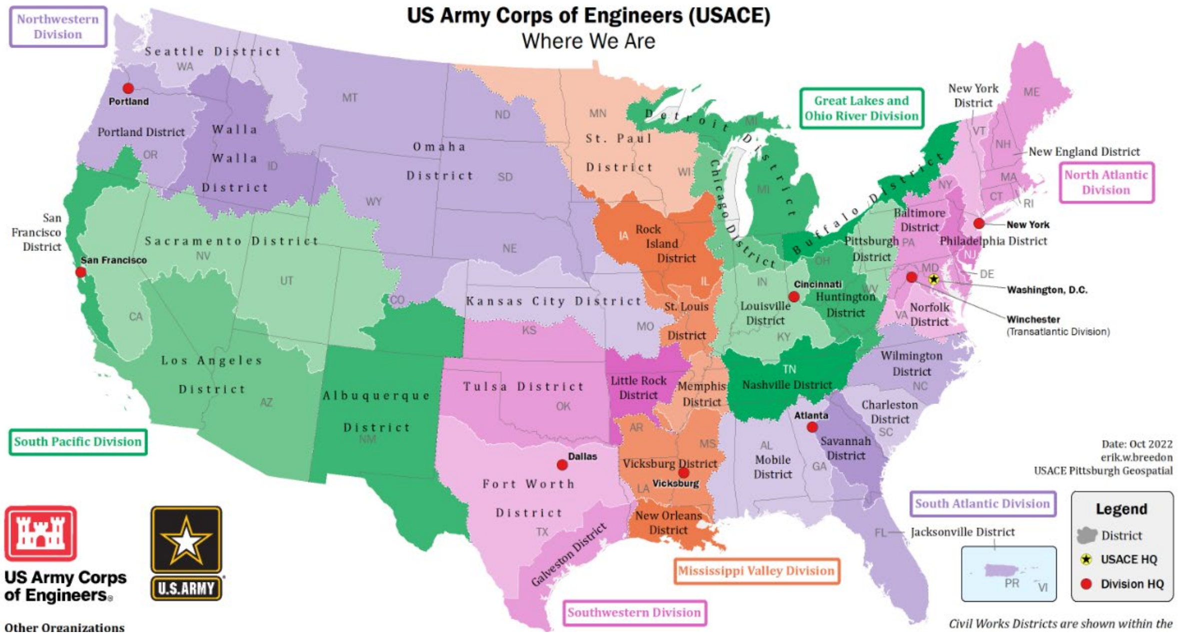
4.3.2 Dredging Performance

Dredging helps remove sediments and debris from the bottom of lakes, rivers, harbors, and other water bodies and is essential in the maintenance of the nation's waterways. The process of dredging is required to help upkeep waterborne traffic due to the natural process of how sand and silt settle underwater. Dredging impacts the channel depth of waterways and helps ensure that they are deep enough for waterway freight movement. The USACE provides U.S. dredging performance through the dredging information system (DIS) which is a database that captures information from planning to project closeout. The DIS provides the following information on the current routine maintenance of dredging with the nations waterway system:

- **Advertising Schedule** outlines all dredging contract projects to be advertised to prospective bidders in the current fiscal year.
- **Corps Dredging Schedule** outlines the work schedule of Corps operated dredging projects during the current fiscal year.
- **Corps/Industry Dredge Weekly Report** outlines the location and dates of Corps minimum fleet dredge and industry hopper dredges.
- **5 year Contracted Dredging Schedule** provides information and status of the latest 5-year Corps dredging projects.
- **Dredging Bid Abstracts** shows the bid abstracts for all dredging in the current fiscal year.
- **Dredging Contracts Awarded** shows information on all awarded dredging projects in the current fiscal year.
- **Dredging Bar Charts** provides selected information and lists work by dredge type, district, and estimated start date.

The USACE collects information on dredging through districts. Figure 4.10 shows the 45 U.S. districts.

Figure 4.10 USACE Districts

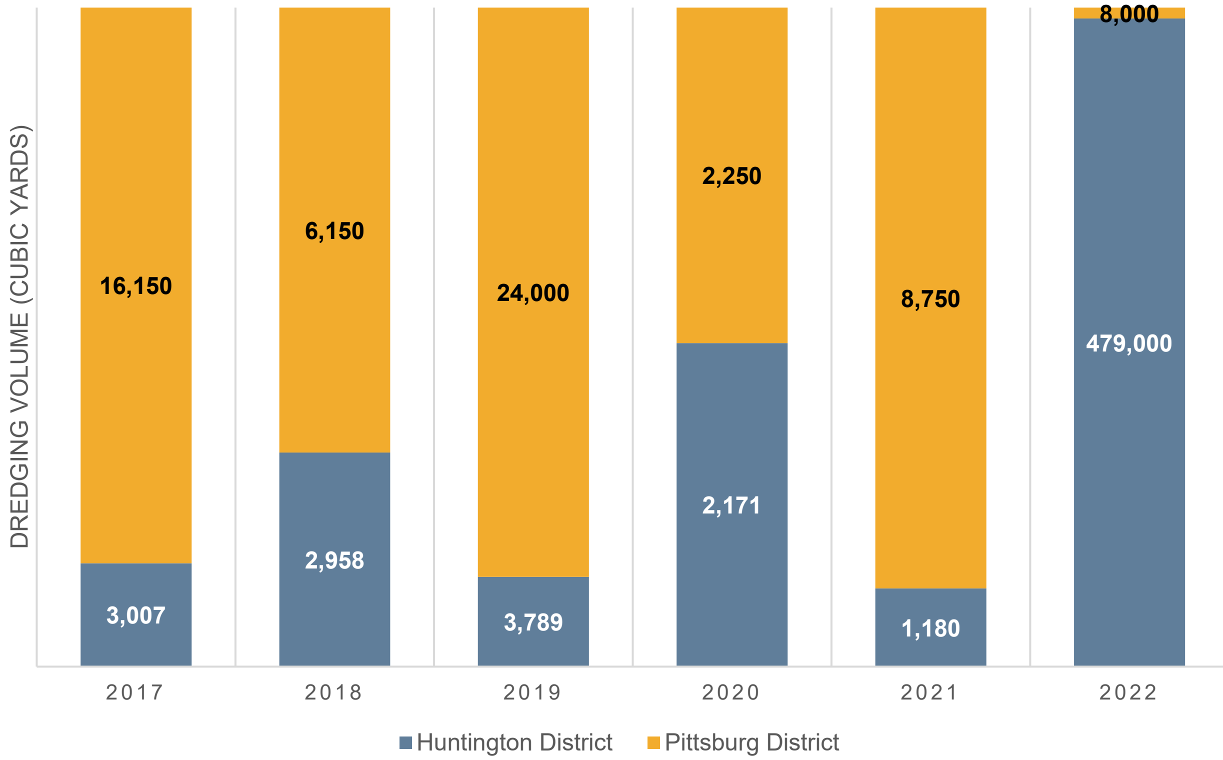


Source: https://www.usace.army.mil/Missions/Locations/

West Virginia waterways and dredging performance can be captured in the Huntington District and Pittsburg District. Using data from the DIS, the estimated cubic yards of dredging for the Huntington and Pittsburg districts were captured for the latest five years. The estimated cubic yards capture the volume of dredging anticipated for the district and shows the maintenance needed to maintain optimal waterway performance.

Figure 4.11 shows the Pittsburg District maintaining the largest volume of dredging from 2017 to 2022 and the Huntington District accounting for the largest volume of anticipated dredging in 2022 at 479,000 cubic yards.

Figure 4.11 Estimate Volume of Dredging for Huntington and Pittsburg Districts (2017 - 2022)



Source: USACE