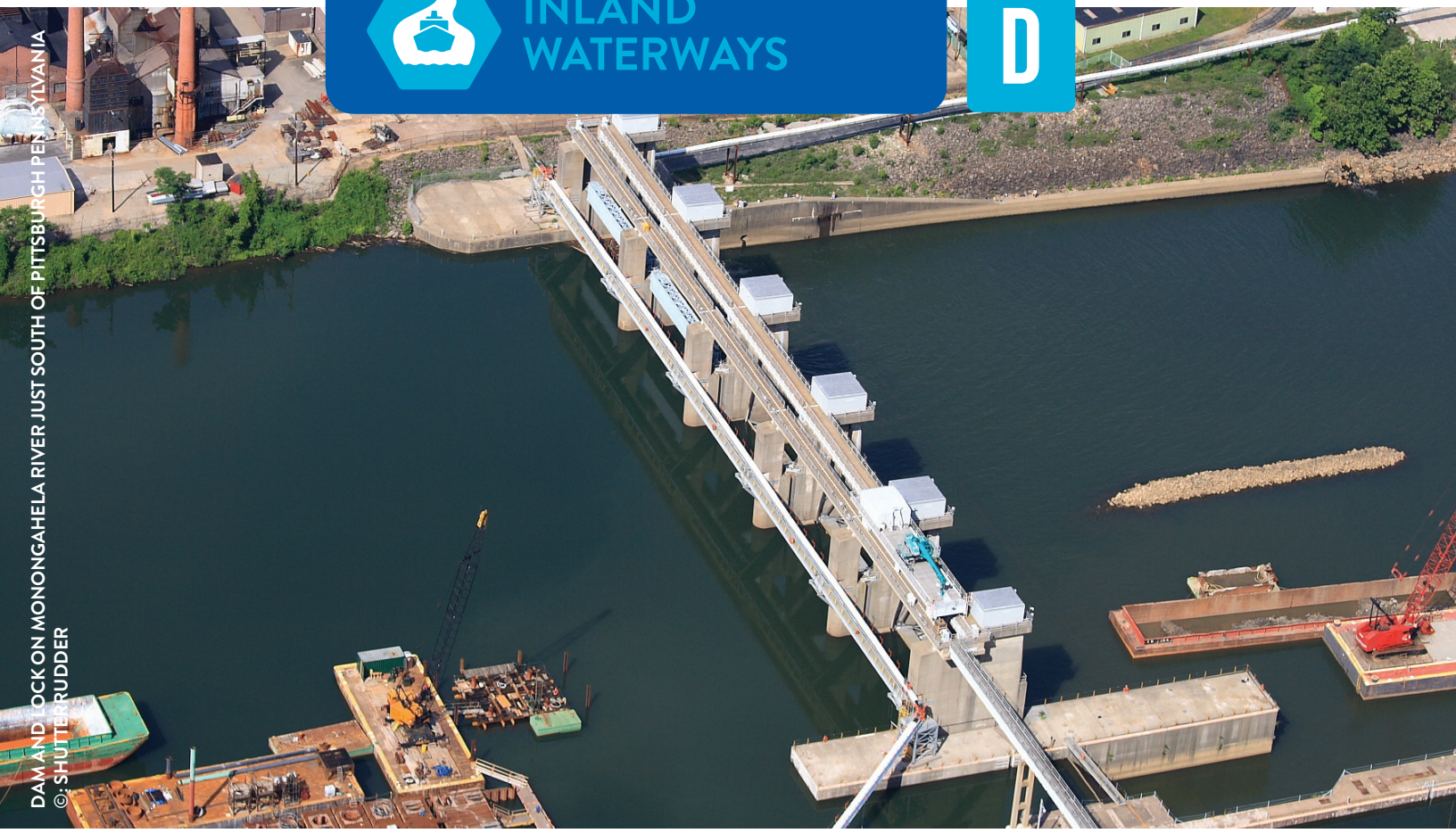


DAM AND LOCK ON MONONGAHELA RIVER JUST SOUTH OF PITTSBURGH PENNSYLVANIA
©: SHUTTERRUDDER

INLAND WATERWAYS

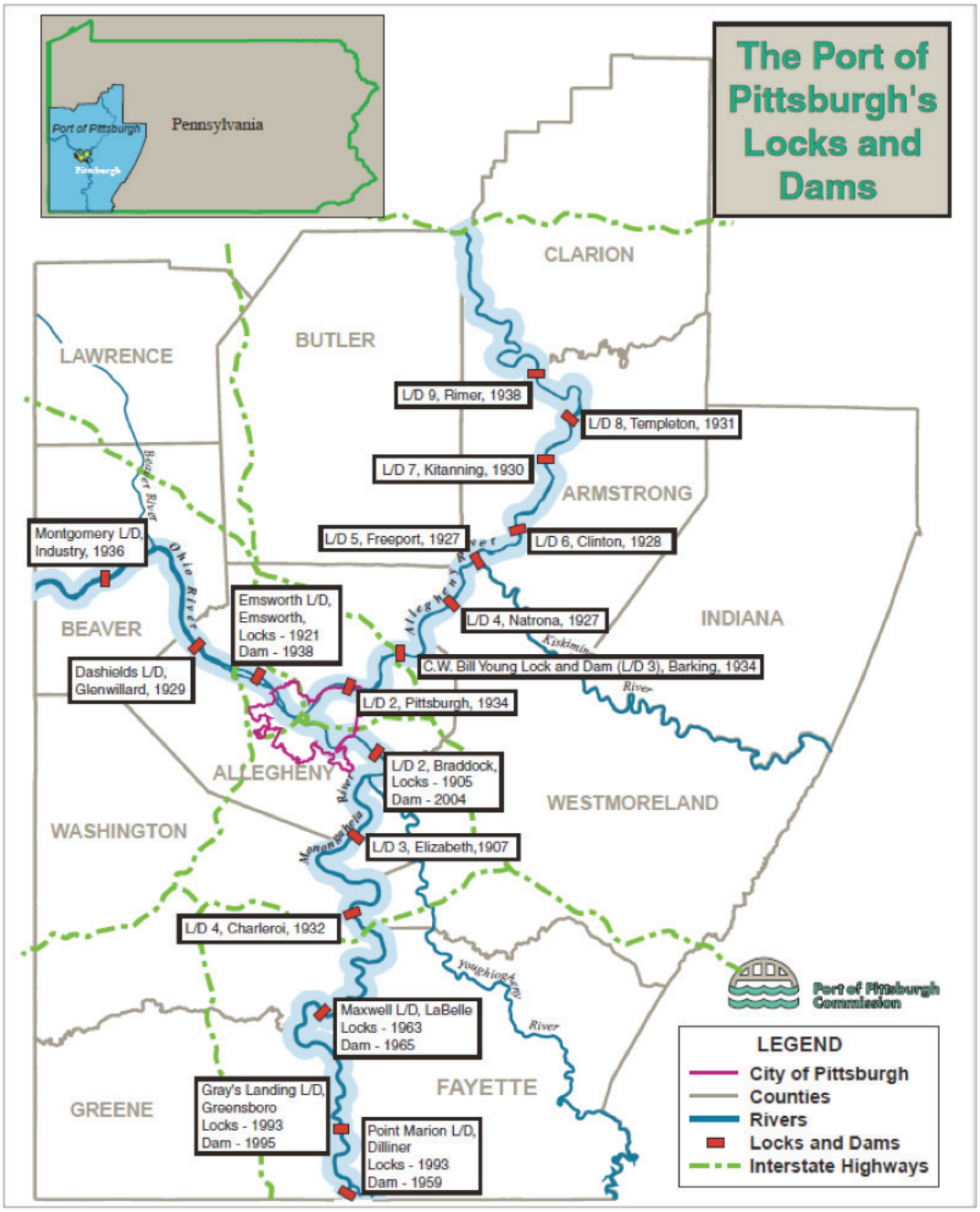
EXECUTIVE SUMMARY

The Port of Pittsburgh's Inland Waterways Navigation System consists of 17 locks and dams on the three major rivers that connect in Pittsburgh. Much of the infrastructure is 70 to 80 years old. Extended age and lack of consistent funding have allowed the condition of this system to deteriorate to the point that watercraft lockages have become severely impeded. Reduced hours of operation are in effect for several locks and dams along the Allegheny and Monongahela Rivers. While an increase in funding for the Olmstead project on the Ohio River is helpful, it has limited available funding for the remainder of the infrastructure. Meanwhile, inconsistent funding has caused project costs to increase from the original 1992 estimate of $750 million to the current estimate of $1.2 billion. Continued lack of sufficient funding could lead to a major lock and dam failure and loss of navigation for an extended period.

BACKGROUND

The Port of Pittsburgh inland navigation system serves twelve counties in Pennsylvania through 200 miles of navigable waterways and 17 locks and dams. Eight of these locks and dams are located on the Allegheny River, six on the Monongahela River, and three on the Ohio River. These are the only rivers considered to be inland waterways in Pennsylvania. There are 200 river terminals and barge industry suppliers, including privately owned terminals that depend on this navigation system. Advocacy for the region's waterways is provided by The Port of Pittsburgh Commission as designated by the Commonwealth of Pennsylvania. Ownership, as well as operation and maintenance of this navigation system, is the responsibility of the US Army Corps of Engineers (USACE), Pittsburgh District. Figure 1 shows the extent of the Port of Pittsburgh's Locks and Dams in Pennsylvania.

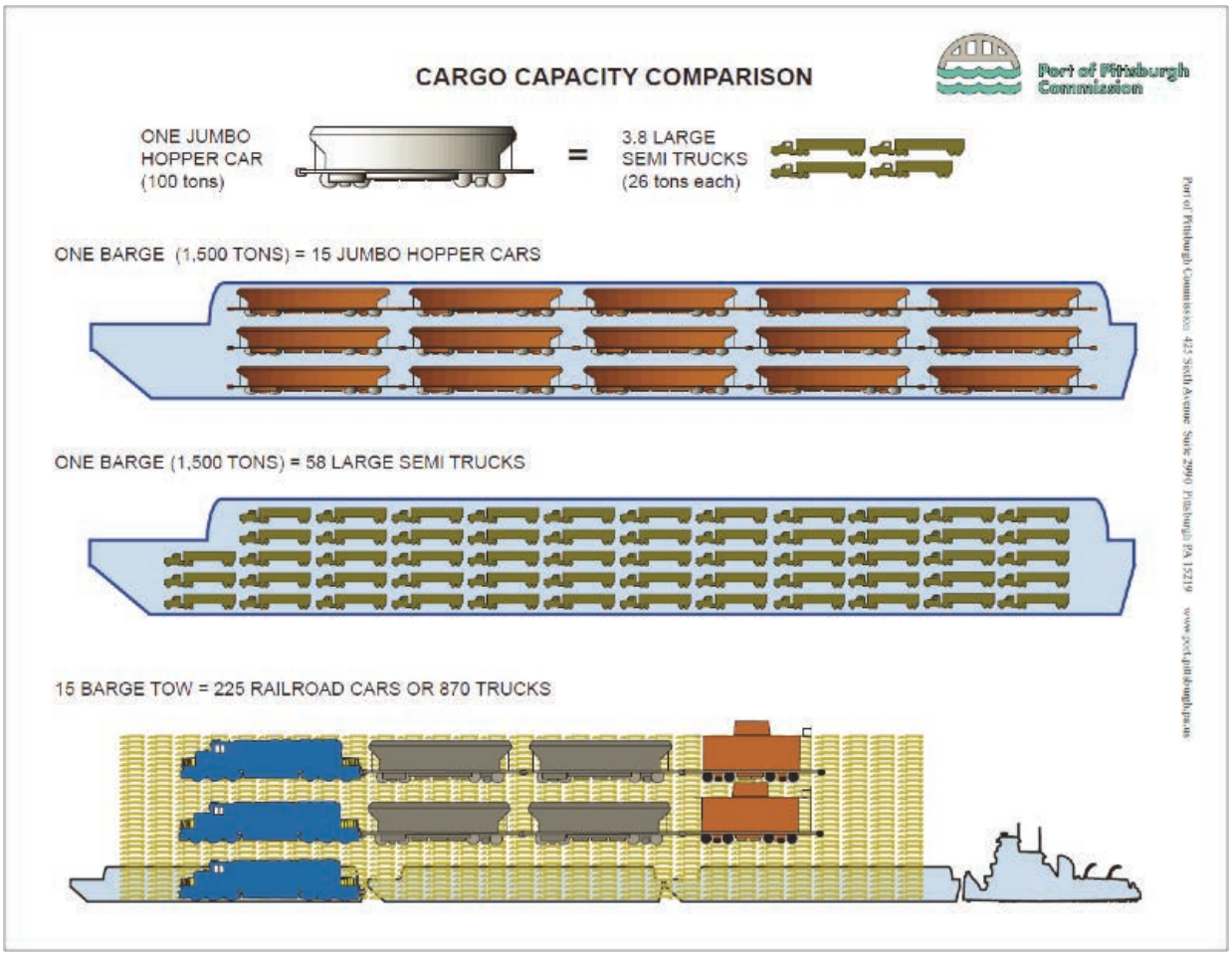
FIGURE 1. PORT OF PITTSBURGH'S LOCKS AND DAMS



CAPACITY

The Pittsburgh District initiated a feasibility study in 2017 to seek alternatives for future commercial use of navigation facilities on the Upper Allegheny and Monongahela Rivers. Figure 2 provides a cargo capacity comparison for rail, truck and barges. This study indicated that there had been a steady decrease in commercial river traffic as well as limited federal funding to support these systems. At the same time, operations and maintenance costs have increased as these structures age. Several locks and dams in the state are 70 to 80 years old, with the oldest exceeding 110 years. These assets continue to need extensive maintenance to function. Reduced hours of operation are in effect for Locks and Dams 5 thru 9 on the Allegheny River, and for the Morgantown, Hildebrand and Opekiska Locks and Dams on the Monongahela River. On the Ohio River, impediments to navigation continue due to the delay of repairs to the Montgomery Locks and Dam.

FIGURE 2. CARGO CAPACITY COMPARISON



CONDITION

The Upper Ohio Navigation System is facing critical problems due to the advanced age of its locks and dams. The Emsworth and Dashields Locks and Dams will have their primary lock chambers closed in spring 2018 for critical maintenance activities. Further impediments to navigation will continue well into the future as work progresses on lift gates at the Montgomery Lock and Dam. A failure of these gates could result in loss of the Pittsburgh Navigation Pool between Montgomery and Dashields Locks and Dams, and severely impact all navigation throughout the Pittsburgh navigation system.

Information reported in the Lock Performance Monitoring System (LMPS), Summary by River Basin for 2016, Table 1, shows that several locks and dams have experienced significant delays in locking vessels during that period.

TABLE 1. PA LOCK AND DAM DELAY STATISTICS

LOCK PERFORMANCE MONITORING SYSTEM SUMMARY BY RIVER BASIN - JANUARY - DECEMBER 2016							
Allegheny River							
Lock and Dam	**Loads / Year**	**K Ton / Year**	**Percentage of Delays / Vessels**	**Delays / Vessel (Hours)**	**Percentage of Delays / Ton**	**Delays / Ton (Hours)**	**# Closures**
L&D #2	3,402	1,259	4%	18.3	18%	2.3	5
C.W. Bill Young	2,460	1,252	18%	18.7	15%	4.2	0
L&D #4	1,777	194	9%	72.9	16%	22.3	2
L&D #5	1,313	79	5%	62.0	4%	61.0	1
	8,952	**2,784**		**171.9**		**89.8**	**8**
Monongahela River							
Lock and Dam	**Loads / Year**	**K Ton / Year**	**Percentage of Delays / Vessels**	**Delays / Vessel (Hours)**	**Percentage of Delays / Ton**	**Delays / Ton (Hours)**	**# Closures**
L&D #2	2,634	10,958	27%	38.0	28%	1.4	7
L&D #3	4,057	9,906	30%	220.0	30%	5.0	1
L&D #4	4,623	8,039	29%	71.0	31%	1.4	11
Maxwell	2,353	4,819	12%	8.0	15%	0.4	27
Grays Landing	1,677	3,752	7%	5.0	6%	1.0	1
Point Marion	1,533	3,771	10%	2.0	9%	0.4	1
	16,877	**41,245**		**344.0**		**9.6**	**48**
Ohio River							
Lock and Dam	**Loads / Year**	**K Ton / Year**	**Percentage of Delays / Vessels**	**Delays / Vessel (Hours)**	**Percentage of Delays / Ton**	**Delays / Ton (Hours)**	**# Closures**
Emsworth	2,804	12,110	22%	177.0	37%	2.7	16
Dashields	2,901	11,840	33%	99.0	33%	3.1	9
Montgomery	3,510	11,478	68%	190.0	70%	2.0	91
	9,215	**35,428**		**466.0**		**7.8**	**116**

Construction work and condition at the Maxwell and the Montgomery Locks and Dam facilities are quite dramatic in terms of both closures and delays per ton. Even at the remaining locks, there are extensive delays that are caused by the dam closures. See Figure 1 for a geographical representation of the Port of Pittsburgh Locks and Dams.

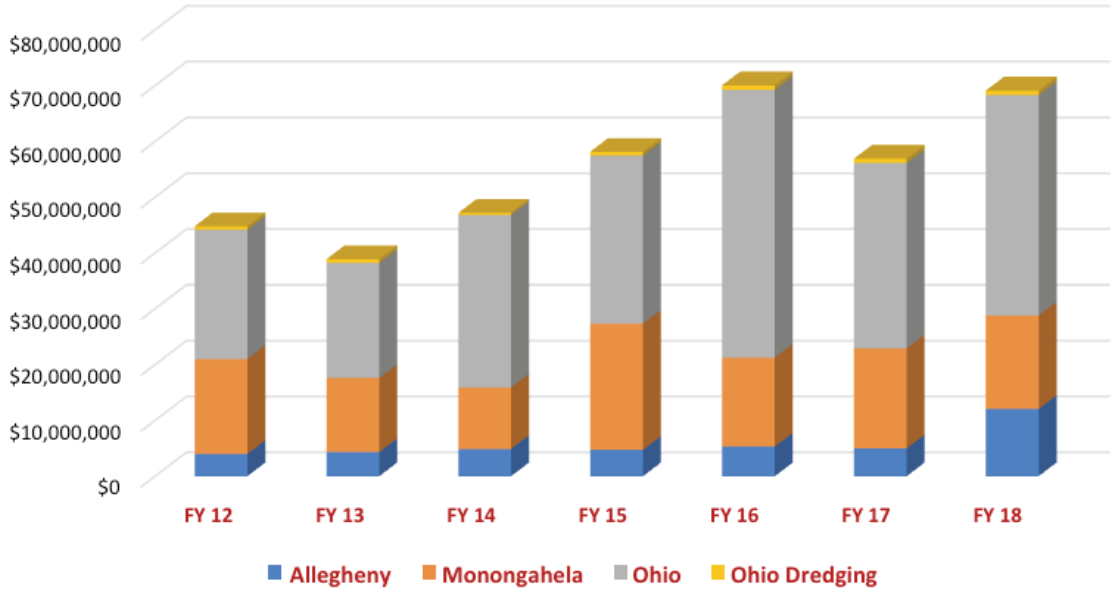
The Lower Mon Project is currently in multiple phases including planning, design, construction and completion. The project is driven by the conditions of the facilities. Work currently under construction consists of replacing Lock and Dam #2 at Braddock, replacing the locks at Lock and Dam #4 in Charleroi, and removing the 110 year old Lock and Dam #3 in Elizabeth. Lock and Dam #2 was replaced, and the new Braddock Dam was put into operation in 2004 as part of the Lower Mon Project.

The remainder of the project includes completing the river chamber at Charleroi, dredging between Elizabeth and Charleroi, and removal of Lock and Dam #3. The Project also includes a new land chamber at Charleroi which at this time is planned to be deferred into the future (25-50 years out) unless traffic warrants construction sooner. Improvements consist of removing Lock and Dam #3 which eliminates a lockage and creates a longer pool from Braddock to Charleroi, larger 84' x 720' chambers at Charleroi, and newer facilities. Once complete the river levels will rise a nominal 5' above Braddock and drop 3.2' from Elizabeth to Charleroi. The long-term benefits of these changes will result in a 30-mile unimpeded navigation pool between Braddock and Charleroi.

FUNDING

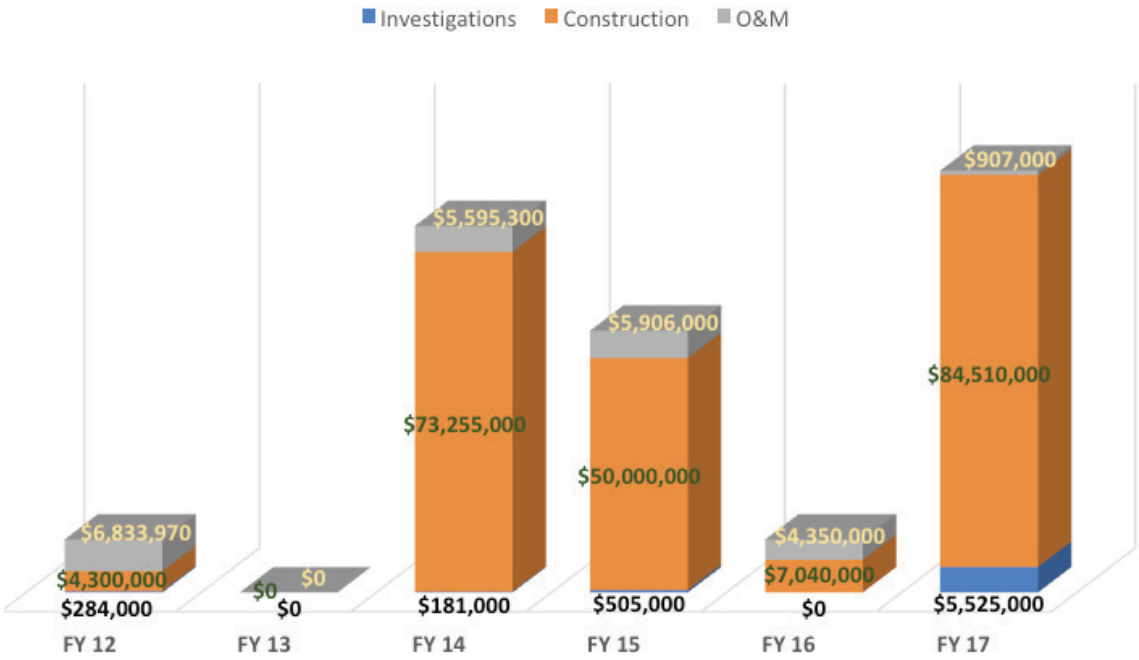
Operation and Maintenance (O&M) line items in the Federal budgets, shown in Figure 3, for FY 2012-FY 2018, showed slight increases for the Allegheny River Navigation System from $4 million to $12 million. The Monongahela River System remained relatively flat, going from $17 million in FY 2012 to nearly $23 million in FY 2015, then dropping to under $17 million in FY 2018. The Ohio River System experienced an increase from $23 million to nearly $48 million between FY 2012 and FY 2015, then saw a drop to just under $40 million in FY 2018.

FIGURE 3. TOTAL SPENT PER FISCAL YEAR – ALL PROJECTS



As shown in Figure 4, actual work history during this same period showed a large increase in spending on investigations from $284 thousand to $5.5 million. Similarly, construction spending rose from $4.3 million to $84.5 million. However, operations and maintenance funding during this same period dropped from $6.8 million to $900 thousand, which results in additional deferred maintenance and potential closures.

FIGURE 4. WORKPLAN HISTORY – ALL PROJECTS



The President's proposed $23 billion Civil Works Budget for FY 2019 includes only $70 million for O&M of the Pittsburgh District's navigation needs. This proposed FY 2019 construction budget would essentially halt the long-delayed work on the Lower Mon Project between Elizabeth and Charleroi. Delays on project funding for this critical project have caused costs to increase from the original 1992 estimate of $750 million to the current estimate of $1.2 billion. As of the time of this report, the House has passed the FY 2019 Energy and Water Development Appropriation that would provide a healthy increase to the Administration budget. The bill is now pending Senate action.

FUTURE NEED

The most pressing funding needs within the Pittsburgh District are to adequately fund the Lower Mon Project between Braddock and Charleroi and to complete the critical gate and lock chamber repair work at the Montgomery Locks and Dam. As mentioned above, the President's Proposed Budget for FY 2019 does not adequately address the Lower Mon Project, and reduced O&M budgets threaten to slow needed gate repairs at Montgomery Locks and Dam. Benefits of the Lower Mon Project are estimated to be $220 million/year. Costs to date have been $533 million of the total estimated $1.2 billion.

For the Upper Ohio River, there is an estimated cost of $2.7 billion to replace undersized and aging lock chambers at the Emsworth, Dashields, and Montgomery Locks and Dams. Funding allocations for the Upper Ohio River projects are competing with other dilapidated navigation structures on the Illinois and Upper Mississippi rivers. The President is calling for additional funding to be raised from the private sector shippers that use the waterways.

PUBLIC SAFETY

It has been estimated that loss of a key lock and dam, such as that at Elizabeth, could result in a major shift in the transportation of coal and coke to the local roadway and rail systems with significant impact, see Figure 2 for a cargo capacity comparison.

To place current tonnage levels onto local roadways would require one truck every 1.5 minutes and a continuous stream of trains carrying coal and coke through the region. Public safety could be severely impacted in the event of lock and dam closures for lengthy periods as more traffic is thrown on local roadways and additional rail crossing sites will pose increased danger to vehicular traffic.

RESILIENCE

Scheduled lock and dam maintenance operations are usually planned to minimize impacts upon river traffic. Failure of a lock for a long period of time would not severely cripple navigation since there are two chambers available. However, the Charleroi lock on the Monongahela River has had to operate with only one chamber for the past 14 years.

Failure of a river navigation dam would have devastating consequences on barge traffic. The potential for this is strong at the Elizabeth and at the Emsworth Lock and Dams facilities. As mentioned earlier in this report, the Montgomery Locks and Dam is subject to a potential lift gate failure which would result in loss of navigation from there well into the Pittsburgh navigation pool.

INNOVATION

The Pittsburgh District is incorporating several innovative concepts into the Lower Mon Project and Upper Ohio River Project. Innovations may include the use of high strength concrete and steel plating to repair cracks in the middle walls between lock chambers. Innovative design/build contracting methods are being considered to improve the commercial and technical delivery of the projects by contractors. It is critical that the construction operations be sequenced so as to not close navigation in that stretch of the river for any extended period of time.

RECOMMENDATIONS TO RAISE THE GRADE

- **Continue efforts by the Pennsylvania Congressional Delegation, the Port of Pittsburgh Commission and the USACE to promote, secure and effectively manage legislation and funding to operate and maintain the Pittsburgh Inland Navigation System.**
- **Congress should allocate sufficient funding in the FY 2019 Budget to complete the Lower Mon Navigation Project. They should also authorize additional funding of this project by increasing the barge fuel tax and user fees as needed.**
- **Congress, in conjunction of the USACE, should prioritize maintenance of federal assets, such as locks and dams on a national level, making resilience to natural disasters, increased flood frequency, and climate change a condition of spending.**

SOURCES

- Boselovic, Len. White House budget again proposes slashing funds for Lower Mon locks and dams work. *Pittsburgh Post-Gazette*, February 23, 2018.
- Gilbert, P.E., Ralph. Remarks by Congressman Conor Lamb at Port of Pittsburgh Board of Directors Meeting. *Pittsburgh Post, ASCE*. February 21, 2018.
- Kennedy, Mary. Cash Market Moves, Study Released on Impacts of Unscheduled River Lock Outages. *The Progressive Farmer*, November 6, 2017.
- Knopman, Debra. Wachs, Martin. Miller, Benjamin M. Davis, Scott G., Pfrommer, Katherine. *Not Everything is Broken: The Future of U.S. Transportation and Water Infrastructure Funding and Finance* The Rand Corporation, December 22, 2017.
- Port of Pittsburgh Commission, *Good Things Flow from Here, Fact Sheet,* February 21, 2018. Available at: www.portpitt.com
- Stolz, P.E., Steve R. Pierce, P.E., Lisa R. Stensby, P.E., Dave A. *Replacing Existing Lock 4 – Innovative Designs for Charleroi Lock.* Available at: http://www.canarysystems.com/papers/CharleroiLD_Stoltz.pdf

SOURCES (CONT.)

- US Army Corps of Engineers, Pittsburgh District, *Army Corps Studying Alternatives for Upper Allegheny, Monongahela Navigation Systems, News Release No. 17-003,* March 1, 2017. Available at: https://www.lrp.usace.army.mil/Media/News-Releases/Article/1098585/army-corps-studying-alternatives-for-upper-allegheny-monongahela-navigation-fac/
- US Army Corps of Engineers, Pittsburgh District, *Corps Set to Replace Failing Dam Gates, News Release No. 17-025,* August 9, 2017. Available at: https://www.lrp.usace.army.mil/Media/News-Releases/Article/1273165/corps-set-to-replace-failing-dam-gates/
- US Army Corps of Engineers, Pittsburgh District, *Emsworth, Dashields Primary Lock Chamber Closures to Cause Long Delays, News Release No. 18-017,* March 2, 2018. Available at: https://www.lrp.usace.army.mil/Media/News-Releases/Article/1457028/emsworth-dashields-primary-lock-chamber-closures-to-cause-long-delays/
- US Army Corps of Engineers, Pittsburgh District, *Emsworth Locks & Dams Major Rehabilitation Project,* 2014. Available at: https://www.lrp.usace.army.mil/Missions/Planning-Programs-Project-Management/Key-Projects/Emsworth-Locks-Dams-Major-Rehabilitation-Project/
- US Army Corps of Engineers, Pittsburgh District, *Locks and Dams 2, 3, and 4 Monongahela River (Lower Mon) Project Fact Sheet,* June 2013. Available at: http://www.lrp.usace.army.mil/Portals/72/docs/HotProjects/LMPJune2013.pdf
- US Army Corps of Engineers, Pittsburgh District, *Lock Performance Monitoring System (LMPS)*, January – December, 2016. Available at: http://corpslocks.usace.army.mil/lpwb/f?p=121:1:16556320337761:::::
- US Army Corps of Engineers, Pittsburgh District, *LRP O&M Budget, President's Budgets, FY 12 – FY 18*, March 12, 2018.
- US Army Corps of Engineers, Pittsburgh District, *LRP Workplan History, FY 12 – FY 18,* March 12, 2018.
- US Army Corps of Engineers, Pittsburgh District, *President's 2019 Budget,* February 14, 2018.