



Monthly Lock to Lock Traffic Connectivity to Support Maintenance Scheduling

ERDC Dredging Operations Technical Support Program (DOTS)

U.S. ARMY CORPS OF ENGINEERS

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Response Summary:

This project used historic vessel position data within lock areas (Fig 1) to identify traffic that moved between locks in a month. This allowed for tabulation of shared traffic between any locks included in the study, regardless of adjacency. Vessel position data was acquired from the U.S. Coast Guard using the AIS Analysis Package (AISAP) software, and further processed using custom python scripts.

Period of Performance:

The study period was the entire 2018 calendar year, with the area of interest spanning inland waterways and associated navigation locks. This included active navigation lock structures on the following waterways: Ohio, Allegheny, Monongahela, Clinch, Big Sandy, Kentucky, Kanawha, Cumberland, Tennessee, Tombigbee, Black Warrior, Mississippi, Gulf Intracoastal Waterway, Arkansas, and Illinois.

Benefits of the Response to the USACE Dredging/Navigation Program:

Concurrent scheduled lock closures are preferred because associated impacts to commercial navigation activity can be minimized, however it has historically been difficult to quantify lock-to-lock traffic connectivity on a monthly level across the entire inland maritime transportation network. This data is now available to Operations personnel at the District and Division level to assist in maintenance scheduling decisions to minimize traffic disruptions.

Deliverable:

The requested deliverable for this DOTS request was a multi-tab spreadsheet file that could be filtered in multiple ways to display the traffic connectivity between locks at different months of the year (Fig. 2).

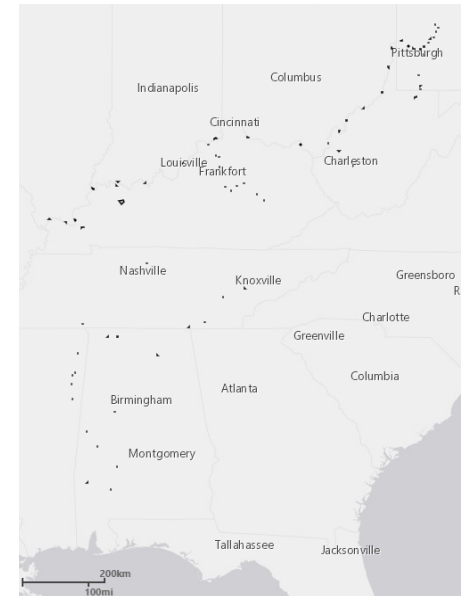


Figure 1. Lock areas (black polygons) in the eastern part of the U.S. displayed in AISAP.

| Month | AOI. (Percent of shared traffic by month.) | Ohio1 Emsworth | Ohio2 Dashiields | Ohio3 Montgomery | Ohio4 New Cumberland | Ohio5 Pike Island | Ohio6 Hannibal | Ohio7 Willow Island | Ohio8 Belleville | Ohio9 Racine | Ohio10 RC Byrd | Ohio11 Greenup |
|-------|--|----------------|------------------|------------------|----------------------|-------------------|----------------|---------------------|------------------|--------------|----------------|----------------|
| 1 | Ohio1 Emsworth | | 0.97 | 0.78 | 0.64 | 0.56 | 0.44 | 0.42 | 0.39 | 0.39 | 0.25 | 0.22 |
| 2 | Ohio1 Emsworth | | 1.00 | 0.90 | 0.62 | 0.55 | 0.45 | 0.28 | 0.28 | 0.28 | 0.21 | 0.14 |
| 3 | Ohio1 Emsworth | | 0.97 | 0.86 | 0.62 | 0.59 | 0.35 | 0.32 | 0.32 | 0.30 | 0.16 | 0.19 |
| 4 | Ohio1 Emsworth | | 1.00 | 0.84 | 0.58 | 0.55 | 0.42 | 0.32 | 0.29 | 0.26 | 0.19 | 0.06 |
| 5 | Ohio1 Emsworth | | 1.00 | 0.87 | 0.74 | 0.71 | 0.53 | 0.50 | 0.47 | 0.45 | 0.32 | 0.16 |
| 6 | Ohio1 Emsworth | | 0.95 | 0.86 | 0.70 | 0.64 | 0.55 | 0.52 | 0.45 | 0.43 | 0.32 | 0.23 |
| 7 | Ohio1 Emsworth | | 0.98 | 0.93 | 0.76 | 0.76 | 0.64 | 0.58 | 0.56 | 0.56 | 0.45 | 0.40 |
| 8 | Ohio1 Emsworth | | 1.00 | 0.82 | 0.61 | 0.55 | 0.45 | 0.42 | 0.42 | 0.34 | 0.32 | 0.26 |
| 9 | Ohio1 Emsworth | | 0.96 | 0.74 | 0.66 | 0.64 | 0.49 | 0.47 | 0.47 | 0.45 | 0.40 | 0.28 |
| 10 | Ohio1 Emsworth | | 1.00 | 0.96 | 0.67 | 0.58 | 0.52 | 0.46 | 0.44 | 0.38 | 0.31 | 0.25 |
| 11 | Ohio1 Emsworth | | 0.93 | 0.84 | 0.68 | 0.55 | 0.50 | 0.48 | 0.48 | 0.45 | 0.41 | 0.36 |
| 12 | Ohio1 Emsworth | | 1.00 | 0.89 | 0.67 | 0.65 | 0.48 | 0.43 | 0.43 | 0.37 | 0.28 | 0.20 |

Figure 2. (Partial table) Percent of vessel traffic shared between Emsworth Lock and other locks on the Ohio River in 2018, by month.



Providing environmental and engineering technical support to the U.S. Army Corps of Engineers Operations and Maintenance navigation and dredging missions

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