Description   This project will establish annual sediment yields for each of over 170,000 catchments of the Ohio River Basin from 1980 to present. The Ohio River Basin is shown in Figure 1, with catchment delineations from the NHDPlusV2 data set. Relationships between sediment and runoff will be used to estimate annual sediment yields across the basin to be applied to all catchments. The approach will then be analyzed for further refinement using other available data sets such as land cover data, slope, and soil type. The project will provide a valuable data set of approximate sediment yields which can fill spatial, or resource-limited, gaps. The accuracy of the resulting data set will be evaluated and presented using USGS observed sediment load data.
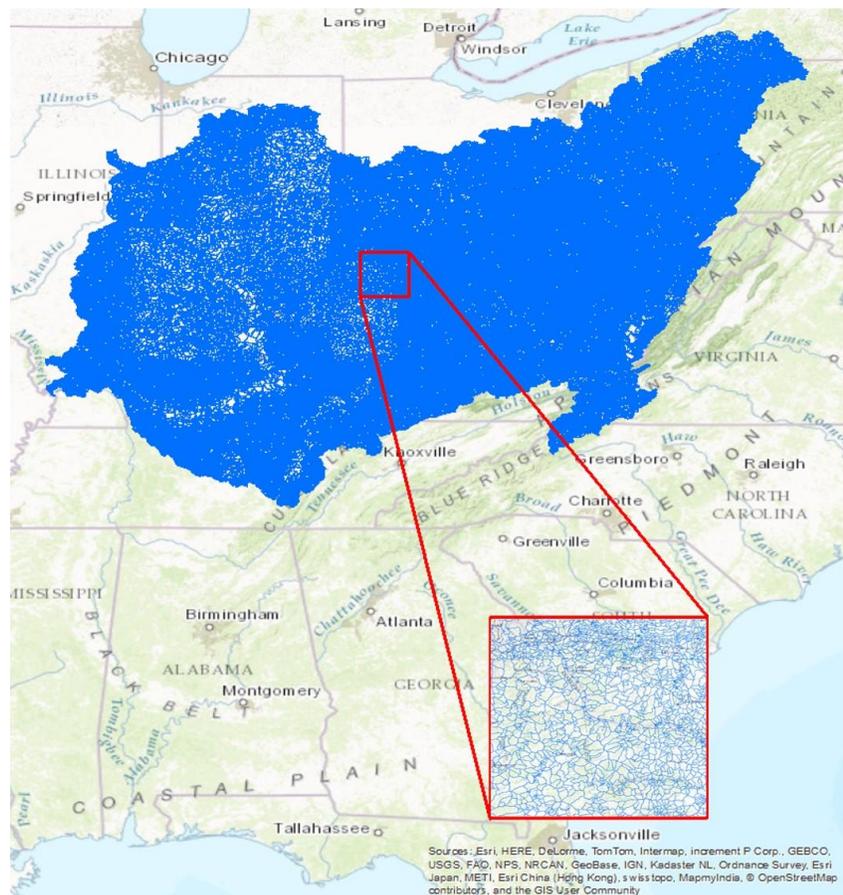

Figure 1. Map of the 170,000+ catchments of the Ohio River Basin

Issue/Challenge To Address   Estimating a watershed's sediment yield is an important first step whenever water resource managers seek to better understand the sediment behavior in a waterway or reservoir. In areas where a complete hydrologic and sediment model (software such as HEC-HMS, GSSHA, SWAT, etc.) cannot be developed due to time or resource limitations, a simpler framework may be sufficient to provide quick information over a wide range of spatial scales. A readily available data set for sediment yield is needed, and one can be developed efficiently through data analysis and GIS processing of available data sets. This project will use an empirical approach of sediment rating curves to estimate sediment yield as a function of runoff. The approach will then be analyzed for further refinement using other

available GIS data such as land cover data, slope, and soil type. The approach will automate the retrieval and processing of USGS sediment measurements at over 300 sites throughout the basin. 200 sites are randomly chosen for calibration and 100 for validation, as shown in Figure 2. Uncertainty will be calculated based on the resulting comparisons with measurements. The use of this data set will be beneficial for all three of the U.S. Army Corps of Engineers primary missions: Navigation, Flood Risk Management, and Environmental Restoration.
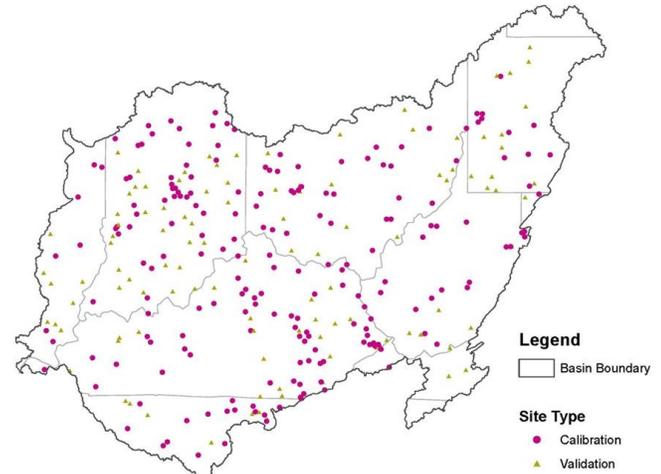
Figure 2. USGS sediment measurement locations chosen for calibration and validation

Successes Lessons Learned

Lessons learned will be compiled during the duration of this study.

Expected Products

- Journal Technical Paper (draft within FY18)
- Data set of annual sediment yield for all Ohio River Basin catchments
- Automated scripts and intermediate data sets or relationships

Stakeholders/Users

Any regional USACE District needing approximate sediment yield information will be able to use this data set quickly. The data set will also be useful for other federal agencies, such as the USGS or EPA, state agencies, or regional water management personnel.

Projected Benefits Value Added

This data set will be used to answer any questions which may not require a complete hydrologic and sediment model (development of each model can easily be upwards of $25,000). This data set will fill gaps, both in available resources and spatial coverage, by providing very high spatial resolution sediment yield information to an entire 2-digit hydrologic unit, the Ohio River Basin (HUC 05).

Leveraging Opportunities

This effort will leverage currently available data sets through the combining of NHDPlusV2 catchments, USGS sediment measurements, national GIS data sets (land cover, soil type, etc.), and the NLDAS runoff estimates to create a final product of sediment yield by high-resolution catchment.

Points of Contact

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Participating Partners

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