



Regional Sediment Management Program Omaha District (NWO): Evaluating the Projected Impacts of Increased Sediment Load to the Lower Missouri and Mississippi Rivers



Description

Sediment in USACE reservoirs has been decoupled from downstream river channels and coastal deltas for decades. A rebalancing of sediment from reservoir storage into rivers and subsequently transported to coastal areas could reduce both riverine and coastal degradation resulting in navigation, habitat, and coastal protection benefits. This analysis of the projected impacts of increasing the sediment supply downstream of the Missouri River Reservoir system will help determine if such management would be beneficial to both inland and coastal water systems.

Issue/Challenge To Address

Since closure of the first of the Missouri River Mainstem Reservoirs in the early 1950's, the sediment load delivered to the lower Missouri and Mississippi Rivers has been significantly reduced.

A prevalent line of thinking today is that reintroduction of sediment trapped in the reservoir system to the Missouri River would solve many of the problems associated with sediment starvation downriver. It is often suggested that reintroducing the sediment stored behind Gavins Point Dam would be sufficient to make a significant reduction in downstream degradation. Figure 1 shows the extent of the study area from Gavins Point Dam to New Orleans, LA. Approximately 80,000 acre-feet per year of sediment is stored in the reservoir system. This sediment was a component of the historic Missouri River sediment load that input to the Mississippi River at St. Louis, MO. Since closure of the reservoir system, the measured suspended sediment load has dropped significantly.

This study will examine the impacts of varying levels of sediment reintroduction through the use of an existing HEC-RAS sediment model below Gavins Point Dam. The model will be used to project the spatial and temporal impacts of sediment reintroduction in the Missouri River down to Sioux City, IA, the upstream start of the Missouri River Bank Stabilization and Navigation Project (BSNP). Using the model determined sediment load change at Sioux City, IA, as input, a transport capacity and sediment load gage analysis will be completed at the main discharge and sediment gages along the lower Missouri and Mississippi rivers to evaluate change throughout the basin.

Using the gage transport capacity and concentrations, a sensitivity analysis will be completed using varying sediment loads delivered to the river below Gavins Point Dam. The HEC-RAS sediment model, combined with the gage analysis will address three questions:

1. Would reintroduction of the annual load retained behind Gavins Point Dam result in a significant change in sediment load at New Orleans, LA?
2. Would the reintroduction of sediment result in aggradation along the river?



Figure 1. The Navigable Lower Missouri and Mississippi Rivers



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3. If the annual load behind Gavins Point Dam does not result in a significant increase in sediment load and New Orleans, LA, what increase is necessary to show a response at the mouth of the Missouri (St. Louis) and Mississippi (New Orleans) Rivers?

This analysis will indicate the influence of changing sediment loads on downstream channel transport and morphology. While this study will not be detailed enough to direct management changes, it will offer guidance on the relative level of impact of upstream sediment management and serve as a framework for future studies connecting riverine/reservoir systems to costal estuaries and deltas.

Successes Lessons Learned

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

Expected Products

- Stakeholder outreach presentation to the Missouri River Sedimentation Action Coalition (MSAC)
- MRGPP Report in FY17
- RSM Tech Note

Stakeholders/Users

MSAC, USACE districts in Omaha, Kansas City, St. Louis, Memphis, Vicksburg, New Orleans, Mississippi River Geomorphology and Potamology Program (MRGPP)

Projected Benefits

Determining the expected level of impacts (if any) from increasing sediment load in the river will provide river and reservoir managers a clearer picture of how the system could potentially change with future management changes. If there is a significant need for increased sediment load below the Missouri River mainstem dams, this analysis should be the first step in estimating the likelihood of transporting sediment to the area of concern.

Leveraging Opportunities

Existing Model – the analysis of sediment transport directly below Gavins Point Dam will be done with an unsteady HEC-RAS model under development for the Missouri River Recovery Program (MRRP) that will be completed early in FY16 and includes sediment transport and an existing sensitivity analysis that will assist in selecting proposed sediment loading rates for the study. This model uses sediment transport tools developed as part of the FY14 NWO RSM project.

Mississippi River Geomorphic and Potamology Program – NWO is currently working with the program on a Lower Mississippi/Missouri River sediment budget. Through this study, sediment and flow data is available for the major gages along the entire reach of the study. The availability of this data will significantly reduce the RSM project cost for data mining.

Points of Contact

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Participating Partners

Mississippi River Geomorphology and Potamology Program