



Regional Sediment Management Effects of Bank Stabilization

Description

NWK will quantify the regional sediment management effects of USACE bank stabilization projects in the Kansas River Basin and distill lessons learned on the performance of those projects. In addition, NWK will perform an analysis of different water release strategies (low gates vs high gates) at Kanopolis Lake and hold a 1-day reservoir sediment management workshop.



Figure 1. Typical Section 14 Bank Stabilization Project.

Issue/Challenge To Address

The Corps of Engineers spends around one billion dollars each year dredging sediments from navigation channels and harbors. In addition, sediment accumulation is decreasing the benefits provided by federal reservoirs—a problem that worsens with each year of accumulation. The Regional Sediment Management (RSM) program has made concerted effort to promote the beneficial use of those sediments for beach replenishment, habitat creation, and other purposes. This project follows the sediment management one step upstream, to the land from which the sediment derives.

In many watersheds, a significant, and sometimes the dominant source of sediment is not erosion on farm fields, but erosion and failure of river banks (see Juracek and Ziegler, 2009). Furthermore, bank sediments may disproportionately derive from erosional “hot spots” – tall banks with high erosion rates (USACE 2011). The Kansas Water Office estimated that stabilization of bank erosion hotspots (addressing sediment at its source) was 21 times more cost effective than reservoir dredging (Gnau 2013).

Section 14 of the 1946 Flood Control Act, as amended, provides authority for the Corps of Engineers to plan and construct emergency streambank and shoreline protection projects to protect endangered highways, highway bridge approaches, and other nonprofit public facilities. Through this and similar programs, the Corps of Engineers has completed hundreds of miles bank stabilization across the country. After construction, the Corps turns these projects over to local sponsors for continued O&M and does no follow-on inspections. Time and the lack of infrastructure failures at these locations suggest the



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general success of this program for its intended purpose of emergency streambank stabilization. However, a comprehensive or representative review of the projects has never been conducted. In addition, the benefits that these projects have for preventing downstream sediment accumulation has not been quantified.

Successes Lessons Learned

Lessons learned will be compiled during the duration of this study. Causes of damage to the projects will be investigated and documented. The post-project erosion rate will be compared with the pre-project erosion rate to quantify the sediment reduction effects of these projects.

Expected Products

- Tech note (1) summarizing the longevity and effectiveness of the stabilization measures and any design changes that could lead to greater success or sustainability and (2) quantifying the reduction in sediment input to the stream from the assessed projects.
- Trade magazine summarizing the findings.
- Presentation of the project at the RSM IPR.
- Lecture material provided for the RSM-U class on reservoir sediment management for engineers.
- Tech note documenting the sediment effects of an altered release strategy at Kannapolis Lake.

Stakeholders/Users

The State of Kansas recently founded an inter-agency research team to address this issue, including researchers and personnel the Kansas Water Office, Kansas State University, the University of Kansas, and the Kansas Biological Survey. Where possible, this RSM effort will be conducted in such a way as to add value to the research efforts of the other groups.

Projected Benefits Value Added

This project will highlight the regional sediment management benefits of Corps bank stabilization projects. This can provide justification for using similar methods with the primary goal of preventing downstream sediment accumulation. Or these results may provide basis to push back against regulatory preferences for watershed stabilization over active management. The lessons learned from this project can also improve bank stabilization for purposes of infrastructure protection and provide guidance for including RSM-effective practices in streambank stabilization.

Leveraging Opportunities

This project leverages analysis on pre-project erosion rates and as-built surveys from previous Section 14 studies and Section 204 studies. This project will also leverage work by other agencies in the recently established interagency working group.

Points of Contact

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Participating Partners

Kansas Water Office