



Evaluating Bedload Sediment Collectors to By-Pass Shoaling Sediment

Dredging Operations Environmental Research (DOER) Program

U.S. ARMY CORPS OF ENGINEERS

BUILDING STRONG®

Focus Area

Innovation in Sediment Management - Innovative Construction and Operations Technologies

Problem

USACE channel maintenance objectives are not to dredge but to keep the channel open for safe and efficient commercial navigation within project authorities. Main channel sediment placement, i.e., thalweg disposal, is common in most large rivers, but is not allowed in the states of Wisconsin and Minnesota because river flow is lower and there are environmental constraints concerning floodway filling, freshwater mussels, aquatic vegetation, and sediment transport to backwater areas. In many locations in Rock Island District and all of St. Paul District dredged sediment is stockpiled near the river but must ultimately be removed from the floodway to upland locations. The sediment rehandling and site identification/coordination/acquisition costs as old sites fill up can be significant and have also led to negative public reaction in some cases.



Study Description

Bedload sediment collectors offer a much different approach for channel management by installing equipment that is left in place and operated on an as-needed basis to remove shoaling sediment and by-pass it back into the bedload transport downstream or adjacent to the collector. This research will evaluate the performance of bedload sediment collectors which are passive-hydraulic systems that include one or more large (30-ft long) rectangular hoppers placed perpendicular on the riverbed. An open grate at the top (1-ft wide, gravel-sized spacing) lets sediment fall into an internal channel system where an external pump is used to move river water through the bedload sediment collector to slurry sediment through appropriate hosing/plumbing to a diffuser in the thalweg downstream. The bedload sediment collector hopper is wedge shaped and trenched into the riverbed to create a self-cleaning sediment trap. The objective is to collect and by-pass sediment at the natural transport rate to eliminate the need for mechanical dredging as well as the associated environmental impacts and sediment management costs. The goal is to keep sediment transporting through the system.

Products

Technical reports and conference presentations will report annual results and a capstone journal paper will convey the study results to an international audience. Online media will provide opportunities for rapid communications and video.

Summary

This research will evaluate the effectiveness of bedload sediment collector by-pass systems which may be an alternative to replace dredging and keep sediment in transport where river current velocity alone is insufficient. This research could lead to significant changes and cost savings for riverine channel management, and it is applicable in coastal settings too.



Balancing operational and environmental initiatives and meeting complex challenges of dredging and dredged material placement in support of the navigation mission.