

## **Bedload Sediment Collector Evaluation, Niobrara River**

*ERDC Coastal and Hydraulics Laboratory (CHL), in collaboration with Omaha District, St. Louis District, and USGS, deployed a bedload sediment collector on the Niobrara River, NE, August 18–21, 2025 to evaluate its feasibility in reducing downstream reservoir sedimentation. Upstream bedload and suspended load measurements were collected to compare with capture rates to evaluate the bedload collector's performance and efficiency. Data from this demonstration will be used to further document feasibility and drive improvements and future efforts.*

The bedload sediment collector is a system designed to intercept bedload material moving along the riverbed and pump it out of the channel for storage or beneficial use. This semi-passive technology offers a potentially cost-effective way to manage sediment, bypass shoaling areas, reduce dredging needs, and extend reservoir capacity. The Niobrara River, a spring-fed system draining the Nebraska Sandhills, historically contributes at least 50 percent of the sediment load entering Lewis and Clark Lake. Unlike many sites where bedload transport only occurs during short-lived flood events, the Niobrara River supplies sand year-round, making it an ideal location to test and evaluate the collector. The constant sediment availability eliminates the need for rapid deployments timed to floods.

In August 2025, ERDC Coastal and Hydraulics Laboratory (CHL), in collaboration with the Omaha District, led the deployment of a 4-foot bedload sediment collector in the Niobrara River, with support from USGS, St. Louis District, and Gavins Point Dam staff, to evaluate its performance relative to the 12-foot unit tested in 2024. The collector was installed using Gavins Point equipment and operated to capture bedload material under the river's steady sand transport conditions. Numerous sediment samples were collected in Millipore bags for later gradation analysis and providing direct measurements of capture rates across a range of operating conditions. USGS supported the effort by collecting Acoustic Doppler Current Profiler (ADCP) data to quantify bedload transport and by sampling suspended sediment to characterize the total load moving through the system.

While the collector intercepted periods of coarse bedload transport, it more consistently captured finer sediments, likely due to localized scouring beneath the unit. Bathymetric data collected around the site will help confirm these effects and improve understanding of the interactions between the riverbed and the collector. All of the data and samples will be analyzed to compare the performance of the 4-foot collector with the 12-foot system and to determine whether the technology scales consistently. The bedload collector was also deployed previously this year in Missouri's Big River in collaboration with St. Louis District to evaluate its efficiency in removing lead-contaminated sediment. Planned FY26 activities include controlled flume testing and a potential field demonstration within side channels of the Lower Mississippi River.



Figure 1. The 4-foot bedload sediment collector being deployed into the Niobrara River.



Figure 2. Sediment sampling using Millipore bags for gradation and capture rate measurements.



Figure 3. USGS and CHL staff collecting data near the 4-foot bedload sediment collector using an ADCP.

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This research addresses and NWO RSM request and DOER Statement of Need, SON1854: Evaluating Bedload Sediment Collectors to By-Pass Shoaling Sediment submitted by St. Paul District Channel Operations.

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