RECLAMATION
Managing Water in the West

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Research Update

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Bottom Line

This research project explored existing methods used by Reclamation, the industry, and other agencies to measure, capture, and control alluvial material.

Better, Faster, Cheaper

Controlling alluvial material before it reaches a main river channel is a potential best management practice and a step forward in avoiding damage.

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Predicting, Managing, and Controlling the Movement of River Rocks and Sand

How to control alluvial material before it is introduced into the Lower Colorado River

Problem

High flows in ephemeral streams can cause alluvial material (rocks and sand) to move. These materials have damaged Reclamation's infrastructure by depositing alluvial fans in the Colorado River channel, which reduce channel capacities and impact water deliveries. Bankline structures are compromised by erosion caused from the channel changes resulting from the wash fan depositions.

This is particularly critical on the Lower Colorado River. Flooding between 2003 and 2005 in the Gould and Mule Washes, tributaries to the Lower Colorado River, carried materials that washed out sections of Reclamation's roadways and structures and deposited thousands of cubic yards of alluvial material and debris into the river channel. In October 2011, Reclamation personnel found 10 large alluvial fans within the river channel from ephemeral tributary flows. These fans constrict the channel and erode and undercut bankline structures.

These problems are not unique to the Lower Colorado River. Throughout the American West, proactive and cost-effective solutions to control alluvial material are needed to ensure sustained water operations.

Solution

Alluvial material and ephemeral stream flows are worldwide issues and are being studied closely. This Reclamation Science and Technology Program research project conducted a literature review to explore ways to control alluvial material. The research team documented successes, problems, and potential gaps in science.

Research reiterated that sediment loads from ephemeral flows are natural occurrences and preventative measures are often costly to install and maintain. The Japanese have invested considerable efforts into testing measures to reduce the impact of these sediment-laden loads. However, as climate, geologic formations, and other considerations differ in the American West, Reclamation may not be able to adopt these measures. Some of the implementation measures, including screened basins, overflow stepped weirs, and staggered upland dikes, could be used.

Future Plans

The research team recommends that Reclamation's Yuma Area Office (YAO) in Yuma, Arizona, implement various designs of debris dams in critical ephemeral areas and test several upland mitigation measures. These structures should be studied for several years to examine the effectiveness and applicability of various combinations of sediment control structures upland of the depositional areas from

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the wash fans. The structures' effectiveness can be measured after each major storm with visual inspections, and instream depositional growth will be monitored through the annual Lower Colorado River Operations and Maintenance (O&M) Inspection.

Based on this research, YAO is now constructing structures. YAO has procured supplies and equipment and will build a structure in fiscal year 2016 at Mule Wash (river mile A110.1), on the Arizona side of the river. After each rainfall, this wash deposits a large amount of alluvial material into the Lower Colorado River. Structures to contain these materials will help alleviate problems in the river, saving O&M costs and preserving banklines on the California side of the river.

YAO is partnering with the Colorado River Indian Tribes Coalition to install structures at two future sites: Quien Sabe and Paradise Point on the California side of the river. This will also help to avoid bankline degradation, losing land to erosion, and navigational issues.

"Carefully choosing measures to control sediment-laden flows in critical ephemeral washes could help preserve banklines and avoid costly operation and maintenance issues."

Carrie Scott
Supervisory Civil Engineer, Reclamation's Lower Colorado Region

More information

www.usbr.gov/research/projects/detail.cfm?id=7796

Photograph taken from the California side of the Lower Colorado River observing the alluvial fan at Mule Wash, river mile A110.1.

The Quien Sabe Wash fan (facing north observing the north fan from the California side of the Lower Colorado River).

Photograph taken from the Arizona side of the Lower Colorado River observing the Paradise Point Wash fan.

The Quien Sabe Wash fan (facing west from the Arizona side of the Lower Colorado River).

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For printable version see: www.usbr.gov/research/docs/updates/2015-04-movement.pdf