

Missouri Basin High Priority Issue Missouri River Bed Degradation Impacts January 2009

Issue

Lowering of the Missouri River bed in the reach bordering Kansas threatens water intakes, bridge abutments and other “hard points” along the river channel. Wildlife habitat in the river and along its banks has also been negatively impacted by channel degradation.

Some impacts from bed degradation are well documented, such as the lowering of surface water levels at water intakes in Kansas City, Kansas. Others, such as the status of foundations of bridge abutments and piers, are less known. Another unknown is the rate of degradation. Observations from the Missouri River near Kansas City indicate that the rate of degradation is accelerating.

Missouri River bed degradation in Kansas potentially impacts water intakes for drinking water suppliers and electric power plants, underground pipelines, bridge and channel structures, levees and bank stabilization structures, recreational boat ramps and habitat for fish and wildlife including those federally listed as threatened or endangered. Old bridge piers previously removed to a certain level to guard against navigation obstructions are being exposed.

Description

The Missouri River System

The Missouri River has been heavily modified from pre-settlement conditions. Starting in 1930, the Kansas City District of the U.S. Army Corps of Engineers (Corps) has placed rock fill (revetments) on the bank of nearly every outer bend of the Missouri River.⁽³⁾

The Corps operates a system of six reservoirs on the Missouri River main stem controlling runoff from approximately half the basin. Together, they comprise the largest system of reservoirs in the United States. The upper three reservoirs, Fort Peck in Montana, Garrison in North Dakota, and Oahe in both North and South Dakota are the Corps’ three largest reservoirs. Their water storage at normal pool represents more than 50 times the combined storage of Tuttle Creek, Milford and Perry

lakes in the Kansas River basin.⁽⁵⁾ The reservoir system also provides flood control and navigation benefits to Kansas.

The Missouri River is a significant source of water supply to the Kansas City metropolitan area and other communities of northeast Kansas along the river and beyond (including water for cooling at power generation facilities).

In addition to reservoirs, the Missouri River navigation channel is maintained by a complex series of dikes and revetments. These structures concentrate the flow of the river to maintain a channel depth sufficient for commercial barge traffic. The Missouri River flood plain also contains a system of levees and dikes to contain flood flows.

With the construction of reservoirs and bank stabilization structures in the 1960s, sediment concentrations in the Missouri River have decreased by approximately 80%.⁽³⁾ Along the Kansas reach of the river, there are major stream gaging stations at Leavenworth, Kansas and at St. Joseph and Kansas City in Missouri. During several years of drought through 2007, these gages have recorded all-time low river levels each year.⁽³⁾

The Missouri River is exhibiting a significant bed degradation trend as illustrated on Figure 1. The most severe degradation is in the Kansas City reach between river miles 340 and 400⁽¹⁾, but is also occurring at other locations. Degradation on the Missouri is considered to be causing the lower Kansas River to degrade as well (see [Kansas River Bed Degradation](#)).

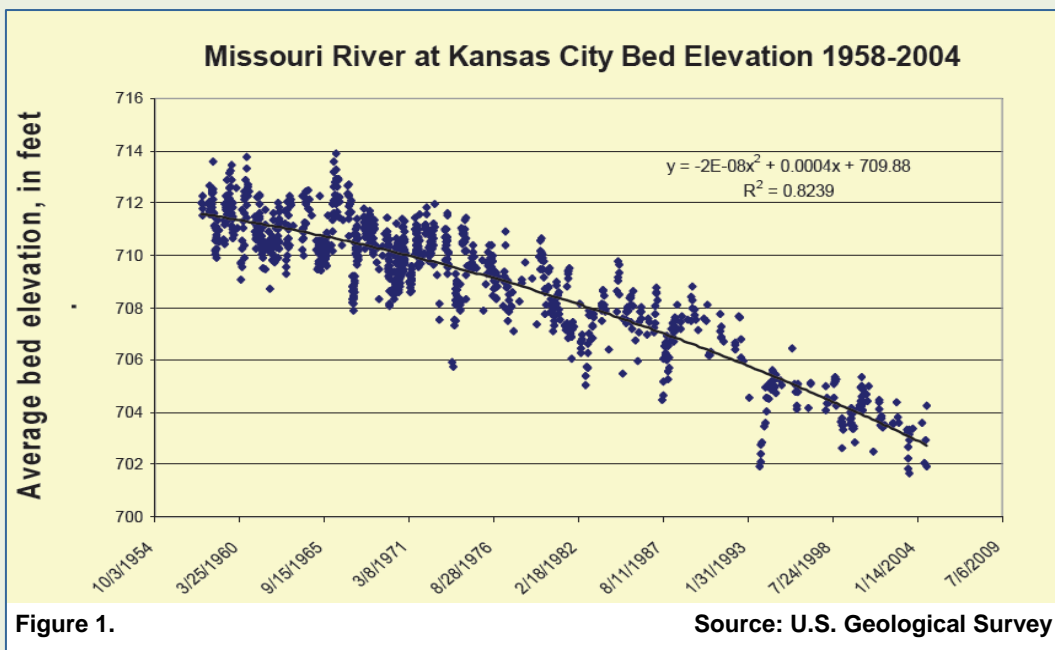


Figure 1.

Source: U.S. Geological Survey

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Corps of Engineers Actions

On August 20, 2007, the Corps issued a joint decision regarding commercial dredging operations in the Missouri River. The decision stated that due to increasing bed degradation throughout the river reach between St. Louis and Rulo, Nebraska, there would be no authorizations for dredging after December 31, 2009, without completion of an Environmental Impact Statement as required by the National Environmental Policy Act (NEPA).⁽¹⁾

The Corps has received funding to conduct a reconnaissance study to determine federal interest in Missouri River bed degradation. The purpose of the study is to gather existing data and assess the need for additional data, develop a plan for modeling requirements and conduct preliminary geomorphology and sediment modeling. The Corps study will begin with the formation of a focused team of national experts and agencies such as U.S. Geological Survey. Together they will coordinate with river stakeholders to develop a coalition of sponsoring partners for the next phase of detailed investigations and design of any corrective action.

Known Impacts

In their proposal for the reconnaissance study, the Corps estimates the regional financial impact of Missouri River bed degradation as follows: Intake low-water costs from 2000 to 2004: \$18,773,321; intake costs for actively planned projects in the near future: \$63,159,120; low water future infrastructure: \$286,075,000; federal levee upgrades: \$250 million.⁽¹⁾

The Wyandotte County Board of Public Utilities has detailed costs of retrofitting two electrical generating stations due to lowering of the water surface elevation on the Missouri.⁽³⁾ While considered to be related to bed degradation, reduced flow due to drought in the upper [Missouri basin](#) and other factors also may contribute to the decrease in surface elevation.

The Nearman Creek Power Station is a 235 megawatt base load unit located at river mile 378.4. From 1999 to 2006, the surface water elevation had an average reduction of 15 feet. The intakes were designed for a river level of 735.5 above mean sea level. At elevation 725.5, cavitation begins, adding air and causing pumps to lose efficiency. Temporary pumps have been employed to lift water from elevations as low as 721 feet.



Nearman Creek Power Station

These changes required the construction of a new cooling tower at the Nearman Station at a cost of \$20 million and \$1.2 million for emergency pumps.

The Quindaro Station, a 78 megawatt power plant at river mile 373.3, required installation of emergency pumps at a cost of \$1,400,000. Total impact of water level declines due to bed degradation to date with capital, operation and maintenance and purchased power is estimated by the Wyandotte County Board of Public Utilities to exceed \$35 million.

The Kansas City (MO) Water Service has monitored historic bed degradation at their primary water treatment intake. Between 1930 and 1950, they recorded approximately 1.5 feet of degradation of the Missouri River bed. In 1951, they constructed a new intake. Between 1950 and 1970, there were two additional feet of degradation. Between 1970 and 1990, there were 2.5 additional feet of degradation with an additional five feet of degradation between 1990 and 2005. These changes have required the use of auxiliary pumps which are subject to ice damage.

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Recommended Actions

1. Investigate the application in Kansas of infrastructure modifications from other states with similar conditions.
2. Monitor impacts to riparian habitats and species related to degradation.
3. Conduct an inventory of bridges, pipelines and other channel infrastructure considered to be susceptible to bed degradation.
4. Monitor and assist with the U.S. Army Corps of Engineers reconnaissance study of bed degradation on the Missouri.
5. Track the cost of past and ongoing repair for retrofit of water intakes (power and water supply) required due to bed degradation.

Resources

1. U.S. Army Corps of Engineers, Kansas City District. 2007. *Missouri River Degradation: Kansas and Missouri, Proposal under General Investigations, Section 216 of the Flood Control Act of 1970.*
2. U.S. Army Corps of Engineers, Kansas City District. 2007. News Release: *Missouri River Commercial Dredging Permits.*
3. Mid America Regional Council. March 2007. River Degradation meeting notes and presentations, North Kansas City, Missouri.
4. Kansas Water Office. January 2005. *Kansas Water Plan Concept Paper: Channel Degradation in the Kansas River.*
5. U.S. Army Corps of Engineers, Northwestern Division. Revised March 2006. *Master Water Control Manual: Missouri River Basin.*