MISSOURI RIVER

Master Water Control Manual Review and Update Study

FACT SHEET

Sedimentation, Erosion, and Ice Processes

This Fact Sheet provides a brief overview of a specific topic important to the Master Water Control Manual Review and Update Study process. Information contained in this Fact Sheet is summarized from technical reports and the preliminary Revised Draft Environmental Impact Statement.

Summary

The physical features of the reservoirs and river reach shorelines and bottoms cause them to be highly erodible. Differences in releases from the lakes could potentially impact the downstream river bed and bankline erosion and ice processes. A 1995 study using 50 years of data found that the potential sediment erosion and deposition changes due to flow releases would not significantly affect channel or lake features. Ice processes are not expected to vary from the CWCP under any of the alternatives, because all plans have the same minimum winter flow downstream from Gavins Point Dam. None of the alternatives is expected to cause significant changes in current sedimentation, erosion, and ice processes.

Sedimentation and Erosion

Existing Conditions

All six of the mainstem reservoirs are located in the Great Plains portion of the Missouri River basin, where slopes are generally gentle. The origin of surface material is a mixture of glacial deposition, river sediments, and wind-blown sediment. Soils are a mixture of clay, silt, sands, and gravels. Bedrock is generally composed of shales and sandstones. Because of these soil features, shorelines and bottoms of reservoirs and river reaches are highly erodible from water action of waves, currents, and ice breakup and freezeup.

Mainstem Reservoir System operations have the potential to impact sedimentation and erosion processes. Differences in releases from the lakes impact the erosion and ice processes on downstream river beds and banks.

> None of the alternatives is expected to cause significant changes in current sedimentation and erosion processes.

If erosion occurs at one location, deposition must occur in another reach. Although normal releases can cause erosion, high water volumes such as those experienced in 1997 have a much greater effect.

In response to public comment, the U.S. Army Corps of Engineers (Corps) initiated a study in 1995 of the potential effects of releases on erosion and sedimentation. This study examined data the Corps has gathered over the past 50 years on erosion and sedimentation in four reaches (downstream from Fort Peck, Garrison, Fort Randall, and Gavins Point dams). The study considered erosion of river channels, sediment deposition in lakes, and erosion of lake shorelines.

Comparison of the Alternatives

The study found no relationship between the Mainstem Reservoir System operation and the effect of sediment erosion and deposition on river channel and lake features. Based on the study conclusions, the effects of the alternatives on sediment erosion and deposition processes were not explored further.

Ice Processes

Existing Conditions

Understanding river ice formation is important primarily because it may increase the likelihood of floods. Ice reduces the channel's water-carrying capacity and backs water upstream of ice bridges. In winter, river flows below the dams may impact the formation and breakup of ice on the river. The formation of river ice also reduces flow downstream, potentially affecting downstream resources dependent on river flow (e.g., water supply intakes). Although river ice is more prevalent in the northern portion of the river, it is also a factor in the Lower River. Mainstem dam releases in winter are adjusted to take into account ice conditions.

Ice does not hinder river flow significantly as long as the ice is in motion. However, when ice begins to bridge or collect along the riverbank, the ice cover makes a portion of the channel unavailable for flow, adds roughness to the channel, and can also cause stage increases with potential for flooding. These factors hinder flow of the river and temporarily reduce downstream flow rates.

For these reasons, minimum releases from Gavins Point Dam are slightly higher during the winter (an average release of 12 thousand cubic feet per second (kcfs) compared to 9 kcfs during other seasons) to adequately serve water supply intakes downstream.

None of the alternatives would significantly affect ice processes.

The Corps operates the Mainstem Reservoir System releases in winter to minimize problems with ice; however, in extreme conditions problems cannot be averted.

Comparison of the Alternatives

All of the alternatives have the same minimum winter flow downstream from Gavins Point Dam and, therefore, variation of the ice processes from that of the CWCP is not expected. Low flows on the Mississippi River are more likely to occur in winter months. Under alternative M66, higher releases in the winter months are more likely to be required. Restrictions on releases in some years due to an ice-covered channel may limit the effectiveness of this alternative.