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Missouri River Recovery Program: Flood Risk Management

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One of the U.S. Army Corps of Engineers’ main responsibilities in managing the Missouri River is protecting property from flood damage. Historically, the dynamic river changed course during the spring and summer months, flooding some areas and eroding banks in other areas. Today, approximately 1.4 million acres of farmland and nearly $18 billion dollars of residential and other property are subject to flooding along the Missouri River. Agricultural lands, residential areas, business districts and navigation benefit from flood risk management measures provided by the Corps through the system of reservoirs on the Missouri River.

Managing Flood Waters

The six reservoirs along the Missouri River store 73.1 million acre-feet (MAF) of water, and the storage system is divided into four unique storage zones. The top two zones, containing 16.4 MAF of storage capacity, are devoted to flood damage reduction.

Every year there are two primary high-risk flood seasons. The first is from late February through April, when snowmelt from the plains and rain run into the river. The second is from May through July, when snow melts from the mountains and more rain falls. Ideally, runoff during the spring and summer high-risk seasons is captured in the annual and exclusive flood control zones. The stored water is then metered out slowly from July through December, so the reservoir system will be prepared to capture the following year’s runoff. A much smaller amount of water is released from January through February because the downstream channel is often covered with ice and the potential risk from ice jam or river ice affected flooding is higher.

The reservoir system is regulated so that the water collected from the previous year in the designated flood storage zones is released by March 1. This helps prepare the reservoir system for the next high-risk flood season. During extended periods of drought, the reservoirs may not fill into the annual flood control zones. Additional flood protection is provided by low reservoir levels, although this is not a desired method of reservoir regulation.

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Managing for Many Purposes

Regulating the reservoir system for flood risk management purposes must also take into consideration the other uses of the river, such as the protection of native species, navigation and production of hydropower. The Missouri River Master Water Control Manual (Master Manual) is the guide used by Corps to regulate the system of six dams on the Missouri River. The Water Control Plan laid out in the Master Manual was developed to meet the contemporary needs of the basin, fulfill the Corps’ responsibilities to American Indian Tribes and comply with environmental laws, such as the Endangered Species Act. As stewards of both the river and the dams, the Corps’ challenge has been to develop a water management plan that balances all the needs of the river.

To reduce the risk for downstream flooding, the Corps’ Northwestern Division, Missouri River Basin Water Management staff prepare a 14-day Missouri River forecast each day using actual streamflow and rainfall measurements and, if appropriate, forecast rainfall. By closely monitoring current and forecasted river conditions and utilizing the flood control flow targets at Sioux City, Omaha, Nebraska City and Kansas City provided in the Master Manual, the Corps minimizes the risk that reservoir releases will exceed downstream channel capacity. The flood control flow targets provide a downstream buffer within the river channel to allow for unforecasted precipitation and forecasting errors. To date, the management of the Missouri River Mainstem Reservoir System has prevented nearly $38 billion of flood damage.