

# Tributary Reservoir Regulation Activities

# 2013 Annual Report

(October 2012 – September 2013)



Bear Creek Reservoir near its peak elevation of 5607.8 ft, almost 50 ft into the Flood Control Zone, photo taken September 23, 2013



High inflows at Bear Creek Dam impacted recreation, photo taken September 23, 2013

Water Control and Water Quality Section  
Hydrologic Engineering Branch  
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Omaha District  
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of Engineers ®

In Wyoming, the Bighorn River channel capacity below Boysen Reservoir has not been tested in recent years. 12,000 cfs releases were made in 1991 with no known damages. Releases have not exceeded 7200 cfs over the past 15 years. It is assumed channel capacity is near 10,000 cfs. The channel capacity downstream of Glendo Reservoir on the North Platte River has been improved after the 2010 and 2011 events when high flows were seen on the river from Glendo Reservoir to Lewellen, NE. During those events, the channel could not contain much above 7000 cfs without overbank flooding along the river.

In Colorado, the reservoir design routings for Chatfield, Bear Creek, and Cherry Creek Reservoirs were made independently of each other. Each Water Control plan sets a target flow of 5000 cfs at the South Platte River at Denver streamgauge, but the individual routings did not account for releases from the other two dams or for incremental runoff below the dams. This constraint impacts the regulation of the Tri-Lakes reservoir system. **Cherry Creek Dam is considered hydrologically deficient because it cannot safely pass the Probable Maximum Flood. A Dam Safety Modification Study is underway at Cherry Creek to determine the best long term repair option. More details on that study are contained below in paragraph e.** A storage reallocation study at Chatfield Dam is expected to be submitted to HQUSACE for approval in FY 2014 recommending that 20,600 ac-ft of flood control storage be reallocated for joint use flood control and water supply. The impacts of reallocation on flood control benefits included evaluation of impacts on the storage, system evacuation and downstream channel capacity of the three-reservoir system downstream to Julesburg, Colorado were evaluated. No significant impacts on flood control benefits were indicated by the evaluation.

In North Dakota, on the James River below Pipestem and Jamestown Reservoirs the channel has some additional capacity due to high flows that have scoured the channel in 2009, 2010, and 2011. In 2009, emergency levees were designed and built by the Corps of Engineers to pass a 4000 cfs combined release in the event this release was needed to safely evacuate the flood storage. Only 3200 cfs was released from the reservoirs because of problems associated with high river stages and city infrastructure. The emergency levees were removed after the flood event. In 2010, the high end runoff forecast was not realized and the maximum combined release was 1800 cfs. In 2011, initially a combined release of 1800 cfs was made necessitating some sandbag levees installed by the city of Jamestown. Because of several late summer rainfall events, combined releases were increased to 2400 cfs, and additional sandbag levees were installed by the city of Jamestown. These levees were removed after the flood event. A flood damage reduction feasibility study was begun in 2012 for the James River in North Dakota.

In South Dakota, the channel downstream of Cold Brook Dam had been filled due to residential construction, but a restoration project on Corps of Engineers property and within city of Hot Springs has increased the channel capacity to 1500 cfs through most of the impacted reach. Fall River County still needs to clear rocks and sloughing and enlarge driveway culverts in their portion of the channel. On Rapid Creek downstream

from Pactola Dam, complaints are received when routine flood control releases of around 500 cfs are made from the reservoir. The James River in South Dakota has large agricultural impacts with high James River flows especially in the Aberdeen area.

**c. Releases for Purposes other than Authorized Project Functions.** No releases were made for purposes other than authorized project functions.

**d. Potential Hazardous Conditions.** A potential problem exists if water is released through project spillways where the land downstream of the project has been developed into urban areas. A hazard-to-life condition exists if a significant flow of water is discharged through the spillways at these projects.

**e. Dam Safety Issues.** There is also a hazard-to-life condition if a flood event occurs that causes overtopping of the dam embankment. Dams located above populated areas are normally designed to safely pass a Probable Maximum Flood (PMF) without overtopping the embankment. The PMF is estimated using probable maximum precipitation (PMP) estimates developed by the National Weather Service. Recent studies indicate that nine Corps of Engineers and nine Bureau of Reclamation tributary reservoirs cannot safely pass the PMF without being overtopped. Following is information on each of these projects along with the status of potential corrective actions.

**i. Corps of Engineers Dams.** Corps dams are being screened and assigned a safety classification rating. This Dam Safety Action Classification (DSAC) system classifies dams into five classes with class I having the highest priority for attention and class V the lowest priority. Part of the screening process for Corps dams with a DSAC rating of I, II or III is to identify interim measures to reduce safety risks while long-term solutions are being pursued. These measures are called Interim Risk Reduction Measures (IRRM) and could be structural or non-structural.

**(1) Cherry Creek Dam.** Corps of Engineers design guidance for dams located above populated areas states they should store and pass the Probable Maximum Flood (PMF) without overtopping the embankment. The most recent precipitation estimate prepared by the National Weather Service for this area indicates that the reservoir could safely pass no more than 66% of the PMF under existing development with a freeboard allowance of 5.0 ft, and can contain 77% of the PMF at the existing minimum top of dam elevation of 5644.4 ft LPD. Cherry Creek Dam has received a Dam Safety Action Classification (DSAC) II rating because of the amount of development below the dam and the PMF studies that have identified a potential for an extreme precipitation event that could fill the reservoir and possibly overtop the dam. Interim Risk Reduction Measures (IRRM) were developed in response to the DSAC rating. Some of the interim measures being implemented for Cherry Creek Dam are an improved flood warning system, updating response procedures with emergency managers, evaluating the capacities of the downstream channel and emergency spillway, as well as evaluating the vulnerability to seepage and earthquakes. The IRRM Plan has undergone an Agency Technical Review (ATR) and the comments are being addressed. The