GAO Highlights

Highlights of GAO-14-741, a report to congressional requesters

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MISSOURI RIVER FLOOD AND DROUGHT

Experts Agree the Corps Took Appropriate Action, Given the Circumstances, but Should Examine New Forecasting Techniques

Why GAO Did This Study

The Missouri River stretches from western Montana to St. Louis, Missouri. The Corps manages six dams and reservoirs on the river to provide flood control and for other purposes, such as recreation and navigation. The Corps bases reservoir release decisions on the guidance in the Master Manual. In the 2011 flood, the Corps managed the highest runoff volume since 1898, resulting in record reservoir releases. Subsequently, drought occurred in the basin in 2012 and 2013.

GAO was asked to review the Corps' release decisions and communication during the flood and drought. This report examines (1) experts' views on the Corps' release decisions; (2) experts' recommendations to improve the Corps' release decisions; and (3) stakeholders' views on the Corps' communication, as well as any suggested improvements. GAO worked with the National Academy of Sciences to convene a meeting of nine experts to discuss the Corps' data, forecasts, and release decisions. GAO also interviewed 45 Missouri River basin stakeholders, including state and local agencies, among others, to discuss their views on the Corps' communication. The views of stakeholders are not generalizable.

What GAO Recommends

GAO recommends that the Corps evaluate the pros and cons of incorporating new forecasting techniques into its management of the Missouri River reservoirs. The Department of Defense concurred with the recommendation.

View GAO-14-741. For more information, contact Anne-Marie Fennell at (202) 512-3841 or fennella@gao.gov.

What GAO Found

Experts who participated in a GAO-sponsored meeting agreed that the U.S. Army Corps of Engineers (Corps) made appropriate release decisions during the 2011 flood and 2012 and 2013 drought affecting the Missouri River basin, given the severity of these events. These experts acknowledged that the flood was primarily due to extreme rain in eastern Montana in May and June 2011. The experts agreed that no existing forecasting tools could have accurately predicted these extreme rainstorms more than a week in advance. One of the experts also said that the Corps would have needed several months to release enough water from the reservoirs to have sufficient space for the runoff that occurred in 2011, and predicting an extreme runoff year that far in advance is beyond the current state of science. Moreover, the experts agreed that the Corps appropriately followed the drought conservation procedures in the Missouri River Mainstem Reservoir System Master Water Control Manual (Master Manual), which sets out policies for managing the river. The experts agreed that the Corps does not need to change the Master Manual in response to the 2011 flood or subsequent drought. However, some of the experts noted that if the Corps develops improved forecasting tools, it might be useful to evaluate whether changes to the Master Manual would help the Corps to act on information from the new tools.

The experts suggested that improving data systems and introducing new runoff forecasting techniques could improve the Corps' ability to make release decisions in less extreme events than the 2011 flood. These data systems—such as streamgages, weather radar, precipitation gauges, soil moisture monitoring, and monitoring for snow on the plains—are not managed by the Corps, but by other federal and state agencies, which creates challenges beyond the Corps' control. The experts agreed that probabilistic forecasting techniques—which correct for unknown initial conditions using statistical techniques and provide a range of potential outcomes and their likeliness—could help the Corps manage risks better than their current methods that create one forecast estimate. One of the experts said that probabilistic methods could provide greater benefits, such as higher water supply reliability, increased flood protection and hydropower production, and easier implementation of variable flows to create fish and wildlife habitats. Probabilistic techniques are currently used by New York City to support reservoir releases to manage flood risk and meet water quality goals without adding expensive new filtration equipment. Corps officials said that they have not considered using probabilistic techniques in the Missouri River basin because they are not sure the benefits would outweigh the difficulty of creating the models or explaining the new methods to their stakeholders.

During both the flood and drought, the Corps communicated with Missouri River stakeholders in a variety of ways, which most stakeholders GAO spoke with said were effective. Most stakeholders were generally satisfied with the Corps' communication, saying that the information they received from the Corps was timely and sufficient for their purposes. Most stakeholders had at least one suggestion on how the Corps could improve communication; however, there was little consensus on any one suggestion. A few stakeholders suggested that the Corps hold separate conference calls to discuss sensitive response-related issues. Corps officials said that they would consider this in the future.