

# RECLAMATION

*Managing Water in the West*

## Impacts from Operational Releases to Populations at Risk

### Research Summary

Research and Development Office  
Science and Technology Program  
Final Report ST-2014-1227-01



Pic: David Kapernick

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Research and Development Office  
Bureau of Reclamation  
U.S. Department of the Interior

October 2015

## **Mission Statements**

The U.S. Department of the Interior protects America's natural resources and heritage, honors our cultures and tribal communities, and supplies the energy to power our future.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188		
T1. REPORT DATE Oct 2015		T2. REPORT TYPE Research		T3. DATES COVERED	
T4. TITLE AND SUBTITLE Impacts from Operational Releases to Populations at Risk – Research Summary			5a. CONTRACT NUMBER 14XR0680A1-RY1541IR201411227		
			5b. GRANT NUMBER		
			5c. PROGRAM ELEMENT NUMBER 1541 (S&T)		
6. AUTHOR(S) Anastasia M Johnson <a href="mailto:amjohnson@usbr.gov">amjohnson@usbr.gov</a> 303-445-3277			5d. PROJECT NUMBER 1227		
			5e. TASK NUMBER		
			5f. WORK UNIT NUMBER 86-68260		
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Anastasia M Johnson, Bureau of Reclamation Technical Services Center, Denver Colorado			8. PERFORMING ORGANIZATION REPORT NUMBER		
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) Research and Development Office U.S. Department of the Interior, Bureau of Reclamation, PO Box 25007, Denver CO 80225-0007			10. SPONSOR/MONITOR'S ACRONYM(S) R&D: Research and Development Office BOR/USBR: Bureau of Reclamation DOI: Department of the Interior		
			11. SPONSOR/MONITOR'S REPORT NUMBER(S) ST-2014-1227-01		
12. DISTRIBUTION / AVAILABILITY STATEMENT Final report can be downloaded from Reclamation's website: <a href="https://www.usbr.gov/research/">https://www.usbr.gov/research/</a>					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT ( <i>Maximum 200 words</i> ) With the initial intent of estimating impacts (risk-based) to downstream populations during operational release events, data was assembled and analyzed from a variety of sources. These data sets were then the basis of discussion regarding the usefulness of such information, and the value to be gained by trying to assemble more accurate data. It was determined that refinement of the data set would take a significant amount of money and time, and the benefits would not be comparable to the expense. Rather, the most effective method to deal with operational releases and subsequent risks to the population is to continue utilizing the emergency exercise process, which has seen a great deal of improvement in the last several decades.					
15. SUBJECT TERMS Operational Releases, Population at Risk, Flooding, Risk, Emergency Management					
16. SECURITY CLASSIFICATION OF: U			17. LIMITATION OF ABSTRACT  U	18. NUMBER OF PAGES  8	19a. NAME OF RESPONSIBLE PERSON Anastasia M Johnson
a. REPORT U	b. ABSTRACT U	c. THIS PAGE U			19b. TELEPHONE NUMBER 303-445-3277





# Summary of Research

This document presents a brief summary of the research performed in FY14 by the Reclamation Technical Services Center to catalogue and better understand operational releases from Reclamation dams on populations downstream.

Dams present enormous benefits all over the world – controlling flood events, reducing flooding impacts as well as providing water supply and power benefits. However, flood plains downstream of many dams in the US (and throughout the world) have become increasingly populated since the initial construction of these dams. As a result of community growth and encroachment into these flood plains, the failure or mis-operation of these facilities may present risks to the downstream population greater than the original designers, engineers, planners and developers may have ever envisioned.

A significant challenge for the emergency preparedness program is to adequately prepare dam owners, operators, and emergency management officials not only for dam failure, but also large operational or uncontrolled releases in order to reduce the potential for life loss and economic consequences. The planned nature of operational releases allows a unique opportunity for coordination with downstream communities to enable organized responses to those releases should they occur.

This research effort was initiated with the thought that it might be possible to assemble available data in such a way that a “risk” value could be approximated for incidents involving operational releases from water storage facilities having the potential to impact downstream populations. Because risk is a well understood framework for understanding other types of events at dams, it was hoped that it would be similarly useful in the context of operational releases. A matrix of data containing dam outflow capability, known safe channel capacity values, and references to inundation maps was assembled. However, once the data collection process began, the larger challenges involved in the study became apparent. Potentially inaccurate or outdated safe channel capacity data points combined with inundation modeling that is primarily for either dam failure or PMF events comprised the bulk of the available information, and were insufficient to accomplish the original goal of the study.

Through discussion of the initial research intent versus what was likely to be more useful in the short term, as well as (much) more financially feasible, the research team came to the conclusion that the existing practices within the emergency preparedness process (planning, exercising, etc.) are already addressing the risks associated with operational releases, although those risks cannot be quantified directly as was originally anticipated.

Specifically, the emergency preparedness process involves direct interface with communities during exercise and response planning. In order to update the safe

channel capacity values for Reclamation facilities (many of which have likely not been updated since the time of construction), it is likely that interfacing informally with people who live in the downstream communities (specifically emergency response personnel) would be the most expedient approach. Through discussion with members of the community who have experienced local flooding in the past, an idea of true safe channel capacity can likely be estimated for many facilities. This discussion-based determination of approximate safe channel capacity within individual communities, paired with emergency response exercises, is perhaps the best way to address the unquantifiable risks.

The current emergency preparedness process involves exercise scenarios of relatively “likely” events, such as operational releases from a more frequent (i.e. smaller) flood event. This process has the advantage, unlike a calculation based on purely operational outflows, of including the effects of tributary flow. The contribution of tributaries to overall downstream flows can be dramatic and are very important to take into account during preparedness activities, but are outside of what a dam owner can accept responsibility for.

In this way, through discussion, collection of anecdotal information regarding safe channel capacity and the impact of both operational releases as well as tributary flow, functional emergency preparedness plans can be assembled to address the safety of those at risk during non-failure flood events. Although the original goal of a quantifiable risk estimate for these circumstances will not be possible to realize, what is truly important is that the risk is being addressed via effective emergency planning and preparedness activities.

# Data summary

## Data Sets that support the final report

N/A

## Share Drive folder name and path where data are stored

N/A

## Point of Contact name, email and phone

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## Short description of the data

(Types of information, principal locations collected, general time period of collection, predominant files types, unusual file types.)

## Keywords

Operational releases, safe channel capacity, emergency management, risk

## Approximate total size of all files (folder size)