



Boise River General Investigation Interim Feasibility Study

U.S. ARMY CORPS OF ENGINEERS

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BACKGROUND: The U.S. Army Corps of Engineers (Corps) has been authorized to conduct a general investigation of the lower Boise River to review various water resource problems, needs and opportunities. General investigation studies are typically conducted in two phases: (1) reconnaissance and (2) feasibility. The Corps completed reconnaissance studies in 1995 and 2001, both of which documented federal support for pursuit of a comprehensive feasibility study. Considerable interest was shown in the areas of flood risk reduction, aquatic and riparian habitat restoration, water quality and supply, and recreation safety.

Three federal dams upstream of the City of Boise are operated as a system by the Corps and the Bureau of Reclamation (Reclamation) to manage flood risk and provide irrigation. Although the reservoir system provides significant flood protection, reducing the one-percent natural discharge (commonly referred to as a 100-year flood) from 41,000 cubic feet per second (cfs) to 16,600 cfs, the system only provides flood protection for a three-percent chance event (approximately a 35-year recurrence interval). Boise River flood stage is 7,000 cfs as measured at the Glenwood Bridge. Significant development in the river corridor and population growth has resulted in renewed interest in flood risk management and water supply. Interest has also been expressed in environmental restoration, to include habitat preservation, aesthetics and recreation along the Boise River.

STUDY OVERVIEW: In May 2009, the Corps and the Idaho Water Resource Board (IWRB) entered into an agreement to initiate the first, or interim, phase of a two-phased feasibility study. The first (interim) phase of the feasibility study is aimed at providing technical information regarding surface water storage potential in the basin, with a focus on water storage upstream of Lucky Peak Dam, and reducing flood risk in the lower Boise River downstream of Lucky Peak Dam. Specifically, the interim feasibility phase study will (1) evaluate and document existing conditions on the Boise River, (2) evaluate and update information about current flood risk, (3) analyze surface water storage opportunities in the basin and (4) develop a path forward to complete the feasibility study.

The interim feasibility study focuses on water storage as one potential measure for addressing water supply and flood risk reduction planning objectives. The larger feasibility study requires evaluation of structural and non-structural alternatives to address identified water resource problems. The second phase of the feasibility study will focus on alternatives in addition to surface water storage and evaluate whether a combination of strategies is appropriate to resolve multiple water resource problems in the Boise River drainage. Planning objectives include:

- Reduce risk to public safety from flooding.
- Reduce flood damages.
- Provide additional water supply.
- Improve riparian and floodplain habitat quantity/quality.
- Improve water quality.
- Improve recreational opportunities and safety.

The Corps developed this two-phased feasibility study approach to assist IWRB with the Treasure Valley Comprehensive Aquifer Management Plan (CAMP), a planning effort initiated by IWRB to address future water supply and demand issues in the lower Boise River basin over the next 50 years. The Treasure Valley CAMP process includes a series of technical studies to characterize surface and groundwater resources. The surface water storage assessment conducted during this interim feasibility study is one of the technical studies associated with the Treasure Valley CAMP. Surface water storage is one of many strategies to meet future water demand that IWRB will consider during the Treasure Valley CAMP.

STUDY AUTHORITIES: The Corps' study authorization is provided by Section 414, Water Resources Development Act (WRDA) of 1999, authorizing a feasibility study for flood control on the Boise River; and Section 4038, WRDA 2007, modifying the 1999 authority to include ecosystem restoration and water supply as project purposes.

IWRB study authorization is provided by bills and memorials passed by the 2008 Idaho Legislature, including House Bills 428 and 644 which directed IWRB to conduct a statewide comprehensive aquifer planning and management effort (to include the Treasure Valley) and created an Aquifer Planning and Management Fund. The planning program requires performance of technical studies to evaluate ground and surface water resource management alternatives. House Joint Memorial 8 encouraged IWRB to initiate and complete a study of additional water storage in the state in coordination with other public and private entities.

CURRENT STATUS: The Corps began an inventory of existing resource conditions in the study area and identified water resource problems and issues that the feasibility study will address. The Corps updated a floodplain model and maps for a reach of the lower Boise River. An inventory of land uses and land values within the 500-year floodplain was begun. This information will be used to update information about flood risk and the economic impact of flooding.

From October 2009 through August 2010, the study team conducted a surface water storage screening analysis. The analysis is described in the August 2010 *Water Storage Screening Analysis* document, which can be downloaded from the Corps website (information below). The analysis and results are summarized below. Based on the screening analysis results, a short list of surface water storage sites was developed and forwarded to IWRB for further consideration and in-depth analysis. Engineering designs, cost estimates and hydrologic analysis will be completed for the selected sites as part of the interim feasibility study when additional federal funding becomes available.

WATER STORAGE SCREENING ANALYSIS: The surface water storage screening analysis used information contained in the Bureau of Reclamation *Boise/Payette Water Storage Assessment Report* (July 2006). The Reclamation study identified 12 sites worthy of further investigation. The Corps conducted a two-step screening evaluation. The first step involved narrowing the list of 12 sites to the six sites that best provided for future water demand and reduced flood risk downstream of Lucky Peak Dam. The second step compared and scored the remaining six sites for performance on six criteria, including future water demand, flood risk reduction, hydropower potential, a relative cost index, and social and environmental effects. The top scoring sites of the analysis will undergo a more in-depth evaluation later during the interim feasibility phase.

The Corps and IWRB conducted four public information meetings during June and July 2010 to provide an overview of the study and present the preliminary results of the water storage screening analysis. Written comment was requested on the June 2010 *Draft Water Storage Screening Analysis*. A total of 154 agencies, organizations or individuals submitted written comments during June and July 2010. A summary of the public comments can be found in the August 2010 *Public Information Meetings and Public Comment Summary* posted on the Corps website (information below).

The Corps and IWRB study team reviewed and considered public comments to finalize the water storage screening analysis. Revisions to the screening analysis included incorporating additional available information about social and environmental effects, revising criteria weighting factors, and revising conceptual technical information and associated cost indexes. The August 2010 *Water Storage Screening Analysis* document describes the screening criteria, the process used to score the surface water storage sites, and the analysis results. The table below summarizes the surface water storage screening results. Sites with high scores performed better or had less impact for a criterion. The highest scoring 'large' volume surface water storage site is a new dam constructed immediately downstream of the existing Arrowrock Dam. The concept evaluated involves a new 368-foot roller compacted concrete dam with the potential for 317,000 acre-feet (AF) of additional system storage. The highest scoring 'small' volume site is the Alexander Flats site. This concept proposed a new rockfill dam, approximately 271 feet high, with the potential to provide an additional 68,000 AF of system storage.

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Summary of Surface Water Storage Screening Concepts and Screening Analysis Weighted Scores.

Site	Height (ft)	Additional Storage ² Acre Feet (AF)*	Criteria Categories and Weighted Scores ^{3,4}						
			Future Water Demand	Flood Risk Reduction	Hydro Potential	Cost Index	Social Effects	Environ. Effects	Weighted Composite Score ⁵
Arrowrock–New Dam	368 ¹	317,000	6.3	7	1.8	4.4	3.2	3.3	25.9
Alexander Flats	271	68,000	3.0	3	1.2	4.4	5.4	4.1	21.1
Twin Springs	371	304,000	4.5	6	1.7	3.2	3.4	1.6	20.3
Barber Flats	181	58,000	2.5	2	0.7	5.6	4.8	4.3	19.9
Lucky Peak–Max. Raise	290 ¹	96,000	4.8	4	1.4	1.6	2.6	5.0	19.3
Dunnigan Creek	351	227,000	6.0	5	0.6	2.4	2.0	3.2	19.2
Lucky Peak–Min. Raise	264 ¹	12,000	1.0	1	1.0	0.8	6.6	6.6	17.0

1. Total structure height for proposed structures. Existing structure height for Arrowrock Dam is 257 ft, for Lucky Peak Dam, 254 ft.
2. Current system capacity is 983,000 AF which includes Arrowrock, Anderson Ranch and Lucky Peak reservoirs.
3. The higher the number, the better the site's performance for a criterion.
4. Weighted scores calculated using the weighting factors: Future Water Demand – 1.0, Flood Risk Reduction – 1.0, Hydropower Potential – 0.3, Cost Index – 0.8, Social Effects – 1.0, and Environmental Effects – 1.0.
5. Weighted composite score = sum of weighted scores for each criterion category. All values were rounded to the nearest tenth.
*One acre foot of water equals 325,851.429 U.S. gallons, or one-foot depth of water covering an acre-large area.

