Boise River Feasibility Study

U.S. ARMY CORPS OF ENGINEERS **BUILDING STRONG®**

The U.S. Army Corps of Engineers (Corps) and Idaho Water Resource Board (IWRB) are partnering on a feasibility study of the Boise River. The feasibility study will evaluate alternatives to reduce flood risk, and meet current and future water-supply needs in the lower Boise River watershed, from Lucky Peak Dam downstream to the confluence with the Snake River. The study will also seek to provide ancillary ecosystem-restoration benefits, while minimizing socioeconomic effects and impacts to sensitive species. A preliminary set of alternatives has been developed for public review. The Corps and IWRB are requesting public input regarding the scope of study alternatives and analyses to consider throughout the feasibility study process and preparation of an Environmental Impact Statement (EIS).

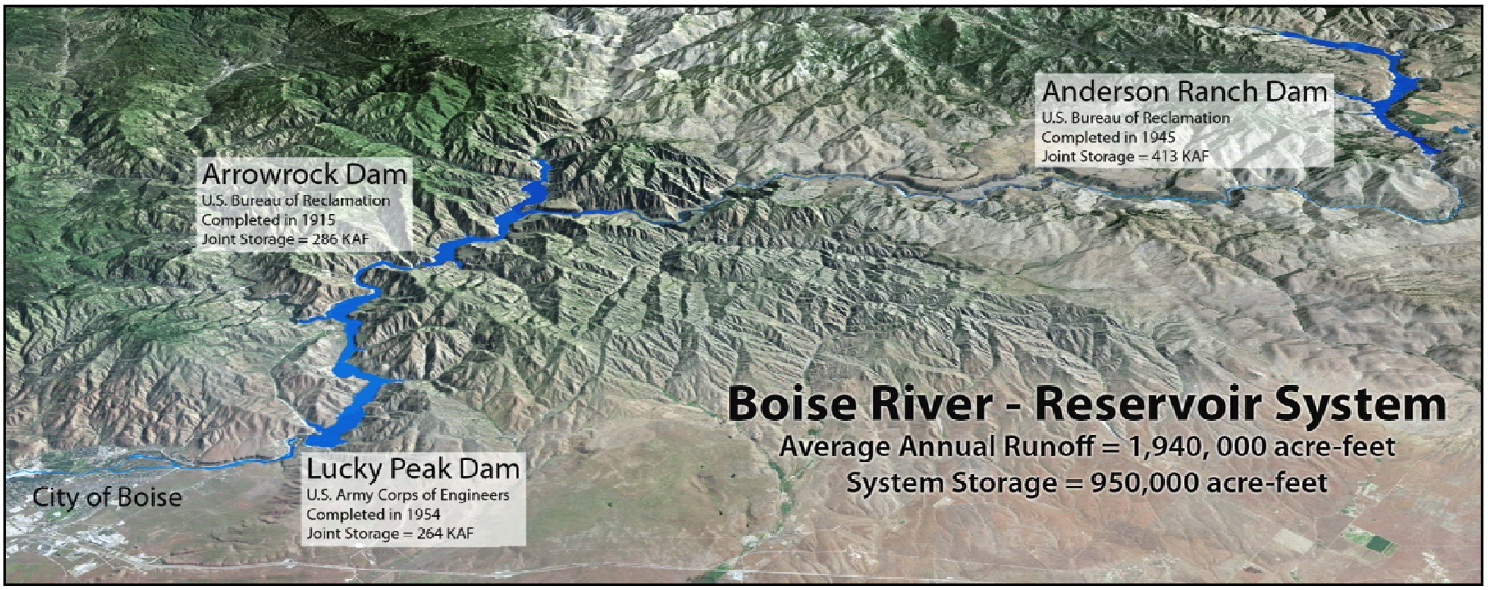
STUDY AUTHORITY – Study authorization is provided by Section 414, Water Resources Development Act (WRDA) of 1999, and Section 4038, WRDA 2007, which authorizes a feasibility study for a multiple purpose project in the Boise River watershed for flood-risk-reduction, water-supply and ecosystem-restoration purposes. Based on IWRB's interests in the study area and authorities associated with their funding, a decision was made to focus the development of alternatives on flood-risk reduction and water supply, while seeking ancillary environmental benefits where feasible.

STUDY BACKGROUND – In May 2009, the Corps and IWRB entered into an agreement to begin the feasibility study. In June and July 2010, the Corps and IWRB conducted public information meetings to present preliminary analyses and solicit feedback on water resources problems and alternatives the study should address. A summary of feedback received at that time is contained in *Public Information Meetings and Public Comment Summary* (September 2010), which is available on the study webpage.

Significant water-supply, flood-risk-reduction and other benefits are currently provided by the federal reservoir system comprised of Lucky Peak Dam and Lake, operated by the Corps; and Arrowrock Dam, Anderson Ranch Dam and Lake Lowell, operated by the U.S. Bureau of Reclamation (Reclamation). However, problems and opportunities related to flood risk and water supply still exist in the project area.

From October 2009 through August 2010, the study team evaluated opportunities to add surface water storage to the reservoir system that would provide additional flood-risk and water-supply benefits. This analysis is documented in *Water Storage Screening Analysis* (2010), which describes evaluation screening criteria and results and is available on the study webpage. The Arrowrock Dam site, constructed and operated by Reclamation, was the top-ranked water-storage and flood-risk-reduction site in the analysis.

At the request of IWRB, the Corps, in coordination with Reclamation engineers and geologists, conducted a preliminary analysis of the Arrowrock site in 2011. The analysis included field reconnaissance and a review of available data, including historical documents related to the planning and construction of Arrowrock Dam, geological records and maps. The



preliminary analysis concluded that, based on existing information, it is technically feasible to raise Arrowrock Dam or build a new dam downstream. The report, *Preliminary Analysis of the Arrowrock Site*, is available on the study webpage.

Since 2012, study efforts have focused on developing problems statements and study objectives, and identifying preliminary alternatives to meet study objectives and resolve identified problems.

PROBLEMS AND OPPORTUNITIES – There are numerous problems and opportunities related to the primary study purposes of water supply and flood risk.

Flood Risk - The Boise River floodplain is highly developed in many areas and, while the existing reservoir system provides some protection, residual flood risk still exists within the project area. Problems related to flood risk include:

- The existing system of reservoirs on the Boise River has insufficient capacity to capture the largest and most damaging flow events.
- The river corridor is constrained by development, reducing the natural function of the floodplain and placing property and infrastructure at risk.
- The ability of the channel to convey flood waters (channel capacity) is inadequate. Development along the river corridor exacerbates this issue. Some bridges across the Boise River may not be high enough to pass high flows, potentially leading to increased localized flooding.
- Gravel extraction pits, ponds, water diversion structures, canal systems and other features along the river extend flood risk beyond the mapped floodplain. If these structures fail, canals can carry flood waters into areas not otherwise subject to high river flows. If floodwaters move uncontrolled into gravel extraction pits and ponds, the potential for severe erosion and migration of the main river channel is increased, possibly introducing flooding into additional areas.

Water Supply - Existing water supplies are currently limited in some areas of the valley, and the need for additional water is expected to increase in the future. The study area consists of a complex water system comprised of interconnected ground and surface water. Most surface water originates as snow in the higher elevations of the upper Boise River Basin. The aquifer system generally has direct hydraulic communication with the Boise River and, to a lesser extent, the Snake River. Applied surface water seepage provides significant recharge to the aquifer system, while return flows from the aquifer contribute to natural flows in the river. Stored surface water, natural flows and ground water are reused in multiple locations across the valley, via a network of natural and manmade drains and direct discharge to the river. While an average of 1 million acre-feet of water is estimated to flow out of the basin annually, it is often used multiple times before reaching the Snake River. Problems related to water supply include:

- The study area has experienced rapid population growth (approximately 2.8 percent annual growth) over the last 50 years and is projected to grow from a population of 600,000 to 1,600,000 (approximately 2.0 percent annual growth) over the next 50 years. Based on projected future development patterns, management of interconnected sources and administrative obligations, an estimated range of between 82,000 and 170,000 additional acre-feet of water demand is expected over the next 50 years.

- Future water needs cannot be sustainably met solely with ground water without impacting the stability of the aquifer. This will result in an increased use of surface water to meet existing and future water-supply needs.

- Upstream of Star Bridge, surface water is considered to be fully appropriated during much of the year, and the shallow ground water is considered to be tributary to the surface water system. As a result, a moratorium currently restricts the development of new shallow ground water and new surface water uses upstream of Star Bridge. New surface water uses are prohibited unless a formal plan to mitigate the new use is submitted and approved.

- Storage water is not available to all areas of the watershed due to access or timing constraints. These areas must rely on ground water. However, because groundwater moratoriums or groundwater management areas in the watershed either prohibit or restrict new groundwater development, surface water is necessary to meet additional demands.

- Recent completion of water rights adjudication may result in the administration of existing junior groundwater uses not previously regulated, potentially resulting in the curtailment of many existing groundwater uses.

As part of the estimate of future water demand for the study area, the study will forecast potential management measures that are practicable and likely to occur in the future. The net reduction in water usage from anticipated conservation and other measures will be considered in the overall estimate of future water demand. Numerous opportunities exist in the project area to reduce the frequency and damage associated with flooding events, as well as meet current and future water demand.

An overview of preliminary measures and alternatives is discussed in the following section.

PRELIMINARY MEASURES AND ALTERNATIVES – The study team reviewed public input and previous studies to identify potential measures that could be combined to develop a preliminary set of alternatives that address identified flood-risk and water-supply problems. The table below summarizes these alternatives. An "X" in the row beside a measure indicates that this measure is included within the alternative.

PRELIMINARY MEASURES	PRELIMINARY ALTERNATIVES				
	A	B	C	D	No Action
Arrowrock Dam Raise	X		X	X	
Managed Aquifer Recharge		X			
Upgrade Irrigation Headgates	X	X	X		
Replace Push-up Dams	X	X			
Upgrade Bridges	X				
Controlled Flooding of Pits/Ponds	X				
Temporary Conveyance of Water in Floodplain	X	X	X		
Flow Split Structure	X				
Non-structural Measures	X	X			

The following is a general description of the measures comprising each preliminary alternative:

Arrowrock Dam Raise - Raising Arrowrock Dam was previously identified as the top-ranked storage option for both flood-risk management and water supply. A range of potential dam raise heights is possible, with a currently estimated maximum raise of 74 feet. The maximum raise would provide an estimated 320,000 acre-feet of storage for flood-risk management, and current and future water demand.

Managed Aquifer Recharge - This measure involves a deliberate strategy of recharge existing groundwater aquifers. The potential for gaining additional water supply through managed aquifer recharge, and additional flood-risk-management benefits associated with this measure, will be based on previous groundwater studies.

Upgrade Existing Irrigation Headgate Structures - Headgates control the diversion of water into irrigation canals and could be improved to reduce the risk of localized flooding. It is likely some headgates have greater potential flood-risk-management benefits than others.

Replace Push Up Dams with Inflatable Weirs - Push up dams assist the diversion of water into irrigation canals. Replacing specific dams with inflatable weirs that can be lowered during high water events is expected to have localized flood-risk-management benefits.

Replace or Upgrade Undersized Bridges - Some bridges in the project area have potential to cause localized flooding during high flow events and could be raised or replaced to reduce the risk of localized flooding.

Controlled Flooding of Gravel Pits and Ponds - This measure involves designing a controlled method of flooding ponds and pits with high potential for pit capture.

Temporary Conveyance of Water in Floodplain - In some areas, there are opportunities to re-grade parks or develop perched side-channels to reduce localized flooding. These measures also have the potential to provide some ancillary environmental benefits.

Flow-Split Structure at Eagle Island - Under some high water scenarios, a controlled split of flows into the north and south river channels around Eagle Island could be beneficial.

Non-Structural Measures - It may be cost-effective opportunities to provide "non-structural" flood protection (e.g., flood-proofing buildings, ring levees around critical infrastructure or raising structures in place) in certain areas to reduce the frequency of flooding.

Measures Common to All Alternatives - Certain measures will be included in all alternatives, such as water conservation measures with potential to reduce future water demand, floodplain management plans to help limit future floodplain development and altered system operations.

FEASIBILITY STUDY PROCESS – In order to evaluate the benefits, costs and environmental effects of possible solutions to flood risk and water supply in the project area, the study will first establish an anticipated future condition for the project area. This will include projected population growth, land-use changes, measures that may reduce flood risk without the project and measures that may decrease future water-supply demand (e.g., conservation).

The study "alternatives" will be compared against this future project condition, and economic costs will be compared against projected benefits of preventing future flood damages and providing additional water supply. These factors, along with

consideration of the environmental and socioeconomic impacts of various alternatives, will be used to select a proposed alternative that best meets study objectives.

The preferred alternative and supporting analysis will be circulated for public review as part of the draft feasibility study and EIS. After all comments have been addressed, a decision will be made regarding which alternative to move forward into a more advanced design phase. Once the design is complete for the selected alternative, a final feasibility study and environmental impact statement will be circulated for public review.

When comments from this final review have been received and addressed, a Record of Decision will be signed, indicating the selection of an alternative and completion of the feasibility study.

NATIONAL ENVIRONMENTAL POLICY ACT COMPLIANCE – The National Environmental Policy Act of 1969, as amended (NEPA), is a law requiring federal agencies to objectively evaluate a range of alternatives for any potential federal action. Alternatives must include a "No Action Alternative," which addresses the consequences of completing no federal action at the location. The NEPA process requires the agency to consider the environmental and social impacts of alternatives so that informed decisions are made with knowledge of potential environmental consequences. Federal agencies are required to prepare an EIS when a proposed major federal action could significantly affect the quality of the human environment.

During the Boise River Feasibility Study, the Corps will prepare an integrated feasibility study and EIS report. Through previous coordination and the collection of background information, the Corps is aware that impacts to the following must be addressed in the EIS, along with other issues:

- Bull Trout, a fish species listed under the Endangered Species Act
- Yellow Billed Cuckoo, a bird species proposed for listing under the Endangered Species Act
- Other sensitive species, including Bald Eagle and Blue Heron
- Sensitive habitats, including wetlands and big game winter range
- Fish habitat in the South Fork Boise River
- Recreation, including fishing and rafting on the South Fork Boise River
- Hydropower generation facilities at Arrowrock Dam
- Effects to cultural and historic resources

SCHEDULE – The anticipated schedule for completion of the feasibility study and EIS is contingent upon available federal funding.

May 2014 - Initiate Public Scoping and Development of integrated feasibility study/EIS
Fall 2015 - Circulate draft feasibility study/EIS for Public Comment
Summer 2017 - Circulate final feasibility study/EIS for Public Comment
Fall 2017 - Sign Record of Decision

PUBLIC INVOLVEMENT – Following publication of a Notice of Intent in the Federal Register, the scoping period of the study will extend for 30 days, currently estimated between April 24 and May 24, 2014. During the study scoping period, the public is encouraged to submit comments to the Corps regarding the scope of issues and alternatives to be addressed in the feasibility study.

Comments can be submitted via email, at BoiseGI@usace.army.mil; using traditional mail addressed to "U.S. Army Corps of Engineers, CENWW-PM-PD-PF, 201 North 3rd Avenue Walla Walla, WA 99362"; or delivered in person at scoping meetings.

Additional information about the study, including reports and analyses, can be obtained by visiting the Corps study website, www.nww.usace.army.mil/Missions/Projects/LowerBoiseRiverFeasibilityStudy.aspx, emailing BoiseGI@usace.army.mil; or by contacting Project Manager Tim Fleeger at 509-527-7247.

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