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RECLAMATION

**Boise River Basin Feasibility Study**

# **Specialist Report: Water Rights**

**Boise Project, Idaho**

**Interior Region 9: Columbia Pacific Northwest**



## **Mission Statements**

The Department of the Interior (DOI) conserves and manages the Nation's natural resources and cultural heritage for the benefit and enjoyment of the American people, provides scientific and other information about natural resources and natural hazards to address societal challenges and create opportunities for the American people, and honors the Nation's trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities to help them prosper.

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.



## Acronyms and Abbreviations

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Acronym or Abbreviation	Meaning
acre-feet/yr	acre-feet per year
CCE	Cat Creek Energy
cfs	cubic feet per second
EIS	Environmental Impact Statement
FRM	flood management risk
IDAPA	Idaho Administrative Procedure Act
IDWR	Idaho Department of Water Resources
Reclamation	Bureau of Reclamation



# Table of Contents

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<b>1. Introduction.....</b>	<b>1</b>
1.1 Regulatory Framework .....	2
<b>2. Affected Environment .....</b>	<b>4</b>
<b>3. Environmental Consequences.....</b>	<b>6</b>
3.1 Methods for Evaluating Impacts .....	6
3.1.1 Assumptions.....	6
3.2 Direct, Indirect, and Cumulative Impacts .....	8
3.2.1 Alternative A – No Action.....	8
3.2.2 Alternative B – Anderson Ranch Dam Six-Foot Raise .....	9
3.2.3 Alternative C – Anderson Ranch Dam Three-Foot Raise .....	14
3.2.4 Cumulative Impacts .....	16
3.2.5 Mitigation.....	17
<b>4. References.....</b>	<b>19</b>

## List of Tables

Table 1. Diversion rate and volume limits.....	7
Table 2. Water rights impact indicators and significance criteria .....	8
Table 3. Diversion rate and volume limits.....	10
Table 4. Anderson Ranch Reservoir contracted space holder shortfalls .....	11





# 1. Introduction

The Boise River Basin Feasibility Study is a feasibility study to evaluate increasing water storage opportunities within the Boise River basin by expanding Anderson Ranch Reservoir. The project is located at Anderson Ranch dam and reservoir, the farthest upstream of the three reservoirs within the Boise River system and located 28 miles northeast of the city of Mountain Home in Elmore County, Idaho. Anderson Ranch Dam is a zoned earth fill embankment structure that provides irrigation water, flood control, power generation, and recreation benefits. The reservoir also provides a permanent dead storage pool for silt control and the preservation and propagation of fish and wildlife. Anderson Ranch Dam is operated by the Bureau of Reclamation (Reclamation). Reclamation, in partnership with the Idaho Water Resource Board (IWRB), proposes to raise Anderson Ranch Dam. New water storage would provide the flexibility to capture additional water when available, for later delivery when and where it is needed to meet existing and future demands. The alternatives analyzed in this document include the No-Action Alternative (Alternative A), a 6-foot raise of Anderson Ranch Dam (Alternative B), and a 3-foot raise of Anderson Ranch Dam (Alternative C).

Alternative A provides a basis for comparison with the two action alternatives, Alternative B and Alternative C. Under Alternative A, current baseline conditions would continue, without increasing Anderson Ranch Dam height or constructing associated reservoir rim projects, access roads, or facilities. The expected project duration of Alternative B is approximately 51 months and Alternative C is 44 months. Reclamation would continue existing operations of Anderson Ranch Dam. Alternative B proposes to raise the dam by 6 feet from the present elevation of 4196 feet to 4202 feet to capture and store approximately 29,000 additional acre-feet of water. Alternative B would inundate an estimated 146 acres of additional land around the reservoir above the current full pool elevation of 4196 feet. Alternative C proposes to raise the dam by 3 feet to 4199 feet, allowing for the ability to capture and store approximately 14,400 additional acre-feet of water. Alternative C would inundate an estimated 73 acres of additional land around the reservoir above the current full pool elevation of 4196 feet.

Each of the two action alternatives, Alternative B and Alternative C, includes two separate, but similar, structural construction methods for the dam raise, downstream embankment raise, or mechanically stabilized earth wall raise. Otherwise, the only difference is the dam raise elevations of 6 feet for Alternative B and 3 feet for Alternative C. Project areas and construction durations for each method are nearly identical, except for a 200-foot difference in approach road length at the right abutment and an approximate 1-month difference in construction duration. The longer road length is within the dam footprint on previously disturbed ground. Because these differences are negligible, they are not differentiated within the analysis of each alternative. Alternative analysis assumes the longer road length and

construction duration, however, a final construction method will be chosen during later phases of engineering evaluation.

Chapter 1 and Chapter 2 of the Boise River Basin Feasibility Study Environmental Impact Statement (EIS) provide a detailed description of the proposed action, project's purpose and need, project area, and alternatives including design features applicable to the action alternatives. This specialist report supports the analysis of expected impacts on water rights as described in the EIS.

### **1.1 Regulatory Framework**

Regulatory framework in place for water rights at the Anderson Ranch Reservoir and Boise River Basin include the following.

- Prior appropriation doctrine as codified in Article XV of the Idaho Constitution (Cornell Law School, no date)
- Idaho Constitution Article XV, titled “Water Rights” and concerns public use of water
- Idaho Code Title 42, Irrigation and Drainage, Water Rights and Reclamation
- Idaho Code Title 46, Chapter 10 State Disaster Preparedness Act
- Idaho Administrative Procedure Act (IDAPA) 37.03.08 Water Appropriation Rules, IDAPA 37.03.11 Rules for Conjunctive Management of Surface and Groundwater Resources, Idaho Department of Water Resources.

#### **Prior Appropriation Doctrine**

Under the prior appropriation doctrine water rights are administered by a priority date. A water right under the law of the state of Idaho can be established only by appropriation. “The priority date is the date when the water right was established, and it determines who gets water when there is a shortage. If there is not enough water available to satisfy all of the water rights, then the oldest (or senior) water rights are satisfied first and so on (in order) until there is no water left. When there is not enough water to satisfy all the water rights, new (or junior) water rights holders do not get water” (Idaho Department of Water Resources [IDWR], 2019).

#### **Idaho Constitution Article XV and Idaho Code Title 42 Irrigation and Drainage, Water Rights and Reclamation**

The Idaho Constitution Article XV and Idaho Code Title 42 guarantees the right to appropriate the public waters of the state of Idaho, and protect the private property rights, which include water rights. A water right is the right to divert the public waters of the state of Idaho and put them to a beneficial use, in accordance with one’s priority date (IDWR, 2019).

**Idaho Code Title 46, Chapter 10 State Disaster Preparedness Act**

Idaho Code Title 46 outlines the policies and procedures in planning and preparing for disasters and emergencies resulting from natural or man-made cause, enemy attack, terrorism, sabotage or other hostile action; during which, water resources may be adversely affected (IDWR, 2019).

**IDAPA 37 Administrative Rules**

IDAPA 37 administrative rules include the procedural rules, comprehensive state water plan rules, water bank supply rules, adjudication rules, beneficial use examination rules, stream channel alteration rules, water appropriation rules, and water distribution rules (IDWR, 2019).

## 2. Affected Environment

Chapter 1 of the EIS describes the purpose and need and general location of the project area potentially affected by the alternatives that were evaluated under the Boise River Basin Feasibility Study. Chapter 2 of the EIS presents a description of the alternatives in detail. The project area for the evaluation of water rights for each of the action alternatives is presented below.

The primary project area relating to Alternative B and Alternative C refers to the general vicinity in and around Anderson Ranch Reservoir extending downstream to the extent of Arrowrock Dam, via the South Fork Boise River.

Idaho is a diverse state comprised of semiarid shrub- and grass-covered plains, irrigated agricultural valleys, volcanic plateaus, forested mountains, woodland- and shrubland-covered hills, glaciated peaks, lava fields, and wetlands. The state is divided into ecoregions that group areas of similar ecosystems by type, quality, and quantity.

A water right is established when a private right to the use of public waters is established through an appropriation by the state of Idaho. In Idaho, surface water is managed through the doctrine of prior appropriation, which determines who gets water when there is a shortage, where senior (older) water rights are satisfied first, followed by junior (newer) water rights. In the Boise River basin, competing demands include irrigation, domestic, aesthetic, commercial, municipal, industrial, mining, power, recreation, flood control, minimum flow targets, ecological flow releases, and ecological storage constraints. Thus, affected demands must be considered in the context of the Boise River system cumulatively.

The minimum target flow downstream of Anderson Ranch Dam is 300 cubic feet per second (cfs) during non-irrigation season, September 16 to March 31; and increases to 600 cfs during the higher demand irrigation season from April 1 to September 15. A constant elevation is typically maintained from the fall through the winter once the minimum flow has been set. This is altered when reservoir releases from Anderson Ranch, Arrowrock, and Lucky Peak dams are adjusted in the new year through early spring to meet the space requirements of the annual flood risk management (FRM) objectives based on forecasts (Appendix F).

Historic hydrologic data indicate that Anderson Dam discharge is often much higher than the 600 cfs minimum target flow during irrigation season due to FRM operations and range from 600 cfs to 1600 cfs when FRM operations have ended. Anderson Ranch Dam discharge is typically set near powerplant capacity to meet downstream irrigation demands, keep Arrowrock Reservoir above its minimum pool, and balance the upper and lower reservoir system. Flows in excess of powerplant capacity are seldom made during irrigation season unless needed for FRM operations or emergencies (Appendix F).

Now, the minimum flow targets cannot always be met, particularly in dry water years. Historic operational data also indicate that Anderson Ranch Dam discharge has often been

lower than 600 cfs before the end of irrigation season on September 16 when there is a concern that the water supply may not be adequate to maintain a release of 300 cfs to meet minimum target flow throughout the winter when the reservoir is near empty. Discharge has at times been higher than 300 cfs after irrigation season to meet downstream demands.

## 3. Environmental Consequences

### 3.1 Methods for Evaluating Impacts

The methods for assessing impacts on water rights from Alternative B and Alternative C include the following.

- **Data collection.** Collect cumulative and quantitative data on the proposed and existing water rights in the Boise River basin, as well as hydrologic technical documents that have been completed to evaluate potential impacts on water rights.
- **Evaluation and peer review.** Evaluate the Water Operations Technical Memorandum, Appendix F; 6-foot Dam Raise Engineering Summary, Appendix C; and the Boise Feasibility Study – Preliminary Hydrologic Evaluation Technical Memorandum (Reclamation, 2017) to determine the impact on water rights in the project area.
- **Water rights impact analysis.** Determine the impact on existing water rights in the Boise River basin.

#### 3.1.1 Assumptions

The following assumptions were considered to assess impacts on water rights from Alternative B and Alternative C.

- The geographic focus of the water rights impact analysis encompasses Anderson Ranch reservoir and dam and the downstream water resources that are affected by the project within the Boise River basin, which includes the South Fork Boise River subbasin and the Upper Boise River basin.
- Water rights in Idaho are defined through Idaho water law pursuant to the laws, regulations, and orders listed in the regulatory framework.
- The water rights impact analysis relies on available draft and final reports and studies such as the following.
  - Boise Feasibility Study – Preliminary Hydrologic Evaluation Technical Memorandum (Reclamation, 2017)
  - 6-foot Dam Raise Engineering Summary, Appendix C
  - Water Operations Technical Memorandum, Appendix F
  - Boise River Storage Feasibility Study – Land, Structure, Infrastructure, and Real Estate, Draft Report (Jacobs Engineering, 2019)
  - Information on existing water right appropriations available through the Idaho Department of Water Resources.
- The Boise River project Alternative B, Alternative C, Cat Creek Energy (CCE) project, and the South Fork Boise River Diversion Project will all be limited to storing water only when it would otherwise be released due to flood control. Further, project impacts and cumulative effects evaluation of past, present, and foreseeable

future projects in the basin were analyzed with priority data water rights modeling scenarios and assumptions utilized in the Water Operations Technical Memorandum (Appendix F). Due to the uncertainty during the analysis, around if and when these new water rights proposals for diversion from, and storage in, Anderson Ranch Reservoir, were being considered, the analysis considered three different diversion configurations of the potential new water rights which resulted in six possible scenarios of priority order. Potential new water rights for Alternative B and Alternative C, and both the South Fork Boise River Diversion Project and CCE storage project were evaluated using the associated maximum diversion rate and annual volume limit summarized in Table 1, and were assumed to only be in priority when:

- there is a minimum of 800 cfs below Anderson Ranch Dam,
- there is a minimum of 240 cfs below New York Canal June 16 through February 29,
- there is a minimum of 1,100 cfs below New York Canal March 1 through May 31,
- and the system is making releases for FRM.

**Table 1. Diversion rate and volume limits**

Entity	Diversion Rate Limit	Diversion Volume Limit
Anderson Ranch New Storage (63-34753)	No Limit	29,000 acre-feet
The South Fork Boise River Diversion Project (63-34348)	200 cfs 100 cfs	10,000 acre-feet No Limit
Cat Creek Energy (63-34652)	3,000 cfs	30,000 acre-feet*

\*consumptive use of water right. The initial CCE fill will divert up to 100,000 acre-feet at a rate of 9,996 cfs which was not considered in the modeling assessment because it is expected to be junior in priority to the Anderson Ranch Reservoir new storage indicators and significance criteria.

The proposed alternatives will, because of the dam restriction caused by construction, impact the ability to accrue storage pursuant to the existing Anderson Ranch Reservoir storage right, which will thereby impact contractors who have contracts with Reclamation for space in Anderson Ranch Reservoir.

There are approximately 27,460 active point of use water rights within the Boise River basin. These represent areas where water can be used from a live flow, either surface water or groundwater (springs, stream, or well) and put to beneficial use under a water right. Active existing water rights are expected to be senior to any new (junior) water right applied for in the basin according to the prior appropriation doctrine administered by priority date. Water use for these active rights includes aesthetic, commercial, cooling, diversion to storage, domestic, fire protection, fish habitat, fish propagation, ground water recharge, heating,

industrial, irrigation, mining, mitigation, municipal, power, recreation, stockwater, water quality improvement, and wildlife. Municipal water rights make up approximately 20 of these 27,460 active water rights and include the general service area of the place of use for organizations with water rights who qualify as municipalities or municipal providers under Idaho Code Title 42 and who have a municipal water right on file at the IDWR.

The storage in each of the three system reservoirs (Anderson Ranch, Arrowrock, and Lucky Peak) accrues water daily according to the reservoirs water right priority and the natural flow available at the point of diversion. Anderson Ranch Dam has an established priority date of December 9, 1940, by the United States acting through the Bureau of Reclamation. Aside from its secondary purpose of hydroelectric power generation at the Anderson Ranch Dam, the beneficial uses of the Anderson Ranch Reservoir include the storage and release of water for irrigation, industrial, and municipal purposes pursuant to contracts between Reclamation and various entities.

Water rights impact indicators and significant criteria are presented in Table 2.

**Table 2. Water rights impact indicators and significance criteria**

Impact Indicator	Significance Criteria
Disruption to existing priority Idaho water rights appropriations in the Boise River basin.	Construction activities and/or the resulting project result in individual alterations, disturbance, or shortage to the existing priority water rights appropriations. These priority water rights may be used for a variety of beneficial uses such as aesthetic, irrigation, domestic, municipal, industrial uses, etc. and are expected to be senior to the new water right of the storage space in accordance with the prior appropriation doctrine.
Reduction to reservoir contracted space volumes.	Construction activities and/or the resulting project results in shortfalls to the contracted space holders of the system reservoirs in effect reducing the owner's ability to obtain their full contracted water volume.

## 3.2 Direct, Indirect, and Cumulative Impacts

### 3.2.1 Alternative A – No Action

Under the No-Action Alternative, there would be no construction at the dam or related facilities, and current water-management operations would continue. This represents the baseline scenario of current system storage capacity, operations, and demand levels.

Even though there would be no change to the current system under the No-Action Alternative, water demands cannot always be met under the current system. Conditions—particularly in dry water years—may result in short- and long-term direct and indirect adverse impacts under the No-Action Alternative because system shortages may increase during dry water years and increasing climate variability. The 2060s climate change hydrologic conditions modeling completed under the Water Operations Technical



Memorandum, showed the potential for increased storage though the simulations assumed perfect forecasts and current operational objectives. The proposed Alternative B and Alternative C would equate to either a 7% or 3% increase in active capacity and a 3% or 1% increase in system active capacity of Anderson Ranch Reservoir, respectively, which would have long-term beneficial direct and indirect impacts because more supply of storage water may be available to support existing and future beneficial water appropriations in the Boise River basin.

### **3.2.2 Alternative B – Anderson Ranch Dam Six-Foot Raise**

The primary project area relating to Alternative B for water rights is the Anderson Ranch reservoir and dam, and the downstream water rights that are affected by the project within the Boise River basin during and after the construction phase of the proposed alternatives.

The action of Alternative B is a 6-foot raise of Anderson Ranch Dam. This raise will increase the storage capacity of Anderson Ranch Reservoir by approximately 29,000 acre-feet for an active capacity of approximately 442,074 acre-feet. The dam raise equates to a 7% increase in the active capacity of Anderson Ranch Reservoir and a 3% increase in system active capacity.

Anderson Dam Raise modeling was conducted and reported in the Water Operations Technical Memorandum. During the time of the study, it was noted that multiple proposals of new water rights for diversion from, and storage in, Anderson Ranch Reservoir were being considered. The uncertainty around these new proposals regarding when and if they would be implemented required the analysis of multiple scenarios. In accordance with the Idaho priority water rights accounting, the sequential priority of water right administration requires that the space for water delivered in the previous water year for “flow augmentation,” or water that is released from the basin to support ecosystems in the Columbia River, will accrue storage before any new junior storage or natural flow water rights established on the Boise River. Therefore, these accounts were modeled as filling before the new accounts or diversions to accurately model the anticipated operation of the system in real time.

Water availability and refill probability analysis used a version of the Boise Planning Model to estimate the amount of water available to the potential new water rights at or near Anderson Ranch Reservoir. The three potential new water rights considered in the analysis include the new Anderson Ranch storage achieved through Alternative B, the South Fork Boise River Diversion Project, and the CCE project. These three potential water rights were assumed to only be in priority when there is:

1. a minimum of 800 cfs below Anderson Ranch Dam,
2. there is a minimum of 240 cfs below New York Canal June 16 through February 29,
3. there is a minimum of 1,100 cfs below New York Canal March 1 through March 31,
4. and the system is making releases for FRM.

The three potential new water rights were evaluated using their associated maximum diversion rate and annual volume limit summarized in Table 3.

**Table 3. Diversion rate and volume limits**

Entity	Diversion Rate Limit	Diversion Volume Limit
Anderson Ranch New Storage (63-34753)	No Limit	29,000 acre-feet
South Fork Boise River Diversion Project Elmore County (63-34348)	200 cfs 100 cfs	10,000 acre-feet No Limit
Cat Creek Energy (63-34652)	3,000 cfs	30,000 acre-feet*

*\*consumptive use of water right. The initial CCE fill will divert up to 100,000 acre-feet at a rate of 9,996 cfs which was not considered in the modeling assessment*

The modeling analysis used both the full 50-year simulation period and a shorter 28-year period. The three different diversion configurations of the potential new accounts result in a total of six scenarios considered in the analysis with entities listed in the priority order in which they were modeled.

1. Anderson Six feet
2. South Fork Boise River Diversion Project > Anderson Six feet > Subordinated Cat Creek Energy
3. South Fork Boise River Diversion Project > Cat Creek Energy > Anderson Six feet
4. Anderson Three feet
5. South Fork Boise River Diversion Project > Anderson Three feet > Subordinated Cat Creek Energy
6. South Fork Boise River Diversion Project > Cat Creek Energy > Anderson Three feet

The model results suggest that the new storage account created by a 6-foot raise results in a refill probability ranging from 29% to 62% of years depending on the dam raise scenario and analysis period. The highest refill probability was associated with refilling Anderson Ranch Reservoir only scenario for the 50-year period, while the lowest refill probability was associated with the scenario where Anderson Ranch Reservoir fills last behind flow augmentation, the South Fork Boise River Diversion Project, and Cat Creek for the 28-year period (Appendix F).

Water availability in Anderson Ranch Reservoir will be affected by Alternative B during construction, which may impact reservoir contracted spaceholders, or storage water rights and cumulatively impact downstream demands. Construction activities associated with the dam raise will require drawdown of Anderson Ranch Reservoir to protect against flood events for a range of return intervals and potential coffer dam configurations. According to the Water Operations Technical Memorandum (Appendix F), the proposed construction schedules call for Anderson Ranch Reservoir to be drafted to the restricted pool elevation of 4174 feet or 4184 feet during the construction period. While it is anticipated that normal operations for downstream water supply will be sufficient to reduce the pool elevation below the designated restricted elevation for construction by the end of August 2022, summer operations may be adjusted to maintain required pool elevations. The Water Operations

Technical Memorandum (Appendix F) analyzed the most restrictive pool elevation of 4174 feet for the purposes of the EIS. Once installation of the coffer dam is complete, operations for FRM and water supply will continue as normal under the restricted pool elevation, resulting in deeper drafts of Anderson Ranch Reservoir than would have occurred without the pool elevation restriction. These deeper drafts will, however, be limited by the powerhead elevation of 4036 feet. As pool elevations in Anderson Ranch Reservoir approach this lower limit, operations may need to be adjusted to maintain pool elevations above 4036 feet while still meeting downstream targets including minimum flows in the South Fork Boise River and minimum pool elevation in Arrowrock Reservoir (Appendix F).

According to the Water Operations Technical Memorandum (Appendix F), the drawdown of Anderson Ranch Reservoir during the construction period could result in reduced fill to reservoir storage accounts, which would be dependent on runoff conditions. The 17 contracted spaceholders and one uncontracted spaceholder that may experience volume shortfalls are typically individual system canal owners/operators who hold the contracted storage space to supplement canal demands when there are natural flow shortages. The Water Operations Technical Memorandum focused on the maximum potential shortfall and assumed that the ability to fill downstream reservoirs would not be impacted by the restriction. Analyzing two different restriction elevations, the maximum volume of shortfall per year was calculated as the full-pool volume minus the restricted-pool volume, resulting in a shortfall of 55,074 acre-feet/yr for a 4184-foot restriction; and a shortfall of 96,074 acre-feet/yr for a 4174-foot restriction. The Water Operations Technical Memorandum assumed that this shortfall volume would be shared proportionally among current Anderson Ranch Reservoir contracted spaceholders, calculated as the total space contracted by each spaceholder multiplied by the total shortfall volume. The shortfall volumes for 17 contracted spaceholders, and one uncontracted space, range from approximately 0.80 acre-foot/yr to 16,292 acre-feet/yr for a 4184-foot restriction; and from approximately 1.4 acre-feet/yr to 28,420 acre-feet/yr for a 4174-foot restriction in Anderson Ranch Reservoir (Appendix F). Adapted from the Water Operations Technical Memorandum, Table 4 provides a summary of these contracted spaceholders, the amount of space contracted, percent of space contracted (excluding power head), and the potential maximum shortfall volumes under the two pool elevation restrictions.

**Table 4. Anderson Ranch Reservoir contracted spaceholder shortfalls**

<b>Contracted Spaceholder</b>	<b>Space Contracted (acre-feet)</b>	<b>Percent of Total Space (%)</b>	<b>Shortfall Volume for 4184-foot Restriction (acre-feet/year)</b>	<b>Shortfall Volume for 4174-foot Restriction (acre-feet/year)</b>
Ballentyne	367	0.09%	48.93	85.36
Big Bend Irrigation District	3,797	0.92%	506.24	883.12

<b>Contracted Spaceholder</b>	<b>Space Contracted (acre-feet)</b>	<b>Percent of Total Space (%)</b>	<b>Shortfall Volume for 4184-foot Restriction (acre-feet/year)</b>	<b>Shortfall Volume for 4174-foot Restriction (acre-feet/year)</b>
Boise-Kuna Irrigation District	109,538	26.52%	14,604.39	25,476.68
Nampa & Meridian Irrigation District	90,758	21.97%	12,100.51	21,108.77
New York Irrigation District	40,051	9.70%	5,339.89	9,315.18
Wilder Irrigation District	122,195	29.58%	16,291.92	28,420.48
Boise Valley	939	0.23%	125.19	218.40
Capitol View	449	0.11%	59.86	104.43
Farmers Union	5,593	1.35%	745.70	1,300.84
New Dry Creek	1,266	0.31%	168.79	294.45
Pioneer Ditch Company	2,123	0.51%	283.05	493.77
Pioneer Irrigation District	24,986	6.05%	3,331.31	5,811.32
Settlers Irrigation District	5,675	1.37%	756.63	1,319.91
South Boise Mutual Irrigation Company	531	0.13%	70.80	123.50
J.R. Simplot Co. & Micron Technology, Inc.	3,000	0.73%	399.98	697.75
Trinity Acquisitions, LLC	800	0.19%	106.66	186.07
United Water Idaho	1,000	0.24%	133.33	232.58
Uncontracted	6	0.00%	756.63	1,319.91

Contracted Spaceholder	Space Contracted (acre-feet)	Percent of Total Space (%)	Shortfall Volume for 4184-foot Restriction (acre-feet/year)	Shortfall Volume for 4174-foot Restriction (acre-feet/year)
<b>TOTAL</b>	<b>413,074</b>	<b>100%</b>	<b>55,074</b>	<b>96,074</b>

### Direct and Indirect Impacts: Short Term

Drawdown of Anderson Ranch Reservoir during the construction period of Alternative B may lead to adjusted operations and reduced fill to the reservoir storage accounts, resulting in estimated shortfall volumes to Anderson Ranch Reservoir contracted spaceholders totaling an estimated 55,074 acre-feet/yr to 96,074 acre-feet/yr depending on restricted-pool volume. The estimated shortfalls to contracted storage space may affect the contracted spaceholders' ability to use storage water from their accounts to meet downstream priority canal demands during natural flow shortages, resulting in a significant adverse impact on water rights by Alternative B for the duration of construction. Additionally, if normal flood control operations under the restricted pool elevation are not sufficient to meet downstream targets, Lucky Peak Reservoir and Arrowrock Reservoir may be drafted more deeply to provide additional flood space. Therefore, short-term significant adverse impacts from Alternative B due to Anderson Ranch Reservoir storage account shortfalls would occur during construction. However, these possible drafts from the downstream system reservoirs and volume shortfalls would cease with the conclusion of construction activities.

### Direct and Indirect Impacts: Long Term

Modeling suggests very little change to the baseline flow from implementation of the dam raise, which indicates that no changes to Anderson Ranch Reservoir operations would need to occur to continue meeting minimum downstream target flow. Further, the new storage area would be the most junior water right in the Boise River system, dependent on its priority with respect to the South Fork Boise River Diversion Project and CCE projects, only accruing water after all senior water right demands are satisfied; thus, upstream and downstream surface, ground, and storage water rights would not be impacted by Alternative B. The dams in the Boise River system operate in series and no significant changes to Anderson Ranch Dam operations are anticipated, so priority downstream and storage water rights would not be directly or indirectly, negatively impacted by the alternative in the long term. Alternative B will increase the capacity of Anderson Ranch Reservoir by approximately 29,000 acre-feet. This would have long-term positive direct and indirect impacts on water rights because more supply of storage water would be available to support existing and future beneficial water appropriations in the basin.

### Summary and Significance

For both Alternative B and Alternative C, the alternative would likely affect the ability to store and deliver water according to existing Anderson Ranch Reservoir contracts due to the

reservoir restriction to 4174 feet required for 42 months during construction. The restriction elevation and duration may be adjusted based on final design, potentially lessening impacts. This EIS evaluates the effects of this restriction on water deliveries. Reclamation and IWRB are developing approaches to address any associated impact to existing spaceholders, including rentals from the water bank or other pre-negotiated financial arrangements. Environmental compliance related to these approaches will be completed in the future if needed.

Short-term, direct and indirect, significant adverse impacts would occur to the contracted storage space during construction of Alternative B. Notably, these impacts would be to Anderson Ranch Reservoir contracted spaceholders due to volume shortfalls as a result of drawdown of Anderson Ranch Reservoir to meet restricted pool elevations during the construction period. Current estimated volume shortfalls were calculated based on analyzing two different restriction elevations, resulting in estimated shortfall volumes to each of 17 contracted spaceholders and one uncontracted space. The estimated shortfalls to storage water rights may affect the spaceholders' ability to use storage water from their accounts to meet downstream priority canal demands during natural flow shortages, resulting in direct significant adverse impacts to contracted storage space by Alternative B for the short-term duration of construction. Following construction, Anderson Ranch Dam operations would return to normal and the volume shortfalls would cease. Following construction of Alternative B, the reservoir would have an increased capacity of approximately 29,000 acre-feet, which would have long-term beneficial direct and indirect impacts as more supply of storage water may be available to support existing and future beneficial water appropriations in the Boise River basin.

#### **3.2.3 Alternative C – Anderson Ranch Dam Three-Foot Raise**

The primary project area relating to Alternative C for water rights is the same as Alternative B.

The action of Alternative C is a 3-foot raise of Anderson Ranch Dam. This raise will increase the storage capacity of Anderson Ranch Reservoir by approximately 14,400 acre-feet for an active capacity of approximately 427,474 acre-feet. The dam raise equates to a 3% increase in the active capacity of Anderson Ranch Reservoir and a 1% increase in system active capacity.

Water availability and refill probability modeling considered three potential new water rights which included the Anderson Ranch Storage achieved through Alternative C; the South Fork Boise River Diversion Project, and the CCE. Using the same approach, simulation periods and six scenarios detailed in Section 3.2.2, with the exception of using Alternative C instead of Alternative B, modeling suggests that the new storage account created by a 3-foot raise results in a refill probability ranging from 36% to 64% of years depending on the dam raise scenario and analysis period. The highest refill probability was associated with the refilling of Anderson Ranch Reservoir only scenario for the 50-year period, while the lowest refill probability was associated with the scenario where Anderson Ranch Reservoir fills last

behind flow augmentation, the South Fork Boise River Diversion Project, and Cat Creek for the 28-year period (Appendix F).

According to the Water Operations Technical Memorandum (Appendix F), the drawdown of Anderson Ranch Reservoir during the construction period could result in reduced fill to reservoir storage accounts, which would be dependent on runoff conditions. As summarized for Alternative B in Section 3.2.2, the 17 contracted spaceholders and one uncontracted space that may experience volume shortfalls are typically individual system canal owners/operators who hold the contracted storage space to supplement canal demands when there are natural flow shortages. The Water Operations Technical Memorandum focused on the maximum potential shortfall and assumed that the ability to fill downstream reservoirs would not be impacted by the restriction. The two different restriction elevations would be the same for both Alternative B and Alternative C; thus, the calculated shortfalls to storage accounts is anticipated to be the same under both alternatives during construction. Analyzing two different restriction elevations, the maximum volume of shortfall per year was calculated as the full-pool volume minus the restricted-pool volume, resulting in a shortfall of 55,074 acre-feet/yr for a 4184-foot restriction; and a shortfall of 96,074 acre-feet/yr for a 4174-foot restriction. The Water Operations Technical Memorandum assumed that this shortfall volume would be shared proportionally among current Anderson Ranch Reservoir contracted spaceholders, calculated as the total space contracted by each spaceholder multiplied by the total shortfall volume. The shortfall volumes for 17 contracted spaceholders, and one uncontracted space, range from approximately 0.80 acre-foot/yr to 16,292 acre-feet/yr for a 4184-foot restriction; and from approximately 1.4 acre-feet/yr to 28,420 acre-feet/yr for a 4174-foot restriction in Anderson Ranch Reservoir. These shortfalls are presented in Table 2 of Section 3.2.2. (Appendix F).

### **Direct and Indirect Impacts: Short Term**

Short-term impacts during and post-construction are expected to be the same as described for Alternative B.

### **Direct and Indirect Impacts: Long Term**

Long-term impacts during and post-construction are expected to be the same as described for Alternative B.

### **Summary and Significance**

Short-term, direct and indirect, significant adverse impacts would occur on contracted storage space during construction of Alternative C. Notably, these impacts would be to Anderson Ranch Reservoir contracted spaceholders due to volume shortfalls as a result of drawdown of Anderson Ranch Reservoir to meet restricted pool elevations during the construction period. Current estimated volume shortfalls were calculated based on analyzing two different restriction elevations, resulting in estimated shortfall volumes to each of 17 contracted spaceholders and one uncontracted space. The estimated shortfalls to storage water rights may affect the contracted spaceholders' ability to use storage water from their

accounts to meet downstream priority canal demands during natural flow shortages, resulting in direct significant adverse impacts on water rights by Alternative C for the short-term duration of construction. Following construction, Anderson Ranch Dam operations would return to normal and the volume shortfalls would cease. Following construction of Alternative C, the reservoir would have an increased capacity of approximately 14,400 acre-feet, which would have long-term beneficial direct and indirect impacts because more supply of storage water would be available to support existing and future beneficial water appropriations in the Boise River basin.

#### **3.2.4 Cumulative Impacts**

Cumulative effects are analyzed for Alternative B and Alternative C. Cumulative effects are those that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. The cumulative effects analysis considers projects, programs, and policies that are not speculative and are based on known or reasonably foreseeable long-range plans, regulations, operating agreements, or other information that establishes them as reasonably foreseeable. Reclamation has identified two past projects (Pine Bridge replacement and the Anderson Ranch Dam security berm) and two potential future projects (the Cat Creek Energy Project and South Fork Boise River Diversion Project) to be considered for the cumulative impact analysis. Additional project proposal information for these, as known by Reclamation to date, is provided in Chapter 2 of the EIS.

Past actions include the Pine Bridge replacement and the Anderson Ranch Dam security berm. These past projects are not anticipated to contribute to any cumulative impacts to water rights associated with the proposed Anderson Ranch Dam through Alternative B or Alternative C.

The water right for the CCE project has been applied for but has not yet been approved. Pursuant to Title 43, Chapter 2 of the Idaho Code, the CCE water right, if permitted, is expected to be senior in priority to the proposed Anderson Ranch Reservoir water right and the non-consumptive hydropower water right would be last to fill. The CCE project would be limited to storing water only when it would otherwise be released due to flood control; therefore, this project is not anticipated to contribute to any cumulative impacts to water rights associated with the proposed Anderson Ranch Dam through Alternative B or Alternative C.

The South Fork Boise River Diversion Project's water right application has been approved for a 10,000-acre-feet water right with the intent of pumping this water from Anderson Ranch Reservoir through a pipeline into the Little Camas Reservoir to support groundwater recharge and irrigation. The South Fork Boise River Diversion Project water right would be senior to the new (junior) water right for the storage space of the Anderson Ranch Reservoir achieved through the dam raise of Alternative B. The South Fork Boise River Diversion Project water right would be limited to storing water that would otherwise be released for flood control; thus, as with the CCE project, this project is not anticipated to contribute to



any cumulative impacts to water rights associated with the proposed raise of Anderson Ranch Dam through Alternative B or Alternative C.

### **3.2.5 Mitigation**

Mitigation for the adverse short-term impacts to storage space holders will comply with applicable state and federal laws.

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## 4. References

- Bureau of Reclamation (Reclamation), 2017. *Boise Feasibility Study – Preliminary Hydrologic Evaluation, Technical Memorandum*, U.S. Bureau of Reclamation, Pacific Northwest Region, Snake River Area Office. February.
- Cornell Law School, (no date). Legal Information Institute: Prior appropriation doctrine. [https://www.law.cornell.edu/wex/prior\\_appropriation\\_doctrine](https://www.law.cornell.edu/wex/prior_appropriation_doctrine)
- Idaho Department of Water Resources, 2019. <https://idwr.idaho.gov>
- Jacobs Engineering, 2019. *Boise River Storage Feasibility Study – Land, Structure, Infrastructure, and Real Estate, Draft Report*, U.S. Bureau of Reclamation, Pacific Northwest Region, Snake River Area Office. February.