Draft Environmental Assessment

and

Finding of No Significant Impact

for the

Water Control Plan for Operation of

Abiquiu Dam, Rio Arriba County, New Mexico

2023

Prepared by

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Draft Finding of No Significant Impact
Water Control Plan for Operation of Abiquiu Dam
Rio Arriba County, New Mexico

The U.S. Army Corps of Engineers, Albuquerque District (Corps) has conducted an environmental analysis in accordance with the National Environmental Policy Act of 1969, as amended. The final Environmental Assessment (EA) dated , for the Water Control Plan for Operation of Abiquiu Dam addresses water management purposes, contractual updates directed by Congress, opportunities, and feasibility in Rio Arriba County, New Mexico.

The Final EA, incorporated herein by reference, evaluated various alternatives that would allow other responsible entities to store San Juan-Chama project water and/or native Rio Grande system water up to elevation 6230.00 NGVD29 at Abiquiu Reservoir in the study area. The recommended plan includes:

- Change conservation storage at Abiquiu Dam from a volume of 200,000 acre-feet to an elevation of 6230.00 NGVD29
- Amend or enter into new storage contracts/agreements with the Albuquerque Bernalillo County Water Utility Authority and other users of storage space at Abiquiu Dam to allow for storage of San Juan-Chama project water and/or native Rio Grande system water up to elevation 6230.00 NGVD29

In addition to a "no action" plan, a single alternative was evaluated. The alternative included: 1) changing conservation storage at Abiquiu Dam from a volume of 200,000 acre-feet to an elevation of 6230.00 NGVD29; and 2) amending or entering into new storage contracts/agreements with the Albuquerque Bernalillo County Water Utility Authority and other users of storage space at Abiquiu Dam to allow for storage of San Juan-Chama project water and/or native Rio Grande system water up to elevation 6230.00 NGVD29.

For all alternatives, the potential effects were evaluated, as appropriate. A summary assessment of the potential effects of the recommended plan are listed in Table 1:

Table 1: Summary of Potential Effects of the Recommended Plan

	Insignificant effects	Insignificant effects as a result of mitigation	Resource unaffected by action
Climate change	☐	☐	☒
Hydrology	☐	☐	☒
Water Quality	☐	☐	☒
Vegetation Communities	☐	☐	☒
Fish and Wildlife Habitat	☐	☐	☒
Recreation	☐	☐	☒
Indian Trust Assets	☐	☐	☒
Cultural Resources	☐	☒	☐

All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the recommended plan. The proposed action is within normal water operations and doesn't need additional best management practices (BMPs) to minimize impacts.

No compensatory mitigation is required as part of the recommended plan.

Public review of the draft EA and FONSI began September 25, 2023. All comments submitted during the public review period will be responded to in the Final EA and FONSI.

Pursuant to section 7 of the Endangered Species Act of 1973, as amended, the Corps determined that the recommended plan will have no effect on federally listed species or their designated critical habitat.

Pursuant to section 106 of the National Historic Preservation Act of 1966, as amended, the Corps determined that historic properties may be adversely affected by the recommended plan. The Corps and the New Mexico State Historic Preservation Officer will enter into a memorandum of agreement to resolve any such adverse effects. All terms and conditions resulting from the agreement shall be implemented in order to minimize adverse impacts to historic properties.

All applicable environmental laws have been considered and coordination with appropriate agencies and officials has been completed.

Technical, environmental, and cost effectiveness criteria used in the formulation of alternative plans were those specified in the Water Resources Council's 1983 Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. All applicable laws, executive orders, regulations, and local government plans were considered in evaluation of alternatives. Based on this report, the reviews by other Federal, State, and local agencies, Tribes, input of the public, and the review by my staff, it is my determination that the recommended plan would not cause significant adverse effects on the quality of the human environment; therefore, preparation of an Environmental Impact Statement is not required.

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Date

JERRE V. HANSBROUGH
LTC, EN
Commanding

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List of Acronyms

ACE	Annual Chance Exceedance
ac	Acres
AF	Acre-feet
AFY	Acre-feet per year
APE	Area of potential effect
ARMS	Archaeological Records Management System
BMPs	Best Management Practices
BLM	U.S. Bureau of Land Management
CEQ	Council on Environmental Quality
C.F.R.	Code of Federal Regulations
cfs	Cubic feet per second referring to stream flow
Compact	Rio Grande Compact
CWA	Clean Water Act
ESRI	Environmental Systems Research Institute
GCS	Grade control structure
GIS	Geospatial Information System
HTRW	Hazardous, toxic, and radioactive waste
ITA	Indian Trust Asset
LiDAR	Light detection and ranging (aerial laser used to develop topography)
MBTA	Migratory Bird Treaty Act
MRG	Middle Rio Grande
MRGCD	Middle Rio Grande Conservancy District
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMCRIS	New Mexico Cultural Resources Information System
NMDGF	New Mexico Department of Game and Fish
NMISC	New Mexico Interstate Stream Commission
NMED	New Mexico Environment Department
NMLO	New Mexico Land Office
NM OSE	New Mexico Office of the State Engineer

NMSHPO	New Mexico State Historic Preservation Office
NOAA	National Oceanic and Atmospheric Administration
NRHP	National Register of Historic Places
OHV	Off-Highway Vehicle
PCEs	Primary constituent elements
PDT	Project development team
Reclamation	U.S. Bureau of Reclamation
RED	Regional Economic Development
RGCC	Rio Grande Compact Commission
SHPO	State Historic Preservation Office/Officer
SJC	San Juan-Chama
TCP	Traditional cultural property
THPO	Tribal Historic Preservation Office/Officer
TSP	Tentatively selected plan
URGWOPS	Upper Rio Grande Water Operations
USACE	U.S. Army Corps of Engineers
USBR	U.S. Bureau of Reclamation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
U.S.C.	U.S. Code
USGS	U.S. Geological Survey
Water Authority	Albuquerque Bernalillo County Water Utility Authority
WCP	Water Control Plan
WRDA	Water Resources Development Act
WSEL	Water surface elevation

1 INTRODUCTION

1.1 Background and Location

The U.S. Army Corps of Engineers (USACE), Albuquerque District is updating the current Water Control Plan (WCP) at the Abiquiu Dam and Reservoir Project, Rio Arriba County, New Mexico. Section 337 of the Water Resources Development Act (WRDA) of 2020 modified previous Congressional authorizations at Abiquiu Reservoir to allow for simultaneous storage of both native Rio Grande system water and San Juan-Chama (SJC) project water at Abiquiu Reservoir. Section 337 of WRDA 2020 also changed the conservation storage at Abiquiu Reservoir from a water volume (200,000 acre-feet) to a surface water elevation (6230 ft NGVD29). USACE prepared this Draft Environmental Assessment (DEA) to analyze potential effects that may result from updating the WCP at Abiquiu Reservoir, as well as the contractual actions directed by Section 337 of WRDA 2020. The updated WCP is included in Appendix D.

The Abiquiu Dam and Reservoir is situated on the Rio Chama about 32 river miles upstream from its confluence with the Rio Grande. The project was authorized for construction by the Flood Control Act of 1948 (Pub. L. No. 80-858) and the Flood Control Act of 1950 (Pub. L. No. 81-516). The Abiquiu Dam and Reservoir was authorized for flood and sediment control, recreation, and development of fish and wildlife resources by Public Laws 80-858, 81-516, and 86-645.

1.2 Purpose and Need for Action

The purpose of the proposed action is revising the WCP for Abiquiu Dam and amending or entering into new storage contracts/agreements with the Albuquerque Bernalillo County Water Utility Authority (Water Authority) and other users of storage space at Abiquiu Dam to incorporate authorization provided in Section 337 of WRDA 2020. The revisions to the WCP and contractual actions will allow water users to simultaneously store native Rio Grande system water and SJC project water up to elevation 6230 ft NGVD29 at Abiquiu Reservoir.

1.2.1 WRDA 2020 Authorization

Section 337 of WRDA 2020 reads as follows:

SEC. 337. SAN JUAN-CHAMA PROJECT; ABIQUIU DAM, NEW MEXICO.

(a) ABIQUIU RESERVOIR.— Section 5(b) of Public Law 97-140 (43 U.S.C. 620a note) is amended by striking "a total of two hundred thousand acre-feet of".

(b) WATER STORAGE AT ABIQUIU DAM, NEW MEXICO.— Section 1 of Public Law 100-522 (43 U.S.C. 620a note) is amended—

(1) by striking "200,000 acre-feet of";

(2) by inserting "and San Juan-Chama project" after "Rio Grande system"; and

(3) by striking ", in lieu of the water storage authorized by section 5 of Public Law 97-140, to the extent that contracting entities under section 5 of Public Law 97-140 no longer require such storage".

(c) WATER STORAGE.— The Secretary shall—

(1) store up to elevation 6230.00 NGVD29 at Abiquiu Dam, New Mexico, to the extent that the necessary real property interests have been acquired by any entity requesting such storage; and

(2) amend the March 20, 1986, contract between the United States of America and the Albuquerque Bernalillo County Water Utility Authority (assigned by the City of Albuquerque, New Mexico to the Albuquerque Bernalillo County Water Utility Authority) for water storage space in Abiquiu Reservoir to allow for storage by the Albuquerque Bernalillo County Water Utility Authority of San Juan-Chama project water or native Rio Grande system water up to elevation 6230.00 NGVD29.

(d) STORAGE AGREEMENTS WITH USERS OTHER THAN THE ALBUQUERQUE BERNALILLO COUNTY WATER UTILITY AUTHORITY.— The Secretary shall—

(1) retain or enter into new agreements with entities for a proportionate allocation of 29,100 acre-feet of storage space pursuant to section 5 of Public Law 97-140; and

(2) amend or enter into new storage agreements for storage of San Juan-Chama project water or native Rio Grande system water up to the space allocated for each entity's proportionate share of San Juan-Chama water.

(e) OPERATIONS DOCUMENTS.— The Secretary shall amend or revise any existing operations documents, including the Water Control Manual or operations plan for Abiquiu Reservoir, as necessary to meet the requirements of this section.

(f) LIMITATIONS.— In carrying out this section, the following limitations shall apply:

(1) The storage of native Rio Grande system water shall be subject to the provisions of the Rio Grande Compact and the resolutions of the Rio Grande Compact Commission.

(2) The storage of native Rio Grande system water shall only be authorized to the extent that the necessary water ownership and storage rights have been acquired by the entity requesting such storage.

(3) The storage of native Rio Grande system water or San-Juan Chama project water shall not interfere with the authorized purposes of the Abiquiu Dam and Reservoir project.

(4) Each user of storage space, regardless of source of water, shall pay for any increase in costs attributable to storage of that user's water.

Under the National Environmental Policy Act (NEPA), a major Federal action does not include activities or decisions that are non-discretionary and made in accordance with the agency's statutory authority (40 C.F.R. § 1508.1(q)(1)(ii); 42 U.S.C. § 4336e(10)(B)(vii)). In Section 337 of WRDA 2020, Congress has directed USACE to "amend or revise any existing operations documents, including the Water Control Manual or operations plan for Abiquiu Reservoir, as necessary to meet the requirements of this section." Furthermore, in Section 337 of WRDA 2020, Congress has directed USACE to amend or enter into new storage contracts/agreements with the Water Authority and other users of storage space at Abiquiu Dam, as detailed above. These actions are explicitly directed by Congress, and therefore they are non-discretionary and made in accordance with USACE's statutory authority. As such, these actions would not be considered major Federal actions subject to NEPA. However, out of an abundance of caution, USACE has elected to prepare this EA to consider the effects of the proposed action.

1.3 Regulatory Compliance

This Environmental Assessment (EA) was prepared by the USACE, Albuquerque District, for the proposed action in compliance with all applicable Federal statutes, regulations, and Executive Orders, as amended, including, but not limited to, the following:

- Archaeological Resources Protection Act (16 U.S.C. § 470aa *et seq*.)
- CEQ Regulations for Implementing the Procedural Provisions of NEPA (40 C.F.R. Part 1500 *et seq*.)
- Clean Air Act (42 U.S.C. § 7401 *et seq.*)
- Clean Water Act (33 U.S.C. § 1251 *et seq.*)
- Endangered Species Act (16 U.S.C. § 1531 *et seq*.)
- Executive Order 11593, Protection and Enhancement of the Cultural Environment, 1971
- Executive Order 11988, Floodplain Management, 1977
- Executive Order 11990, Protection of Wetlands, 1977
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, 1994
- Executive Order 13112, Invasive Species, 1999
- Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance, 2009
- Farmland Protection Policy Act (7 U.S.C. § 4201 *et seq.*)
- Federal Noxious Weed Act (7 U.S.C. § 2814)
- Fish and Wildlife Coordination Act (48 Stat. 401; 16 U.S.C. § 661 *et. seq.*)
- Migratory Bird Treaty Act (16 U.S.C. § 703 *et seq.*)
- National Environmental Policy Act (NEPA, 42 U.S.C. § 4321 *et seq*.)
- National Historic Preservation Act (54 U.S.C. § 300101 *et seq*.)
- Native American Graves Protection and Repatriation Act (25 U.S.C. § 3001 *et seq*.)
- Occupational Safety and Health Act of 1970 (29 U.S.C. § 651 *et seq*.)
- Section 438 of the Energy Independence and Security Act of 2007 (Pub. L. No. 110-140, § 438; 121 Stat. 1492, 1620)
- U.S. Army Corps of Engineers' Procedures for Implementing NEPA (33 C.F.R. Part 230 *et seq*.; ER 200-2-2)

Two New Mexico agencies manage intra- and interstate water rights. The New Mexico Office of the State Engineer (NM OSE) is charged with administration of all water in the State of New Mexico pursuant to NMSA 1978, § 72-2-1 (1982). In the Rio Grande basin, the NM OSE performs numerous activities, some of which may be affected by the proposed action. Those activities include, but are not limited to, basic water rights administration under state law and NM OSE Rules and Regulations, Active Water Resource Management (AWRM), and addressing state water resource policy issues that may impact the river system.

The New Mexico Interstate Steam Commission (NMISC) is charged with administration of all interstate water compacts for New Mexico, as well as protecting, conserving, and developing the waters and stream systems of the State (NMSA 1978, § 72-14-3 (1953)). In the Rio Grande basin, the NMISC performs numerous activities, some of which may be affected by the proposed action. Those activities include monitoring water operations of the USACE and the U.S. Bureau of Reclamation (Reclamation), conducting annual accounting of Rio Grande and SJC project water,

coordinating with the NM OSE and water users on Rio Chama water administration and active water resource management (shortage sharing), assessing and determining Rio Grande Compact compliance, and addressing Federal natural resource policy issues that may impact the river system.

This EA also reflects compliance with all applicable State and local regulations, statutes, policies, and standards for conserving the environment, such as water and air quality, endangered plants and animals, and cultural resources.

1.3.1 Rio Grande Compact

The Rio Grande Compact (Compact) is an interstate agreement between New Mexico, Colorado, and Texas to equitably apportion the water of the Rio Grande between the three states and the Republic of Mexico (URGWOPS FEIS; USACE, USBR, NMISC, 2007). The Compact was approved by Congress on May 31, 1939 (Pub. L. No. 76-96), and is administered in New Mexico pursuant to NMSA 1978, § 72-15-23 (1945). A Rio Grande Compact Commission (RGCC) was established consisting of one representative from each state and a United States-designated representative.

1.3.2 Federal Trust Responsibilities to Pueblos and Tribes

The Federal Indian trust responsibility is a legal obligation under which the United States "has charged itself with moral obligations of the highest responsibility and trust" toward Indian tribes. *Seminole Nation v. United States*, 316 U.S. 286 (1942). The Federal Indian trust responsibility is also a legally enforceable fiduciary obligation on the part of the United States to protect tribal treaty rights, lands, assets, and resources, as well as a duty to carry out the mandates of Federal law with respect to American Indian and Alaska Native tribes and villages.

1.4 Documents Incorporated by Reference

Incorporation of previous analysis by reference is encouraged by NEPA. For NEPA, the Council on Environmental Quality (CEQ) regulations (40 C.F.R. §§ 1500.4, 1502.21) state that agencies will incorporate material by reference when the effect will be to reduce bulk without impeding agency and public review of the proposed action alternative. The incorporated material will be cited, and its content summarized. No material may be incorporated by reference unless it is reasonably available for inspection by potentially interested persons within the time allowed for comment. Material based on proprietary data, which are themselves not available for review and comment, will not be incorporated by reference.

This EA incorporates by reference information contained in the following documents:

- Upper Rio Grande Basin Water Operations Review and EIS. Final Environmental Impact Statement. (URGWOPS FEIS; USACE, USBR, NMISC, 2007). This document was prepared by USACE, Reclamation, and NMISC to analyze the effects of water operations by these agencies on the Rio Grande and Rio Chama.

Relevant portions of all documents incorporated by reference into this EA are summarized throughout this EA where specifically noted.

1.5 Abiquiu Dam and Reservoir

The USACE is responsible for operation and maintenance of Abiquiu Dam for flood risk

management (flood control) on the Rio Chama (Figure 1). The primary purpose of Abiquiu Dam is flood and sediment control, with water supply and hydropower generation as authorized by Congress. Two Reclamation-operated facilities at Heron Reservoir and El Vado Dam upstream of Abiquiu Reservoir play important roles regulating tributary flow on the Rio Chama.

The Abiquiu Dam and Reservoir Project is situated on the Rio Chama about 32 river miles upstream from its confluence with the Rio Grande. The project was authorized for construction by the Flood Control Act of 1948 (Pub. L. No. 80-858) and the Flood Control Act of 1950 (Pub. L. No. 81-516). The Flood Control Act of 1960 (Pub. L. No. 86-645) requires that all USACE dams in the middle Rio Grande (MRG) (Abiquiu, Cochiti, Jemez Canyon, and Galisteo) work as a unit to reduce flood risk in the MRG. Construction of Abiquiu Dam was initiated by the USACE in 1956, and the project was completed and placed into operation in 1963. The dam is a rolled earthfill structure with a crest length of 1,800 feet, and the maximum height above the stream bed is approximately 341 feet. The drainage area contributing flow to Abiquiu Reservoir comprises 2,146 square miles.

Subsequent legislation added authority for water supply storage for SJC project water (Pub. L. No. 97-140) and native Rio Grande system water (Pub. L. No. 100-522) to be stored in the flood control space. Currently, only SJC project water is stored in Abiquiu Reservoir. The reservoir's storage allocations include 502,000 acre-feet (AF) for flood control and 77,039 AF for sediment retention. At the end of 2021, an estimated 53,770 AF of the initial 77,039 AF sediment reserve space remained unfilled. Storage of SJC project water occurs within the flood control space and unused portion of the sediment reserve space. Section 337 of WRDA 2020 authorized USACE to simultaneously store both native Rio Grande system water and SJC project water at Abiquiu Reservoir. Section 337 of WRDA 2020 also changed the conservation storage capacity at Abiquiu Reservoir from 200,000 AF to an elevation of 6,230 ft NGVD29. The current volume at elevation 6,230 ft NGVD29 is approximately 229,199 AF; however, this volume will diminish over time due to inflow of sediment. As directed by Congress, USACE is revising the Abiquiu WCP, as necessary, to address the changes authorized by Section 337 of WRDA 2020.

1.5.1 Rio Chama Flood Regulation

During normal (non-flood control) operations, Rio Grande basin flow and releases from El Vado Reservoir upstream are passed through Abiquiu Reservoir. During flood control operations, releases from Abiquiu Dam are regulated to non-damaging flow rates downstream. The Abiquiu Dam WCP designates the overall maximum discharge that can be conveyed safely in the channel not to exceed 1,800 cfs immediately downstream from the dam, 3,000 cfs at the Chamita gage on the Rio Chama, and 10,000 cfs at the Otowi gage on the Rio Grande.

Operation of Abiquiu Dam for flood control is coordinated with Cochiti, Galisteo, and Jemez Canyon dams, which are jointly operated for a non-damaging flow at Albuquerque (Central Avenue Bridge) not to exceed 7,000 cfs. Flood regulation is initiated at Abiquiu Dam when flows into the reservoir exceed the capacity of the Rio Chama downstream from the Dam or when flows on the Rio Grande equal or exceed its channel capacity. Flood regulation at Abiquiu Dam can be expected from April through June and during the monsoon season from July through September. Historically, storage level at Abiquiu Reservoir reached a maximum water storage to date of 402,258 AF (elevation 6,261.1 ft) in June 1987, which is about 22.4 ft below top of the flood control pool (elevation 6,283.5 ft).

1.5.2 Rio Chama Hydropower

A hydroelectric power facility was constructed downstream of Abiquiu Dam in 1991. The power plant was constructed and is currently owned and maintained by the incorporated County of Los Alamos. A written agreement between the County and the USACE prior to construction of the plant stipulates that no releases will be made specifically for the benefit of the power plant (USACE 1995). The plant is a run-of-the-river facility that does not impact reservoir storage or releases.

1.5.3 San Juan-Chama Water Retention

Reclamation's SJC project diverts water from the Navajo, Little Navajo, and Blanco rivers, which are upper tributaries of the San Juan River (of the Colorado River basin), for use in the Rio Grande basin in New Mexico (USACE, USBR, ISC 2007). After being diverted through an underground tunnel, this water is stored at Heron Reservoir, upstream from Abiquiu Dam. Reclamation delivers SJC project water to users in the middle Rio Grande basin based on contracts with various water-management entities. Delivery of SJC project water is authorized for municipal, domestic, industrial, recreation, irrigation, and fish and wildlife purposes. The following statutory conditions must be met for use of SJC project water:

- Must be consumptively and beneficially used in New Mexico.
- Must have a downstream destination.
- Must not harm native Rio Grande system water.
- Is not subject to provisions of the Rio Grande Compact.

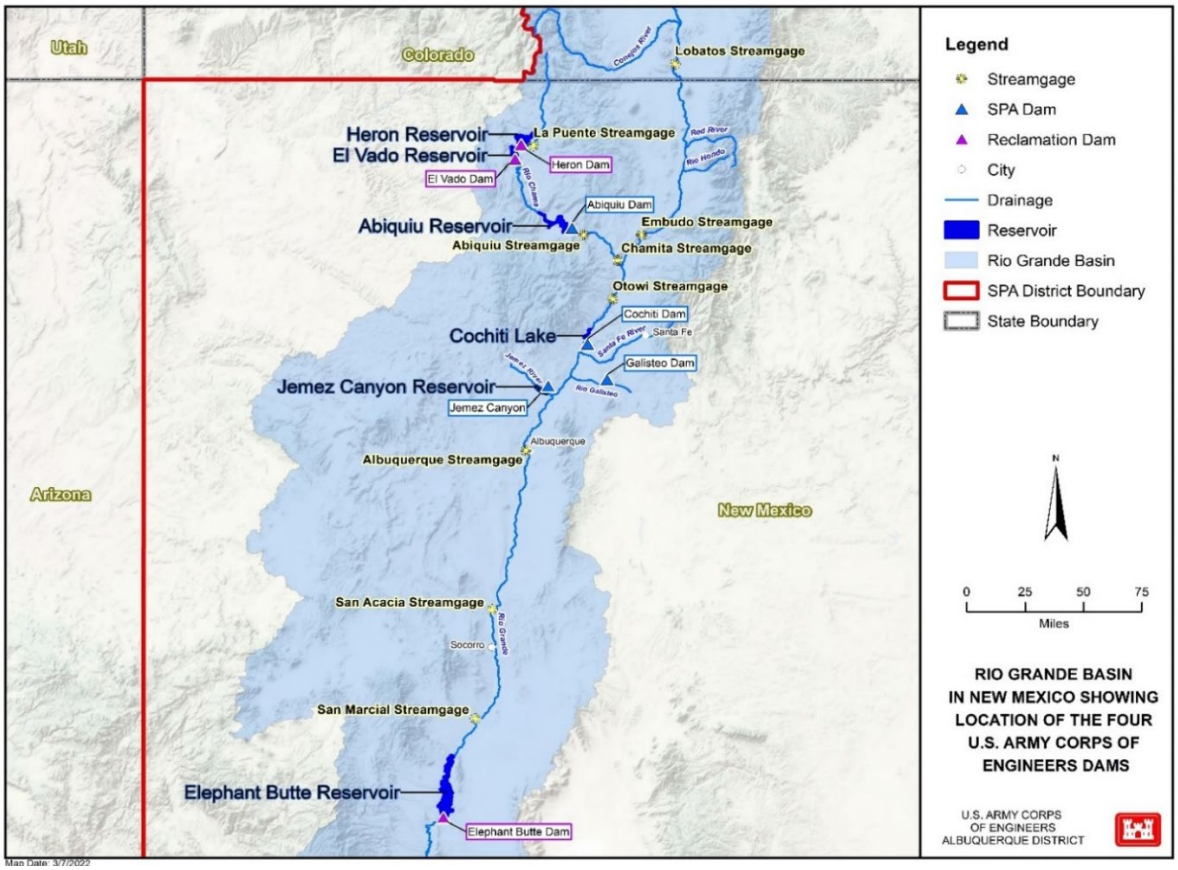

Figure 1 Map of the Rio Grande basin in New Mexico showing location of the four U.S. Army Corps of Engineers dams. USACE 2019.

SJC project water is released from Heron Reservoir by Reclamation to a specific user, who can use such water immediately or store it in other facilities for future use. In 1981, Pub. L. No. 97-140 authorized the Secretary of the Army to enter into agreements with entities that have contracted with the Secretary of the Interior for water from the SJC project. The authorization allowed for up to 200,000 AF of this water to be stored in Abiquiu Reservoir within the flood control space and unused portion of the sediment reserve space. The USACE has entered into agreements with the Water Authority and other entities for SJC project water storage (Table 1). Up to 184,753 AF (elevation 6,220 ft) could currently be stored due to the current easement agreements[1]. When full, this pool creates a 4,190-surface-acre reservoir. The authorizing legislation stipulates that storage of this water shall not interfere with the authorized purposes of Abiquiu Reservoir (namely, flood and sediment control). Releases of SJC project water from Abiquiu Reservoir represent individual decisions made by water users to call for their water, without any discretionary action by the USACE. The USACE does ensure that such flows are passed in a manner that does not threaten the safety or structural integrity of flood control facilities.

[1] The upper limit of SJC storage is the 6,220-foot elevation, which corresponds to the vertical extent of the Water Authority's storage easements with surrounding landowners. The actual volume of allowable SJC storage decreases over time as sediment retention in the reservoir increases.

Table 1 San Juan-Chama project storage allocations at Abiquiu Reservoir, 2021.

San Juan-Chama project contractor	Allocation (AF)
Albuquerque-Bernalillo County Water Utility Authority	170,900
Middle Rio Grande Conservancy District	2,000
City of Santa Fe	7,542
City of Los Alamos	1,730
City of Española	1,442
Town of Bernalillo	577
County of Santa Fe	541
Twining Water & Sanitation District	22
Total	184,753

In 1988, Pub. L. No. 100-522 authorized the storage of up to 200,000 AF of native Rio Grande system water at Abiquiu Reservoir in lieu of SJC project water to the extent storage space is no longer required for the storage of SJC project water as authorized by Pub. L. No. 97-140. Presently, all water supply storage at Abiquiu Reservoir consists of SJC project water; there are no agreements for storage of native Rio Grande system water.

Section 337 of WRDA 2020 authorized USACE to simultaneously store both native Rio Grande system water and SJC project water at Abiquiu Reservoir. Section 337 of WRDA 2020 also changed the storage capacity at Abiquiu Reservoir from 200,000 AF to an elevation of 6,230 ft NGVD29 (current volume at this elevation is approximately 229,199 AF). As directed by Congress, USACE is revising the Abiquiu WCP, as necessary, to address the changes authorized by Section 337 of WRDA 2020.

2 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 Proposed Action

USACE is updating the Abiquiu WCP to include operational changes authorized by Section 337 of WRDA 2020. One update to the WCP would allow simultaneous storage of both native Rio Grande system water and SJC project water at Abiquiu Reservoir. The second would change the authorized water supply storage at Abiquiu Reservoir from a volume of 200,000 AF (Pub. L. No. 97-140 and Pub. L. No. 100-522) to an elevation of 6,230 ft NGVD29 (Section 337, WRDA 2020; Figure 2; Table 2). Abiquiu Reservoir (Figure 3) is the area of analysis for the update to the WCP in this EA.

Section 337 of WRDA 2020 modifies previous Congressional authorizations at Abiquiu Reservoir to allow more flexibility for concurrent storage of San Juan-Chama project water and Rio Grande system water by SJC project contractors. Changing the authorized water supply storage limit within the flood control space to an elevation (6,230 ft NGVD29) would increase the currently authorized storage space by approximately 30,000 AF until the space diminishes over time due to sediment inflow. The additional space would be exclusive to the Water Authority and does not affect storage space for other existing agreement holders. Other SJC project contractors will have a fixed space of 29,100 AF that will not be affected by accumulated sediment. All water is stored in Abiquiu flood space and will be evacuated if the space is needed for flood control operations; therefore, flood control operations will not be affected by stored water.

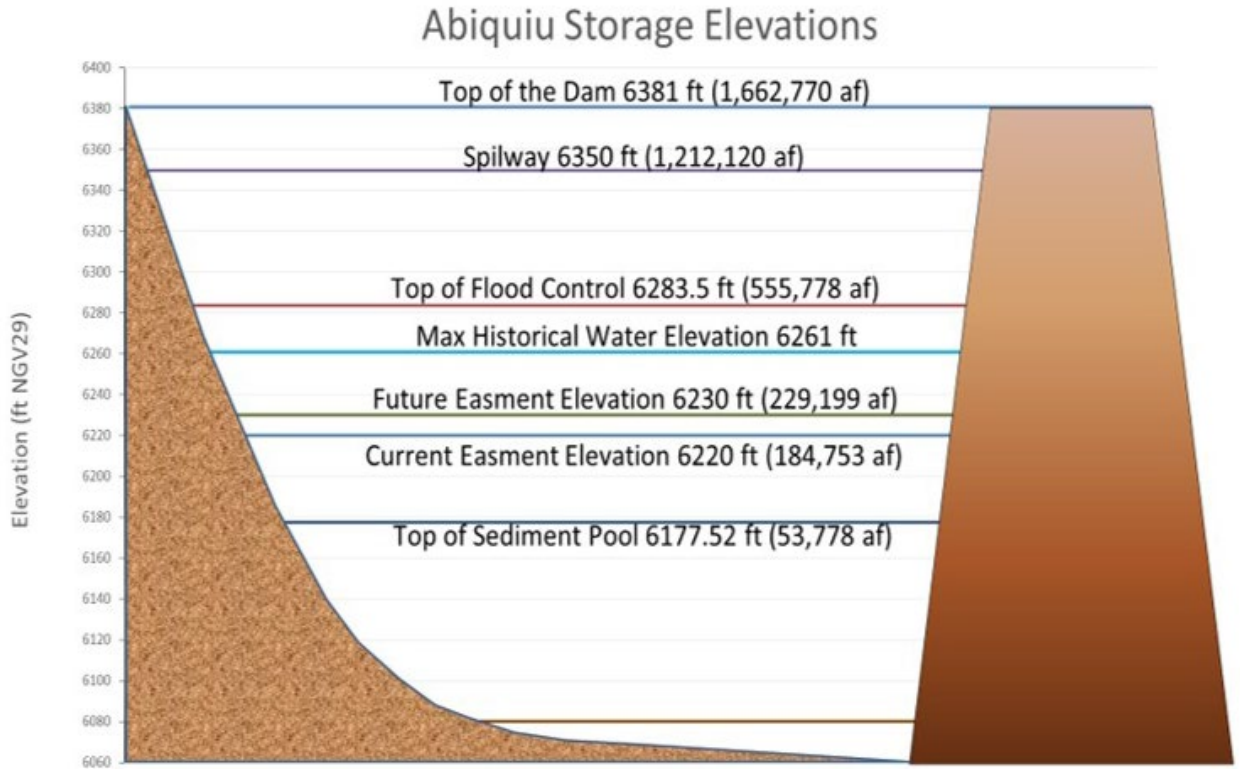

Figure 2 Abiquiu elevations for sediment and water storage.

Table 2 Key water surface elevations with estimated volume and surface area.

Description	Elevation (ft)	Storage Volume (AF)	Surface Area (ac)
Current Storage Easement	6,220.0	184,753	4,207.7
New Storage Easement	6,230.0	229,199	4,703.8
Maximum historic water elevation	6,261.0	402,000	6,296.3
Top of Flood Pool	6,283.5	555,778	7,700.9

USACE will amend or enter into new storage contracts/agreements with the Water Authority and other users of storage space at Abiquiu Dam to allow for the authorized storage of native Rio Grande system water and/or SJC project water up to an elevation of 6,230 ft NGVD29 at Abiquiu Reservoir.

Entities requesting water storage at Abiquiu Dam must acquire the necessary real property interests for such storage. All water management actions performed by the responsible entities under the updated WCP should comply with applicable state and Federal laws, including the articles and provisions of the Compact and the resolutions of the RGCC. In addition, responsible agencies shall be responsible for acquiring any and all of the appropriate and applicable state permits.

2.2 The No Action Alternative

Under the no action alternative, the water storage limit within the flood control space would remain at 200,000 AF of SJC project water, and native Rio Grande system water would not be stored. Therefore, the proposed no action (baseline scenario) would continue operations using the current WCP criteria for water retention. It should be noted that the no action alternative would not be consistent with the explicit direction received from Congress in Section 337 of WRDA 2020.

2.3 Alternative Actions Evaluated

No other alternatives were considered for inclusion as components of the proposed action.

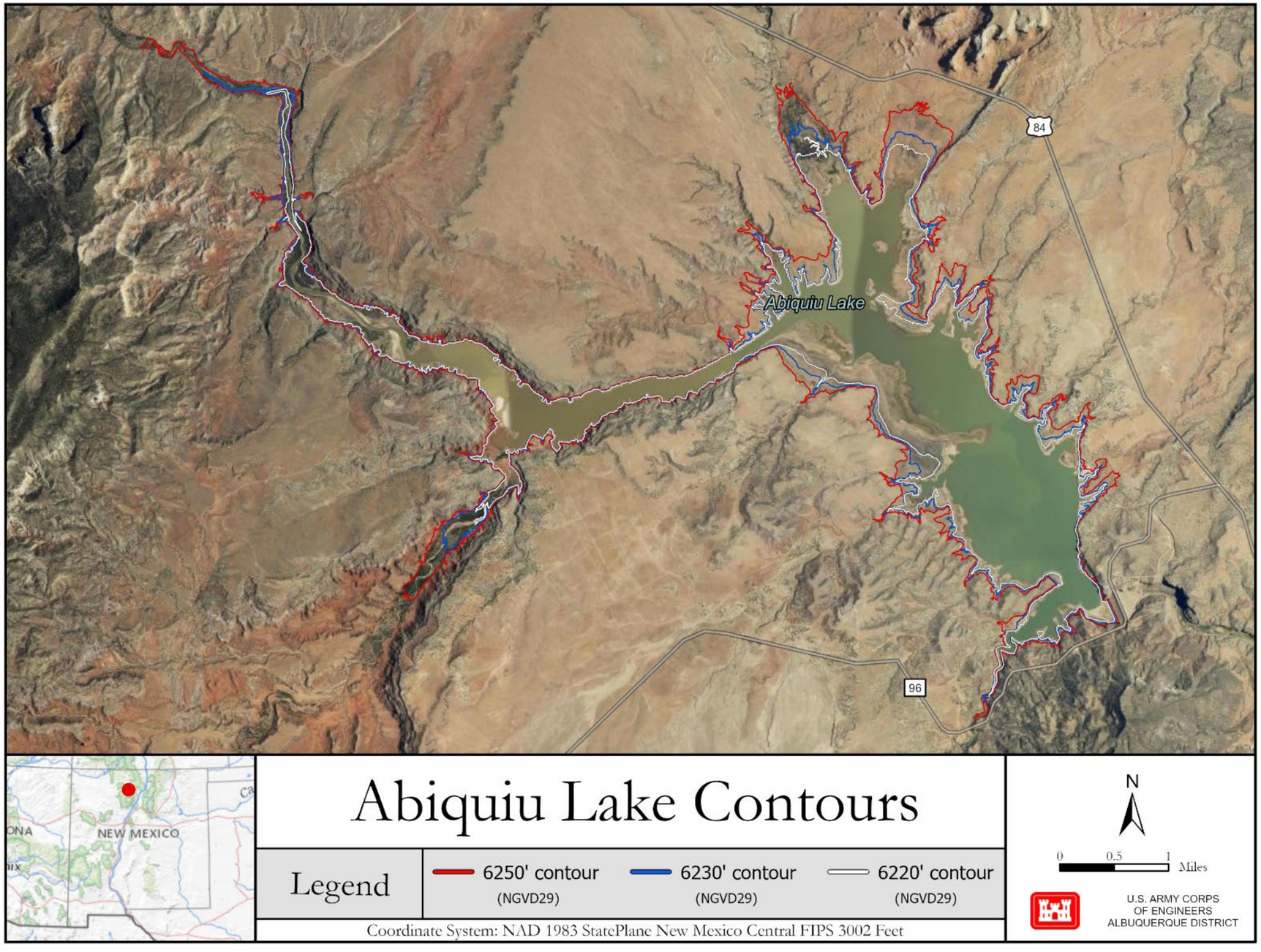

Figure 3 Area of analysis and Area of Potential Effect (APE) at Abiquiu Reservoir, showing contour intervals at 6,220 ft, 6,230 ft, and 6,250 ft elevations.

3 EXISTING ENVIRONMENT AND FORESEEABLE EFFECTS OF THE NO ACTION ALTERNATIVE

3.1 Background and Location

The following general summary of the physical environment of the Abiquiu Dam and Reservoir is sufficient for the purposes of analyzing the effects of implementing revisions to the current WCP, as well as the contractual actions directed by Section 337 of WRDA 2020, to change the storage criteria from a volume to an elevation and allow for native Rio Grande system water storage in the reservoir. This section describes the existing environmental resources in the action area and evaluates effects of the no action alternative.

3.2 Environmental Resources Not Considered in Detail

Initial evaluation of the effects of the proposed action indicated that there would likely be little to no effect on several resources with implementation of the proposed action. This analysis also considers the 'no action' alternative where the proposed action is not implemented. These resources are discussed below to add to the overall understanding of the action area.

Initial evaluation of the effects of the proposed action indicated that there would likely be little to no effect on regional geology, air quality, noise, floodplains and wetlands, noxious and invasive species, land use, aesthetics, socioeconomics, demographics, and environmental justice with either "with" or "without" action alternatives. This EA incorporates by reference the URGWOPS FEIS (USACE, USBR, ISC 2007) for the effects of water management at Abiquiu Reservoir for these resources. Under the existing conditions (no action), there would likely be little to no effect on regional geology, air quality, ambient noise, aesthetics, hazardous waste, demographics, socioeconomics, and land use.

3.2.1 Regional geology

The action area lies within the Española Basin, a sediment-filled asymmetric west-tilted half-graben that formed as part of the Rio Grande Rift. The Rio Grande Rift created a series of north-south trending faults that resulted in uplifted mountains, widespread volcanism, and large sediment filled basins. The Española Basin is bounded by the Sangre de Cristo Mountains to the east, the Jemez Volcanic Field to the west, the San Luis Valley and Chama basins to the north, and the Albuquerque Basin to the south-southwest (USACE 2017).

The Rio Chama flows through a narrow canyon (~350 feet deep), varying in width from about 300 feet at the bottom to about 1,500 feet at the top (USACE 1987). The upper rim of the canyon is the Poleo Sandstone (Triassic age) underlain by the Abo formation (Permian age). Poleo Sandstone is dominantly white to buff colored, medium to coarse grained, quartzitic, well cemented, and highly jointed. Locally, there are thin seams and zones of conglomerate with cobbles up to four inches in diameter. All sand and gravel size material are well rounded. The upper Abo formation is a massive, red to brown mudstone with irregular lenses and masses of gray green sandy mudstone. The remainder of the Abo formation exposed at the dam site is a series of intermingled lenses of silty mudstone and silty sandstone. The dominant color is red-brown, but some units are purple to green. There would be no adverse effect to the regional geology in the future with the no-action alternative.

3.2.2 Air Quality

This EA incorporates by reference the URGWOPS FEIS (USACE, USBR, ISC 2007) regarding impacts to air quality. The area is an attainment area for all criteria air pollutants. Non-criteria pollutants, such as those associated with Los Alamos National Laboratory and tailpipe emissions from increasing traffic will continue to be air quality issues. Bandelier National Monument is a Class I Federal air quality area. Future actions within the action area must account for and avoid potential degradation of the air quality at Bandelier. There are no documented air quality non-attainment issues in Rio Arriba County, NM. There would be no adverse effect to air quality in the future with the no-action alternative.

3.2.3 Noise

This EA incorporates by reference the URGWOPS FEIS (USACE, USBR, ISC 2007) regarding impacts to noise. The action area is located in Rio Arriba County, NM. The action area is generally quiet, rural settings, with only limited background noise from major highways, aircraft flyovers, sirens, or other urban noise. Background noise levels would not change under the no action conditions.

The lands adjacent to the reservoir and river are relatively undeveloped. Dominant sounds in the action area originate from natural sources: water, wind, and wildlife. Local traffic noise is generated by various highway crossings. Noise levels and patterns at developed recreation areas and frequently used informal use areas are localized and typical of campground and day use recreational areas. Beyond these formal and informal recreation areas, the most conspicuous noise producers are power boats and jet skis on the reservoirs that allow these activities. Noise levels above 85 decibels (dB) will harm hearing over time. Noise levels above 140 dB can cause damage to hearing after just one exposure. There would be no adverse effect to ambient noise in the future with the no-action alternative.

3.2.4 Floodplains and Wetlands

Waters of the U.S. (i.e., wetlands and other surface waters) provide important and beneficial functions, including protecting and improving water quality, providing fish and wildlife habitat, and storing floodwaters. Because they provide these important functions, this resource is protected via two Acts: section 10 of the Rivers and Harbors Act of 1899 and section 404 of the Clean Water Act (CWA) of 1972, as amended. These Acts require avoidance of adverse impacts, minimization of adverse impacts, and offsetting of unavoidable adverse impacts to existing aquatic resources; and for wetlands, striving to achieve a goal of no overall net loss of values and functions.

Executive Order 11988 (Floodplain Management) provides Federal guidance for activities within the floodplains of inland and coastal waters. Federal agencies are required to "ensure that its planning programs and budget requests reflect consideration of flood hazards and floodplain management." Preservation of the natural values of floodplains is of critical importance to the nation and the State of New Mexico. These natural values include preservation of wetlands.

Wetlands are lands transitional between terrestrial and aquatic ecosystems where the water table is at or near the surface or the land is covered by shallow water (Cowardin et al. 1979). Saturation with water determines the nature of soil development and, in turn, the types of plant and animals inhabiting these areas. Scurlock (1998) has summarized trends for historic Rio Grande riparian communities over the last 150 years. The riparian ecosystem has changed with the decline of

cottonwood gallery forest, encroachment of upland junipers, and invasion of salt cedar (*Tamarix ramosissima*), Russian olive, and Siberian Elm (*Ulmus pumila*).

The flood control pool at Abiquiu Reservoir consists of upland vegetation described in Section 3.4. The fluctuating water surface elevation doesn't support development of wetlands in the flood control pool. There would be no adverse effect to floodplains or wetlands in the future with the no-action alternative.

3.2.5 Noxious Weeds and Invasive Species

The majority of non-native species within the action area are plants. Though some non-native fish and other wildlife may exist, they are not of major concern. The invasive tree species of concern include salt cedar, Russian olive, and Siberian elm.

Executive Order 13112 directs Federal agencies to prevent the introduction of invasive (exotic) species and provides for their control to minimize the economic, ecological, and human health impacts that invasive species cause.

In addition, the New Mexico Department of Agriculture designates and lists certain weed species as being noxious (Nellessen 2000). "Noxious" in this context means plants not native to New Mexico that may have a negative impact on the economy or environment and are targeted for management or control. Class C listed weeds are common, widespread species that are fairly well established within the state. Management and suppression of Class C weeds is at the discretion of the lead agency. Class B weeds are considered common within certain regions of the state but are not widespread. Control objectives for Class B weeds are to prevent new infestations, and in areas where they are already abundant, to contain the infestation and prevent their further spread. There would be no adverse effect to noxious weeds and invasive species in the future with the no-action alternative.

3.2.6 Land Use

This EA incorporates by reference the URGWOPS FEIS (USACE, USBR, ISC 2007) regarding impacts on land use and agriculture. The flood control space in the Abiquiu Reservoir action area is unmanaged terrestrial habitat. Public lands on both sides of the Rio Chama immediately downstream of Abiquiu Reservoir are managed by USACE, the Bureau of Land Management (BLM), the US Forest Service (USFS), and the New Mexico Land Office (NMLO). Immediately downstream of these public lands are private agricultural lands on one or both sides of the Rio Chama. These agricultural lands use acequias that divert irrigation water from the river. Sixteen irrigation diversion structures exist on the Rio Chama between Abiquiu Dam and the confluence with the Rio Grande (USACE 1996). There would be no adverse effect to land use in the future with the no-action alternative.

3.2.7 Aesthetics

The NEPA and CEQ regulations identify aesthetics as one of the elements that must be considered in determining the effects of an action. Aesthetics include the presence and appearance of landforms, water surfaces, vegetation, and human created features relative to the surroundings and settings of the area. These features are primary characteristics of an area or action that determine visual character and the manner in which people view the setting. Aesthetics analysis considers

the existing and future appearance, or perception of views, of the project site and areas surrounding the site, as well as viewer sensitivity. The existing condition for the aesthetics of the Rio Chama and adjacent riparian areas ranges from fair to good. There would be no adverse effect to the local aesthetics in the future with the no-action alternative.

3.2.8 Socioeconomics

This EA incorporates by reference the URGWOPS FEIS (USACE, USBR, ISC 2007) regarding impacts to socioeconomics. The leading employment sectors in Rio Arriba County (USACE 2017) are education, health care, and social services (20.9 percent), and public administration (16.4 percent). Agriculture employs about four percent of the county's workers, while hospitality services and construction each employs more than ten percent of the workforce. Implementation of the proposed action would not adversely impact the socioeconomics of the action area. Increased recreational use may contribute to the local economy. There would be no adverse effect to the socioeconomics in the future with the no-action alternative.

3.2.9 Demographics

This EA incorporates by reference the URGWOPS FEIS (USACE, USBR, ISC 2007) regarding impacts to demographics. The action area and affected populations is in Rio Arriba County, NM. The population of Rio Arriba County has decreased slightly from 41,190 in 2000 (U.S. Census Bureau 2018). The majority of the surrounding project population is Hispanic/Latino followed by White (not Hispanic), Native American, Black, and Asian (Table 3). New Mexico population projections were developed (Table 4) for the recently approved New Mexico State Water Plan to support regional water planning efforts (USACE 2006). There would be no adverse effect to the demographics in the future with the no-action alternative.

Table 3 Demographic parameters by heritage and age for the action area (2018).

	Total Population	**White, not Hispanic**	**Hispanic / Latino**	**Native American**	**African American**	**Asian**
New Mexico	2,088,070	37.5%	48.8%	10.9%	2.5%	1.7%
Santa Fe County	148,750	43.0%	51.0%	4.3%	1.2%	1.6%
Los Alamos County	18,738	72.0%	17.8%	1.4%	1.2%	6.4%
Rio Arriba County	39,159	12.9%	71.3%	19.0%	0.8%	0.6%
United States	325,719,178	60.7%	18.1%	1.3%	13.4%	5.8%
	Total Population	**0-17 years**	**18-64 years**	**65 and over**	**Below poverty level**	
New Mexico	2,088,070	23.4%	59.7%	16.9%	19.7%	
Santa Fe County	148,750	18.4%	58.4%	23.2%	14.0%	
Los Alamos County	18,738	22.7%	59.9%	17.4%	4.0%	
Rio Arriba County	39,159	23.7%	57.6%	18.7%	22.5%	
United States	325,719,178	22.6%	61.8%	15.6%	12.3%	

Table 4 Projected County Population and Annual Average Growth Rate

2000 to 2040									
Counties/Key Municipalities	**Total County Population by Projection Year (5 year increments)**								
	2000	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
New Mexico Counties									
Rio Arriba	41,307	43,694	46,030	48,196	50,027	51,451	52,519	53,269	53,676
Los Alamos	18,359	18,722	19,122	19,122	20,099	20,565	20,866	21,034	21,224
Santa Fe	129,936	143,987	158,624	174,400	191,403	208,801	226,112	244,751	264,778

3.2.10 Environmental Justice

Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (11 February 1994) was designed to focus the attention of Federal agencies on the human health and environmental conditions of minority and low-income communities. It requires Federal agencies to adopt strategies to address environmental justice concerns within the context of agency operations and proposed action. The 1995 Environmental Protection Agency (EPA) guidance document, Environmental Justice Strategy: Executive Order 12898, defines the approaches by which the EPA will ensure that disproportionately high environmental and/or socioeconomic effects on minority and low-income communities are identified and addressed. Further, it establishes agency-wide goals for all Native Americans with regard to environmental justice issues and concerns. These goals are designed to:

- Focus the attention of Federal agencies on human health and general environmental conditions in minority and low-income communities with the goal of achieving environmental justice;
- Foster nondiscrimination in Federal programs that could substantially affect human health or the environment; and
- Give minority and low-income communities greater opportunities for public participation on matters relating to human health and safety.

This EA incorporates by reference the URGWOPS FEIS (USACE, USBR, ISC 2007) regarding impacts for Environmental Justice. Environmental justice addresses the issue of disproportionate impacts on minority and/or low-income populations. Therefore, the locations of these populations must be known in order to evaluate potential environmental justice issues. For this analysis, populations with a high percentage of people of Hispanic origin, a high percentage of Native Americans, and a high percentage of low-income households or high poverty rates are identified. The locations of these identified populations are used to evaluate Environmental Justice concerns. The Reservoir is not known to be utilized disproportionately by the groups described above. Additionally, implementation of the Proposed Action would not involve population relocation, health hazards, or property takings. For the reasons described, the Proposed Action would have no adverse human health or environmental effects on minority and low-income populations, nor Indian

tribes. There would be no adverse environmental justice effects in the future with the no-action alternative.

3.2.11 Hazardous, Toxic, and Radioactive Waste (HTRW)

This EA incorporates by reference the URGWOPS FEIS (USACE, USBR, ISC 2007) regarding impacts from hazardous, toxic, or radioactive waste (HTRW) in the action area. There would be no adverse effect related to HTRW materials in the future with the no-action alternative.

3.3 Climate

This section provides information on the existing climate in the action area, and on projected changes in future climate conditions. A detailed discussion of regional climate and climate change, along with an assessment of climate impacts to regional hydrology, riparian and aquatic ecosystems can be found in the Española Valley, Rio Grande and Tributaries, New Mexico Final Integrated Feasibility Report and Environmental Assessment (USACE 2017, Appendix G).

Recent overviews of climate change in the Southwestern United States have been provided (Garfin et al. 2013; Melillo et al. 2014), with important syntheses of climate change impacts to New Mexico (NM OSE 2006; USBR et al. 2013). These sources indicate that observed trends are likely to continue. Models project substantial warming over the 21st Century of 5-7°F by 2100 as compared to late 20th Century averages; warming may reach as much as 8.5 to 10°F by 2100 under plausible high emissions (large radiative forcing) scenarios. Even with no net changes in total precipitation, warming will affect regional hydrology through changes in the snowpack (Elias et al. 2015). Higher temperatures will delay the date at which precipitation falls as snow in the fall and cause a 4-6 week earlier shift in the date at which precipitation reverts to rain in the spring. The altitude at which a winter snowpack will develop is anticipated to rise. The combination of these trends is an overall reduction in snowpack volume to support ecologically essential spring runoff flows, as well as reductions in baseflows during the remainder of the year. For the Rio Grande basin above Elephant Butte, declines in snow water equivalence, annual runoff, December-March runoff, and April-July runoff are all anticipated (USBR 2011). Increases in the frequency, intensity, and duration of both droughts and floods are expected (USBR et al. 2013).

Riparian and aquatic ecosystems along the Rio Chama are likely to be affected by changes in stream flow that alter water quantity, seasonal water availability, water quality, and increases in riparian evaporation. Projected reductions in annual maximum monthly flows are likely to reduce the spring runoff hydrograph, and, therefore, reduce the average amount and extent of spring runoff flooding of restoration measures on the floodplain. However, the amount of this projected reduction is small relative to the interannual variability, adding considerable uncertainty to estimates of ecological impacts. Projected impacts to the Middle Rio Grande riparian areas (Friggens et al. 2013) that are likely to be broadly applicable to northern New Mexico riparian areas include:

- Reduced riparian habitat due to decreased stream flows and longer drought;
- Decline in cottonwood gallery forests due to lower flows, more frequent wildfires, and disease;

- Loss/reduction of native vegetation and replacement by invasive tree and grass species due to fire and lower water tables, and changes in spring runoff timing/volumes;

- Increasingly arid conditions would favor replacement of grassland and woodland habitats with scrubland, accompanied by reductions in vegetation cover; and

- Increased duration of drought, with increases in droughts lasting 5 years or more and increases in drought intensity.

3.3.1 Existing Climate

The climate of the Española Valley ranges from semi-arid (approximately 10" of precipitation/year) along the Rio Grande to alpine (approximately 40" of precipitation/year) at the highest elevations of the surrounding mountain peaks. Mountain areas retain snow during the winter months and melting of the snowpack in spring contributes significantly to spring runoff flows on the Rio Grande and Rio Chama.

A National Oceanic and Atmospheric Administration (NOAA) National Weather Service Cooperative Observer station with a relatively complete record is located at Alcalde (Station 290245), along the Rio Grande northeast of Ohkay Owingeh. The period of record for this station is 1953 through October 2012. The climate at Alcalde is arid continental with large daily and seasonal temperature differences (USACE 2017). Summers tend to be hot and dry; winters tend towards cool and humid. Peak precipitation occurs during the late summer/early fall (July, August, September) during the peak of the North American Monsoon (monsoon), with a secondary peak in winter. Spring and fall tend towards warm and dry.

The monthly period of record temperature summary at Alcalde (USACE 2017, Appendix G) shows that monthly average daytime maximum temperatures (Tmax) are above freezing in all months. Winter Tmax averages 47.7°F, with few winter days with Tmax <=32°F. Monthly overnight minimum temperatures (Tmin) average 17.1°F in winter, but can reach as low as -34°F. In summer, Tmax averages 87.4°F. July is the hottest month, with an average of 16 days with temperatures above 90°F and occasional days where temperatures peak as high as 102°F. Monthly overnight low temperatures average 69.9°F in summer.

At Alcalde, precipitation averages 10.01” per year (USACE 2017, Appendix G). In most months, precipitation is 0.75” or less, but is higher during the monsoon season: July receives an average of 1.37”, August 1.89”, September 1.26”, and October 1.04”. Precipitation may fall as snow from October through April, with average monthly snowfall peaking in December at 2.8”.

Floods occur from April through October and are usually the result of rain alone, rain-augmenting snowmelt runoff, or in some rare cases, extremely high snowmelt runoff events. Local rain events caused by convective storms create flash floods on the tributaries, which accumulate in the Rio Grande’s channel. Many of the flood-producing storms on the main stem Rio Grande occur during the transitional periods between spring and summer and between summer and fall. During these periods, the strong intrusion of cool northern air interacts with the moist tropical air to produce the widespread storms over the watershed.

Topography significantly influences local climate in winter and summer. In winter, the dominant pattern is for storms to move into the region from the west or northwest; much of the precipitation falls over the western and central portions of the Jemez Mountains, and the amount declines rapidly

moving east of the Sierra de los Valles and down slope to the Rio Grande. During the monsoon season, thunderstorm development is encouraged by daytime surface heating over the Pajarito Plateau and Sierra de los Valles. Daytime surface heating causes air to rise, initiating convection that can pull in air from lower areas to the southeast (Bowen 1996). This convection leads to the formation of thunderstorms over the plateau. Westerly winds in the upper atmosphere can push these storms east towards the Rio Grande as well as advect precipitation into the area. The Sangre de Cristo Mountains prevent moisture from the Plains from entering the region. The region effectively lies in the rainshadow of the Sangre de Cristo Mountains with respect to moisture transported northwestward from the Gulf of Mexico.

Wind direction is generally from the southeast in summer and from the west in winter but varies greatly because of local topography and mountain and valley breezes. Los Alamos National Laboratory researchers have deduced a diurnal pattern of wind movement from observations in the various Pajarito Plateau Canyon systems. During the day, the winds tend to blow up-canyon from the east; at night, the winds tend to blow down-canyon from the west. Shear winds have also been noted across the canyons (Bowen 1996).

In recent decades, temperature increases have been observed regionally (USACE 2017, Appendix G). Annual temperatures in New Mexico warmed at an average rate of 0.219°F (0.10°C) per decade from 1912 to 2011 but at the faster rate of 0.678°F (0.34°C) per decade since 1970 (Tebaldi et al. 2012). The same pattern of faster recent warming was also observed in annual average daytime maximum high temperature (Tmax) and annual average nighttime minimum temperature (Tmin). Higher rates of warming have been observed in high elevation areas, particularly in winter. There has been no detectable trend in precipitation.

In the vicinity of the action area, statistically-significant increases in temperature have been observed over the period 1971-2012, particularly in the months of January and March, and in the summer months from May through September. Daytime high temperatures have risen at about 1°F/decade from May through November in the Middle Rio Grande, and at approximately half that rate along the Rio Chama and Jemez River. Rates of warming have been slower in the Jemez Mountain stations. Only in March is there a significant, region-wide warming trend of approximately 1°F/decade.

Nighttime low temperatures have also risen significantly in many months, particularly in the period April through September when a warming trend of approximately 0.5°F/decade was observed. Increases in Tmin were particularly evident in the Jemez Mountains, with significant rates of increase in excess of >0.59°F/decade in all months except February and December. As a result of this warming, there has been a trend towards increasing numbers of late spring days with night-time temperatures warmer than 32°F. Historic precipitation trends in the action area show little in the way of statistically significant trends. There would be no change to the regional climate in the future with the no-action alternative.

3.4 Water Resources

3.4.1 Hydrology

This EA incorporates by reference the URGWOPS FEIS (USACE, USBR, ISC 2007) regarding hydrology. Water operations along the Rio Chama have four general purposes: flood control, irrigation supply, municipal and industrial supply, and environmental operations (USACE, USBR, NMISC 2007). Water operations also include downstream monitoring to ensure that desired flows are achieved. Little Rio Grande flow is actually captured and stored in the major reservoirs in this system. On average, only 100,000 AF of native Rio Grande system water (less than 10% of annual average flow at Otowi gage), is historically stored in El Vado Reservoir. Except for temporarily detained flows due to flood regulation, all of the water stored in Abiquiu Reservoir is imported SJC project water. When Pub. L. No. 86-645 is triggered, Abiquiu Reservoir is required to retain carryover flood storage because no native Rio Grande system water may be withdrawn from storage after July 1 (exclusive of water from upstream storage) when the natural flow at the Otowi gage is less than 1,500 cfs. Native Rio Grande system water that is locked into storage is not permanent; it must be released at the end of the irrigation season (November 1) and must be fully evacuated by March 31 of the following year.

Along the Rio Chama, Heron Reservoir manages imported SJC project waters, passing all Rio Grande flows (USACE, USBR, NMISC 2007). El Vado Reservoir regulates native Rio Grande system water for Prior and Paramount (P&P) water needs and retains native Rio Grande system water when allowed by the Compact for use by the Middle Rio Grande Conservancy District (MRGCD). When space is available, El Vado can also store SJC project waters. Abiquiu Reservoir is Congressionally authorized for flood control, sediment control, and water supply storage of both SJC project water and native Rio Grande system water. Figure 4 illustrates the historic water surface elevations at Abiquiu Reservoir. However, Abiquiu Reservoir does not currently store native Rio Grande system water except for flood control purposes.

Flood control operations adjust the rate of releases at Abiquiu Reservoir (USACE, USBR, NMISC 2007). Flood control operations are typically in effect during snowmelt runoff, when mountain snowpack is heavier than normal, and during unusually heavy summer monsoon seasons. Releases from Abiquiu Reservoir are adjusted to take into account flow from Cochiti, Galisteo, and Jemez Canyon reservoirs along the Rio Grande main stem and its tributaries. These four reservoirs are operated as a system to ensure that flows at critical downstream points are not exceeded.

The Compact, in effect, limits the amount of surface water that can be depleted in the Middle Rio Grande based upon the natural flow of the river measured at the Otowi gage downstream of the action area (Compact, 1939). In addition, the NM OSE has determined the Middle Rio Grande to be fully appropriated. Therefore, any increase in water use in one area of the river must be offset by a reduced use in another area of the river.

Under the no action alternative, normal operations would continue at Abiquiu Dam with regards to flood and sediment control. USACE may evacuate conservation storage from the described flood control pool, or any portion thereof, as necessary for flood control purposes, in accordance with authorized project purposes. The USACE further reserves the right to take such measures as may be necessary to preserve life and property, including being able to meet emergency situations or to permit maintenance or repair of the dam or appurtenant structures. Regulation and releases will be accomplished with the USACE service gates, and the USACE will not be liable or

responsible for any loss of the retained waters resulting from releases made to fulfill Abiquiu Dam and Reservoir's flood control purpose, or due to any malfunction of the service gates, or due to inspection and maintenance of the gates that may be necessary to ensure the proper and safe operation of Abiquiu Dam and Reservoir. The responsible entities will make release decisions for water delivery.

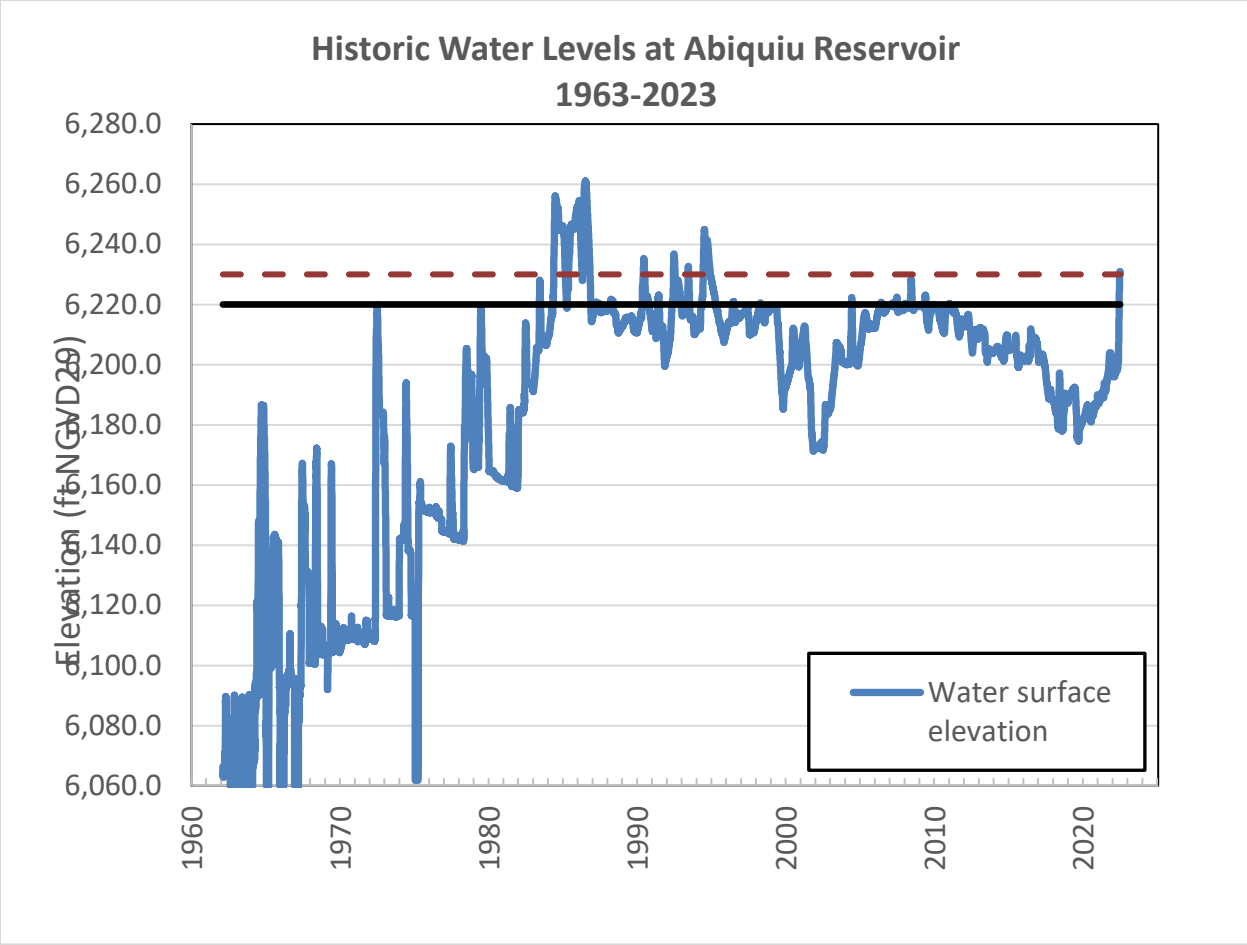

Figure 4 Historic water surface elevations at Abiquiu Reservoir from 1963 to June 2023. The red dashed line represents the 6,230 ft water level.

3.4.2 Rio Grande Water Delivery

Rio Grande water management operations on the Rio Chama have been previously evaluated under NEPA (USACE, USBR, NMISC 2007), and the Endangered Species Act (ESA) by Reclamation (2015, 2020), and the Fish and Wildlife Service (USFWS 2016).

3.4.3 Water Quality

This EA incorporates by reference the URGWOPS FEIS (USACE, USBR, ISC 2007) regarding water quality for the Rio Chama and Abiquiu Reservoir.

New Mexico Environment Department (NMED) periodically monitors water quality within the state's waterbodies (i.e., lakes rivers, and streams) to determine whether attainment of water quality standards and supporting designated uses is occurring. The results of this assessment are used for reporting through the 303(d)/305(b) Integrated List and the development of total maximum daily load (TMDL) documents for each waterbody not meeting standards. The designated uses for Abiquiu Reservoir and the reaches of the Rio Chama upstream and downstream include irrigation, livestock watering, wildlife habitat, cold water fishery, and warmwater fishery (NMWQCC 2017). The most recent survey of the reservoir and river reaches occurred between 2012 and 2014 (NMED 2015). From this assessment, it was determined that river reaches fully support the designated uses (NMED 2018), while the reservoir supported all designated uses except for the cold and warmwater fisheries. The impairment is a result of fish consumption advisory listings for PCBs (polychlorinated biphenyls) and mercury. Per U.S. Environmental Protection Agency (USEPA) guidance, these advisories demonstrate non-attainment of CWA goals stating that all waters should be fishable. Therefore, the impaired designated use is the associated aquatic life even though human consumption of the fish is the actual concern. TMDL exceedances occurred for sedimentation (Rito Encino, Coyote Creek and Poleo Creek – tributaries to the Rio Puerco de Chama), and *E. coli* (Cañones Creek) in tributaries to the Abiquiu Reservoir (NMED 2022).

The construction of Heron, El Vado, and Abiquiu dams, and the importation of Colorado River Basin water via the SJC project has had numerous effects on water quality in the Rio Chama watershed (Langman and Anderholm 2004). The coordinated storage and releases from the dams and the additional flows from the SJC project decreased specific conductance and suspended-sediment concentration and increased pH (Langman and Anderholm 2004). The hypolimnetic release from Abiquiu Reservoir can also influence the dissolved oxygen (DO) regime on the Rio Chama. For example, exceedances of the water quality standard for DO (6 mg L^{-1}; NMWQCC 2017) occurred once during the summer and twice in the fall of 1999 (NMED 2004). The exceedances were attributed to documented summer stratification and formation of anoxic water within the hypolimnion (Davis and Joseph 1999, Davis 2007) that was subsequently released from the reservoir (NMED 2004). The hypolimnetic release, which dampens thermal regime downstream of the dam, may also facilitate elevated DO concentrations due to physical controls of the solubility of oxygen in water (Wetzel 2001).

It is unclear how the flow-through hydropower facility, which is operated during high- and low-flow by Las Alamos County, impacts water quality on the Rio Chama downstream of Abiquiu Dam. However, it can be assumed the impacts are less severe than a typical hydroelectric peaking operation, where water is stored at night when electrical demand is relatively low and released

through turbines during the day to satisfy demand, with considerable ecological effects downstream (Cushman 1985, Moog 1993, Friedl and Wüest 2002).

Nevertheless, water quality could be impacted under the no action alternative due to a changing climate (Langman and Nolan 2005, Vörösmarty et al. 2000, Murdoch et al. 2000, Whitehead et al. 2009, and van Vliet et al. 2013). Lakes and reservoirs are considered sentinels, integrators, and regulators of a changing climate (Williamson et al. 2009). For example, the El Niño Southern Oscillation, reservoir inflows, and reservoir oxygen content series oscillated in common periods and decreasing inflows reduced the oxygen content by 20% in a Mediterranean reservoir (Marcè et al. 2010). Stefan et al. (2001) quantified the potential reduction of habitat for cold and cool water fishes that is likely to become drastically reduced under conditions of atmospheric CO_2 concentration doubling in greater than 200 North American lakes. Other climate-mediated disturbances such as wildfire activity, which has increased in each of the last two decades in the southwestern U.S. (Westerling et. al. 2006), and impacted water quality of streams and rivers within the Rio Grande basin (Dahm et al. 2015, Reale et al. 2015, Sherson et al. 2015). Wildfires can also impact the physical, biological, and chemical processes in lake ecosystems, but has been less studied than flowing waters (McCullough et al. 2019). However, the hypolimnetic release may dampen the impacts of a wildfire on water quality immediately downstream of the dam (Dahm et al. 2015).

The future with the no action alternative would not change the existing water quality in the action area and have no effect on Waters of the United States.

3.5 Vegetation Communities

The area surrounding Abiquiu Reservoir supports upland vegetation typical of the Great Basin Conifer Woodland and Desert Scrub biotic communities (USACE 2017). One-seed juniper is prominent on the steeper slopes of dissected terraces or plateaus. Juniper and piñon pine are both prominent on the shallow, sandy soils found on outcroppings and foothills.

The area has been mapped to classify vegetation, primarily through photo-interpretation from Abiquiu Dam to the confluence with the Rio Grande (USACE 2007). Classification of Rio Grande basin riparian vegetation relies on plant community designations developed by Hink and Ohmart (1984). The river corridor previously supported cottonwoods, willows, New Mexico olives, shrubs, and wetlands. The vegetation surrounding Abiquiu Reservoir would remain unchanged from the existing upland trees and plants.

3.6 Fish and Wildlife

The fish and wildlife species by taxa that potentially occur in Rio Arriba County (BISON-M, NMDGF accessed December 7, 2021) are fish (33), amphibians (12), reptiles (28), birds (251), and mammals (89). The list of all wildlife species is provided in Appendix A.

Mammals associated with the upland areas surrounding Abiquiu Reservoir include mule deer (*Odocoileus hemionus*), pronghorn (*Antilocapra americana*), coyote (*Canis latrans*), desert cottontail (*Sylvilagus audubonii*), Ord's kangaroo rat (*Dipodomys ordii*), piñon mouse (*Peromyscus truei*), rock squirrel (*Otospermophilus variegatus*), and white-throated wood rat (*Neotoma albigula*). The riparian corridors support beaver *(Castor canadensis*), muskrat (*Ondatra zibethicus*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), and Botta's pocket gopher

(*Thomomys bottae*). Bobcat (*Lynx rufus*) and other large carnivores occur infrequently in the area due to disturbances by humans.

Avifauna that may be found in the Abiquiu Reservoir area include the American Kestrel (*Falco sparverius*), Prairie Falcon (*Falco mexicanus)*, Mourning Dove (*Zenaida macroura*), Great Horned Owl (*Bubo virginianus*), Common Nighthawk (*Chordeiles minor*), Cordilleran Flycatcher (*Empidonax occidentalis*), Horned Lark (*Eremophila alpestris*), Cliff Swallows (*Petrochelidon pyrrhonota*), Rock Wren (*Salpinctes obsoletus*), Canyon Towhee (*Melozone fusca*), House Finch (*Haemorhous mexicanus*), and Western Meadowlark (*Sturnella neglecta*). Flocks of cormorants and wintering Bald Eagles (*Haliaeetus leucocephalus*) utilize the shallow waters, and lands at lower elevations along portions of the northern shoreline. Bald Eagle winter roosting sites have been noted along the Rio Chama drainage, although not in the immediate vicinity of the dam or reservoir. Western Grebe (*Aechmophorus occidentalis*), Great Blue Heron (*Ardea herodias*), Common Merganser (*Mergus merganser*), and Mallard (*Anas platyrhynchos*) are among the most frequently observed waterfowl utilizing the river area.

The Rio Grande is a major migratory flyway for avian species (Yong and Finch, 2002). The peak nesting season for birds is April 15 through August 15. The Migratory Bird Treaty Act (MBTA) (16 U.S.C. § 703 *et seq*.) is the primary legislation in the United States established to conserve migratory birds (USFWS 2004). The list of the species protected by the MBTA appears in Title 50, Section 10.13, of the Code of Federal Regulations (50 C.F.R. § 10.13). The MBTA prohibits taking, killing, or possessing of migratory birds unless permitted by regulations promulgated by the Secretary of the Interior. The USFWS and the Department of Justice are the Federal agencies responsible for administering and enforcing the statute.

More than 160 bird species, which are Federally protected under the Migratory Bird Treaty Act, may be found in the Rio Chama valley. Since 2001, 152 bird species have been observed at the Los Luceros Important Bird Area (IBA, Audubon Society) on the Rio Grande. Hink and Ohmart (1984) recorded 277 species of birds in the bosque ecosystem. Highest bird densities and species diversity were found in edge habitat vegetation with a cottonwood overstory and an understory of Russian olive (*Elaeagnus angustifolia*) (Hink and Ohmart 1984). Emergent marsh and other wetland habitats also had relatively high bird density and species richness. Thirty of the forty-six species of breeding birds found in the bosque used cottonwood forest habitat. No bird species showed a strong preference for Russian olive stands (Hink and Ohmart 1984).

Most reptiles are found in areas adjacent to the reservoir, while amphibious species generally inhabit marginal lakeside habitats. Amphibian and reptilian species which may occur in the area include the Spadefoot Toads (*Spea multiplicata* and *S. bombifrons*), Northern Sagebrush Lizard (*Sceloporus graciosus*), and Plateau Fence Lizard (*Sceloporus tristichus*). Herptile abundance and diversity was found to be greatest in habitats that lacked dense canopy cover and that were characterized by sandy soils and sparse ground cover (Hink and Ohmart 1984). Many of the species found in the bosque were representative of drier upland habitats. Hink and Ohmart (1984) did describe a distinct assemblage of species associated with denser vegetation cover in mesic or hydric habitats. Common species included Tiger Salamander (*Ambystoma mavortium*), Boreal Chorus Frog (*Pseudacris maculate*), Bullfrog (*Lithobates catesbeianus*), Northern Leopard Frog (*Lithobates pipiens*), Many-Lined Skink (*Plestiodon multivirgatus*), Black-Necked Garter Snake (*Thamnophis cyrtopsis*), and Western Painted Turtle (*Chrysemys picta*).

This EA incorporates by reference the URGWOPS FEIS (USACE, USBR, ISC 2007) regarding fish in the Rio Chama and Abiquiu Reservoir. Common fish species in the Abiquiu Reservoir (Sublette et al. 1990) include Rainbow Trout (*Oncorhynchus mykiss*), Brown Trout (*Salmo trutta*), Kokanee Salmon (*Oncorhynchus nerka*), Common Carp (*Cyprinus carpio*), Rio Grande Chub (*Gila pandora*), Fathead Minnow (*Pimephales promelas*), Flathead Chub (*Platygobio gracilis*), White Sucker (*Catostomus commersoni*), Channel Catfish (*Ictalurus punctaus*), Green Sunfish (*Lepomis cyanellus*), Bluegill (*Lepomis macrochirus*), Smallmouth Bass (*Micropterus dolomieui*), and Walleye (*Stizostedion vitreum*).

With the no action alternative, there would be no changes to fisheries or terrestrial wildlife or their habitat in the action area from the existing conditions.

3.6.1 Special Status Species

Three agencies have a primary responsibility for the conservation of animal and plant species in New Mexico: the USFWS, under the authority of the Endangered Species Act of 1973, as amended; the NMDGF, under the authority of the Wildlife Conservation Act of 1974; and the New Mexico Energy, Minerals and Natural Resources Department, under authority of the New Mexico Endangered Plant Species Act and 19.21.2 NMAC. Each agency maintains a list of animal and/or plant species that have been classified or are candidates for classification as endangered or threatened based on present status and potential threat to future survival and recruitment.

There are several Federal and State listed threatened or endangered species, species of concern, and rare plants that occur, or could potentially occur, in Rio Arriba County (BISON-M, NMDGF accessed March 8, 2023); however, federally designated critical habitat is not present within the action area for these species. Four Federally listed, two candidate, and one proposed threatened species potentially may be present in or near the Abiquiu Reservoir and are listed in Table 5. See Appendix A for additional information on wildlife species of concern. There are no special status species that would be affected by the no action alternative at this time.

Table 5 Federally listed Threatened or Endangered Species that occur near the action area (USFWS iPaC accessed March 8, 2023. Additional information in Appendix A).

Common Name	Scientific Name	Status	Present	Critical Habitat
New Mexico Meadow Jumping Mouse	*Zapus hudsonius luteus*	E	N	N
Mexican Spotted Owl	*Strix occidentalis lucida*	T	N	N
Southwestern Willow Flycatcher	*Empidonax traillii extimus*	E	N	N
Western Yellow-Billed Cuckoo	*Coccyzus americanus*	T	N	N
Rio Grande Cutthroat Trout	*Oncorhynchus clarki virginalis*	C	N	N
Monarch Butterfly	*Danaus plexippus*	C	unknown	N
Silverspot	*Speyeria nokomis nokomis*	PT	N	N

3.7 Recreation

Abiquiu Reservoir offers fishing for cold, cool, and warmwater species, with trout fishing below Abiquiu Dam on 2.7 miles of river through lands managed by USACE, BLM, USFS, and the NMLO. Other recreational activities may include camping, walking, biking, hiking, wildlife viewing, and picnicking. These activities are anticipated to continue at the same levels under the

no action alternative. There would be no changes to recreation in the action area from the existing conditions.

3.8 Indian Trust Assets

Indian Trust Assets are legal interests in property held in trust by the United States for Indian tribes or individuals. Examples of trust assets include, but are not limited, to land, minerals, hunting and fishing rights, and water rights. The United States, as part of its Indian Trust Responsibility, must protect and maintain rights reserved by or granted to Indian tribes or individuals by treaties, statues, executive orders, and rights further interpreted by the courts. This trust responsibility requires that all Federal agencies take all actions reasonably necessary to protect such trust assets. There would be no effect to water rights and traditional agricultural practices or other Indian Trust Assets for Rio Grande Basin Pueblos under the no action alternative.

3.9 Cultural Resources

Section 106 of the National Historic Preservation Act (NHPA) [54 U.S.C. § 300101 *et seq.*] and its implementing regulations (36 C.F.R. Part 800) require Federal agencies to take into account the effects of their undertakings (e.g., projects or permits) on historic properties.

Historic properties are legally considered to be those properties (cultural resources) eligible for listing on the National Register of Historic Places (NRHP). To be eligible for listing, a property must have "the quality of significance in American history, architecture, archeology, engineering, and culture" that can be "present in districts, sites, buildings, structures, and objects," must "possess integrity of location, design, setting, materials, workmanship, feeling, and association," and must meet at least one of a set of four criteria relating to (A) association with historical events; (B) historically significant people; (C) distinctive characteristics of a period or style; and/or (D) are likely to yield information important to prehistory or history. There are many possible examples of historic properties, including archaeological sites, historic buildings, traditional cultural properties (TCPs), and historic districts. As such, the identification and evaluation of historic properties (including archaeological sites, historic buildings, and other features constructed or modified by humans in the past) is an important component of this action.

The Section 106 process includes the identification of historic properties that might be affected by an action, the evaluation of those properties, determinations of effect on those properties, consultation with various parties (including the New Mexico State Historic Preservation Officer (NMSHPO), Tribes, local governments, and the public) about those effects, and resolution of any adverse effect on historic properties.

There is a long history of human occupation in the Chama Valley, extending from more than 10,000 years ago to the present day. The prehistory and history of the Chama are divided by archaeologists into the following periods, with associated dates:

- Paleoindian: c. 12,500-5500 BC
- Archaic: 5500 BC – AD 400/600
- Developmental Period: AD 400/600-1200
- Coalition Period: AD 1200-1325

- Classic Period: AD 1325-1540
- Historic Period: AD 1540-Present

Each of these periods is characterized by different lifeways, subsistence strategies, and technologies. These periods can be grouped into two major divisions: Prehistoric (dating before contact with Europeans), and Historic (dating after contact with Europeans). Many archaeological surveys have been conducted in and near Abiquiu Reservoir, including Klager 1980; Schaafsma 1975a, 1975b, 1976, 1977, 1978a, 1978b, 1979; O'Leary 1988; USACE n.d.; Van Hoose 2021.

3.9.1 Area of Potential Effect

The area of potential effect (APE) for the proposed undertaking is defined as the geographic area within which the proposed undertaking could potentially cause direct or indirect effects to historic properties. For the purposes of the current analysis, the USACE determines that the APE consists of the areas where a new storage maximum (6,230 ft) may result in changing lake elevations that could affect archaeological sites through inundation, exposure, or wave action, within an elevation range of approximately 6,220 ft to 6,230 ft, with a broader potential for sporadic inundation up to 6,250 ft. As will be described below, URGWOM modeling suggests that the elevation range most likely to experience inundation are elevations at and below 6,220 ft, with a much smaller likelihood of having maximum elevations up to 6,250 ft (Figure 3). In addition, any changes in flow regimes could have the potential to affect properties located within the channel downstream of Abiquiu Dam.

Based on an examination of the New Mexico Cultural Resources Information System (NMCRIS) database, as well as USACE records, a total of 148 archaeological sites have been documented within this APE, and these sites represent human use of the landscape ranging from the Archaic to Historic periods. Of these 148 sites, 45 are located above the 6,220 ft level.

In addition, there are numerous historic properties documented near the Rio Chama channel downstream of Abiquiu Dam, including a wide range of prehistoric and historic resources, including active acequia systems.

3.9.2 Evaluation of the No Action Alternative

Under the no action alternative, the water storage limit within the flood control space would remain at 200,000 AF of SJC project water, and native Rio Grande system water would not be stored. Evaluation of the effects of this alternative requires a consideration of effects on reservoir elevation and on downstream flow regime.

3.9.2.1 Reservoir Elevation

Reservoir elevation can affect archaeological sites by subjecting them to a number of processes, including inundation and wave action. Wave action in particular has been shown to have a significant impact on archaeological sites (e.g., Dunn 1996; Ebert et al. 1989; Lenihan et al. 1977a, 1977b; Phillips and Rozen 1982; and Van Hoose and Lundquist 2019).

Figure 4 shows daily reservoir elevations throughout the history of the reservoir. Between the years of 1963 and 1987, reservoir elevations increased from a starting point of around 6,060 ft

NGVD to an all-time maximum of approximately 6,260 ft in August 1987. Since late 1987, elevations have remained largely between 6,170 ft and 6,220 ft, spiking above 6,220 only five times. The figure shows that the predicted average range of elevations for the no action alternative is very similar to the elevation range characteristic of the years since 1987. The no action alternative would be unlikely to inundate sites that have not been inundated over the last three decades.

On the question of wave action, Figure 4 shows that the range of elevation in any given year over the last decades has been relatively small (within 20 ft). Given that the expected range of fluctuation is expected to remain at a similar scale, and the fact that the average predicted range of water levels for the no action alternative has been subjected to substantial wave zone action over the last several decades, the no action alternative would not be expected to create new impacts to resources in the APE below 6,220 ft at Abiquiu Reservoir over baseline.

In general, reservoir elevations above 6,220 ft have been rare over the last three decades, so large or sustained spikes above this level would have the potential to introduce effects from wave actions that sites at those elevations have not often experienced. As such, we do not expect the no action alternative to introduce substantial or new effects to sites above 6,220 ft.

3.9.2.2 Downstream Flow Regime

Under the no action alternative, there would no change to the downstream flow regime. Flows would still be within the historic range of releases as part of normal water operations, and as such would not be expected to introduce new effects to resources downstream.

4 FORESEEABLE EFFECTS OF THE PROPOSED ACTION

4.1 Background and Location

The foreseeable effects of the proposed action would likely be little to no effect on regional geology, air quality, ambient noise, floodplains, wetlands, noxious weeds, invasive species, land use, aesthetics, socioeconomics, demographics, environmental justice, and hazardous waste.

4.2 Climate

The proposed action would have no effect on the future regional climate.

4.3 Water Resources

4.3.1 Hydrology

The proposed action would change water management activities at Abiquiu Dam but not significantly change the flow regime downstream of the dam.

4.3.2 Water Delivery

Owners of stored water will conduct any necessary environmental compliance when they develop their water storage plans, and prior to storing any native Rio Grande system water or SJC project water at Abiquiu Reservoir. Releases from Abiquiu Reservoir of any water stored for responsible entities will represent individual decisions made by water users to call for their water, without any discretionary action by the USACE. The USACE does ensure that such flows are passed in a manner that does not threaten the safety or structural integrity of flood control facilities.

4.3.3 Water Quality

There would be no effect to long-term water quality within the reach if the proposed action is implemented. Climate-mediated impacts to water quality (Section 3.3) would remain if the proposed action is implemented.

4.4 Vegetation Communities

The vegetation in the action area would remain unchanged from the sparse riparian and upland trees and plants. The vegetated area above the 6,220 ft elevation has been subject to periodic inundation from time to time since the dam's construction, but water levels have not reached 6,230 ft very frequently in that time. A ten-foot increase in lake elevation would inundate the vegetation for longer durations than they have previously experienced. While this would not be a qualitatively new impact, it would decrease the density of plants intolerant of periodic inundation within the 6,220-6,230 ft elevation range. The proposed action would have no effect on vegetation communities.

4.5 Fish and Wildlife

Under the proposed action alternative, migratory birds and other wildlife using the area would be able to move away from inundated areas. The effects of retention of water would be similar to the current management and result in no effects for fisheries and terrestrial wildlife.

4.5.1 Special Status Species

There are no special status wildlife species that would be affected by the proposed action.

4.6 Recreation

The effects of the proposed action are expected to increase reservoir water elevations. These changes may increase visits for camping, walking, biking, hiking, wildlife viewing, water sports, and picnicking. The effects to recreation are insignificant.

4.7 Indian Trust Assets

The proposed action has been coordinated with the Rio Grande Basin Pueblos, and other tribal nations. The proposed action would not adversely affect Indian Trust Assets. The effects of the proposed action are insignificant and protect Indian Trust Assets.

4.8 Cultural Resources

The primary impacts of the proposed action would stem from the change in storage to an elevation of 6,230 ft. As shown in Figure 4, lake elevations have rarely exceeded 6,220 ft in the last few decades, but have often spent long periods of time at or near the 6,220-foot mark. Effects from the proposed action therefore have the most potential to stem from the potential ten-foot increase to 6,230 ft.

Three primary sources of potential impacts to these resources have been considered: direct impacts from retention of water; indirect impacts from potential changes in flow regime; and potential impacts from increased recreational use of the area. These are each discussed below.

4.8.1 Water Retention

During the period 1963-2020, lake elevation has exceeded 6,220 ft for a total of 2,098 days, and the elevation range of 6,220-6,230 ft has been within the potentially damaging “wave zone” for a total of 519 days.

A change to defining storage capacity as 6,230 ft would therefore allow water levels to exceed this under certain circumstances, depending on factors such as (a) annual rainfall and runoff conditions, and (b) the amounts of any actual requests for storage received by the USACE. Drought conditions that have been present especially during the last 15 years have resulted in progressively lower lake elevations due to natural conditions, and therefore within the historic range of lake fluctuation. As such, any storage requests received under the new authorization may still be within the historic range of lake elevations and may not in reality exceed 6,220 ft in practice.

However, if lake elevations were to exceed 6,220 ft for extended periods of time, this would have the potential to subject archaeological sites within that elevation range to increased erosion due to wave action. Due to these uncertainties, we currently do not have enough information to clearly make a determination regarding whether any such future changes in lake elevation would adversely affect historic properties. Much of our existing archaeological survey data are old, deriving from surveys conducted during the 1970s and 1980s. We estimate that approximately 20-30 archaeological sites are likely to sit within the ten-foot elevation range between the current maximum elevation (limited by existing easement agreements) and the proposed new elevation.

All these sites have also been subject to periodic inundation from time to time since the dam's construction, but water levels have not reached 6,230 ft very frequently in that time. To the best of our current understanding, an increase of ten ft in lake elevation would bring additional acreage into the lake's wave zone for longer durations than they have previously experienced. While this would not be a qualitatively new impact, it could increase the amount of erosion due to wave action within that elevation range. Most of the previously documented archaeological sites that would be within the 6,230 ft elevation are also currently intersecting the 6,220 ft elevation. As such, an increase in lake levels would likely not have impacts on additional sites not currently being impacted. Given our current knowledge of lake behavior and likely future precipitation patterns, these impacts are likely to be relatively small, but we are uncertain about their magnitude. In addition, the age of our available archaeological survey data makes it difficult to adequately characterize the cultural resources that may be within this ten-foot band; it is possible that many of the previously-mapped sites either do not in fact intersect this elevation band, or that they do not retain integrity necessary to be eligible for the National Register of Historic Places (NRHP).

We therefore anticipate that raising the conservation storage elevation to 6,230 ft may possibly have the **potential to adversely affect** these historic properties, but we need additional information to make this determination. As such, the USACE is currently consulting with the New Mexico State Historic Preservation Officer (NMSHPO) and with Native American Tribes with interests in the area on the proposed action.

Options for a way forward include getting updated field data on the sites within the APE in order to better make both eligibility and effects determinations. If updated field reconnaissance shows that eligible sites are present within the APE and further analysis suggests that adverse effects may result, the Corps would develop a Memorandum of Agreement (MOA) with SHPO and other consulting parties to resolve those adverse effects. Possible ways of addressing potential adverse effects under such an agreement may include monitoring plans for archaeological sites; seeding programs to help offset increased erosional impacts; and others.

4.8.2 Downstream Flow Regime

As with the no action alternative, flows would be within the historic range of releases as part of normal water operations, and as such would not be expected to introduce new effects to resources downstream. We therefore determine that the proposed action would have **no adverse effect** to downstream cultural resources.

4.8.3 Recreation

While slightly higher water levels may result in some increases in recreation, the ranges of water levels (and therefore the expected variation in coincident recreation activities) are within historical ranges. As such, we expect potential increases in recreation to be negligible relative to the no action alternative.

4.8.4 Summary of Cultural Resources Analysis for Future With Proposed Action Alternative

Given the above information, USACE has determined that the proposed action has the **potential to adversely affect** historic properties, but this determination may be revised pending updated field reconnaissance data. Section 106 consultation with NMSHPO and Tribes was initiated in

May 2023 and is ongoing. The approach initially proposed by the USACE in this consultation was to prepare a Programmatic Agreement, which would allow full Section 106 compliance after water storage requests were received. This is reflected in the attached Section 106 consultation correspondence (Appendix B). However, USACE has determined that it is appropriate to consider the effects of updating the WCP to change conservation storage at Abiquiu Dam from a volume of 200,000 AF to an elevation of 6230.00 NGVD29, as well as the contractual actions directed by Section 337 of WRDA 2020. Because of this, USACE is working toward obtaining updated archaeological survey information and would likely address any adverse effects with a MOA. NMSHPO concurred with a determination of no adverse effect for downstream flows (see Appendix B).

5 CONCLUSIONS AND SUMMARY

5.1 Background and Location

The proposed action would not affect regional geology, air quality, noise, floodplains, wetlands, noxious weeds, invasive species, land use, aesthetics, socioeconomics, local demographics, environmental justice, and HTRW. The proposed action would not affect climate, hydrology, water management, vegetation communities, fish and wildlife resources, recreation, or Indian Trust Assets. Cultural resources have the potential to be adversely affected by the proposed action, but development of a MOA to address such effects would render those effects less than significant through minimization and/or mitigation.

All releases from Abiquiu Dam will be within the typical historical range of releases as part of normal water operations.

6 PREPARATION, CONSULTATION, AND COORDINATION

6.1 Preparation

This EA was prepared by the USACE, Albuquerque District. Personnel primarily responsible for preparation include:

- Michael D. Porter, Fishery Regional Technical Specialist
- Jonathan Van Hoose, Archaeologist
- Justin Reale, Supervisory Hydrologist

6.2 Quality Control

This Draft EA has been reviewed for quality control purposes. Reviewers include:

- Ryan Gronewold, Chief Planning Branch
- Danielle Galloway, Chief Environmental Resources Section
- Nabil Shafike, Chief Water Management Section
- Reynalden Delgarito, Rio Grande Basin Manager

6.3 Consultation and Coordination

USACE has coordinated with NMSHPO and Tribes on cultural resources.

6.4 Public Involvement

6.4.1 Scoping Letter

Letters were sent to the organizations and agencies below on November 16, 2022, and January 12, 2023. Responses to the Scoping Letter are included in Appendix C.

Pueblos and Tribes	State Agencies
Jicarilla Apache Nation	Albuquerque Bernalillo County Water Utility
Kewa Pueblo	Colorado State Engineer Office
Navajo Nation	El Paso County Water Improvement District No. 1
Ohkay Owingeh	Elephant Butte Irrigation District
Pueblo de Cochiti	Middle Rio Grande Conservancy District
Pueblo of Isleta	New Mexico Department of Agriculture
Pueblo of Jemez	New Mexico Department of Game and Fish
Pueblo of Laguna	New Mexico Energy, Minerals and Natural Resources Department
Pueblo of Nambe	New Mexico Environment Department
Pueblo of Picuris	New Mexico Interstate Stream Commission
Pueblo of Pojoaque	New Mexico Office of State Engineer
Pueblo of San Felipe	New Mexico Office of the Governor
Pueblo of San Ildefonso	Texas Water Development Board

Pueblo of Sandia	
Pueblo of Santa Ana	**Federal Agencies**
Pueblo of Santa Clara	RGCC Commissioner for Colorado
Pueblo of Taos	RGCC Commissioner for Texas
Pueblo of Tesuque	RGCC Federal Chair
Pueblo of Zia	U.S. Bureau of Indian Affairs
	U.S. Bureau of Land Management
	U.S. Bureau of Reclamation
	U.S. Environmental Protection Agency
Acequias	U.S. Fish and Wildlife Service
Rio Chama Acequia Association	U.S. Forest Service
Abeyta Trujillo Acequia	U.S. Geological Survey
Barranca Acequia	USDA Natural Resources Conservation Service
Chamita Acequia	
Chili Ditch	**Non-Governmental Organizations**
El Barranco Acequia	Audubon Southwest
Ferran Acequia	Center for Biological Diversity
Garcia y Duranes Ditch	Defenders of Wildlife
Gonzales Acequia	East Rio Arriba
Hernandez Acequia	Ghost Ranch
Jose V Martinez Acequia	Land of Enchantment Guides
JP Gonzales Acequia	Los Rios River Runners
La Puente Acequia	New Mexico Trout
Lopez, Mora Ranch Acequias	New Mexico Wilderness Alliance
Manzanares & Montoya Acequia	Rio Arriba Concerned Citizens
Mariano Acequia	Rio Arriba County
Quintana Acequia	Rio Grande Restoration
Rio de Chama Acequia	The Reel Life
Salazar Acequia	Trout Unlimited
Valentine Martinez, Tierra Azul Acequia	Wild Watershed
	WildEarth Guardians

6.4.2 Summary of the Public Review and Comments

The Notice of Availability was sent to agencies and stakeholders for a 30-day public review starting September 25, 2023 by publication of the Notice of Availability in the Albuquerque Journal and the Santa Fe New Mexican. Comments received from the public review of the Draft EA will be included in Appendix C.

The Draft EA was made available online at:
http://www.spa.usace.army.mil/Missions/Environmental/EnvironmentalComplianceDocuments/EnvironmentalAssessmentsFONSI.aspx.

The public can also request a copy of the Draft EA from Michael Porter at:
abiquiu.wcp.2023@usace.army.mil or 505-342-3264.

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