Appendix 3-A. Spanish Fork River Gage Height Analysis Technical Memorandum

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MEMORANDUM

NEBO WATER PROJECT

Date:	Tuesday, February 24, 2026
Project:	Nebo Regional Water Project
To:	Central Utah Water Conservancy District
From:	HDR
Subject:	Spanish Fork River Gage Height Analysis with the Nebo Regional Water Project's Preferred Alternative

Introduction

The Central Utah Water Conservancy District (District) is a regional wholesale provider that serves seven counties (all of Utah, Salt Lake, Wasatch, Duchesne, and Uintah Counties, as well as part of Juab and Summit Counties) in central Utah and collaborates with other agencies to serve its constituents. The District's primary responsibility is to deliver a safe and secure water supply to its customers by managing the federal Central Utah Project and the District's network of non-federal water facilities. The District is a water wholesaler to various cities and irrigation districts. The Central Utah Project Completion Act (Public Law 102-575, Section 205) required that the District enter into an agreement with the U.S. Department of the Interior to act as a federal agency for compliance with environmental laws, including the National Environmental Policy Act (NEPA).

As Joint Lead Agencies (JLAs), the District, the U.S. Bureau of Reclamation, the U.S. Department of the Interior – Central Utah Project Completion Act Office, and the Utah Reclamation Mitigation and Conservation Commission are preparing an environmental assessment (EA) in accordance with NEPA, 42 *United States Code* Section 4321 and subsequent sections, and applicable regulations for the proposed Nebo Regional Water Project (Proposed Project).

The Proposed Project would develop an integrated raw (or untreated) water and finished (or treated) water delivery system that is reliable, resilient, and able to serve current and future municipal and industrial and agricultural water demands in southern Utah County and eastern Juab County.

This memorandum was prepared to evaluate and predict how the gage height for the Spanish Fork River could change with reduced flows resulting from the Preferred Alternative for the Proposed Project. Historic discharge (water flow) and gage height (water level) in the Spanish Fork River were used to help better understand the indirect effects of the Preferred Alternative's reduction of water flow and water level in the Spanish Fork River.

Methodology

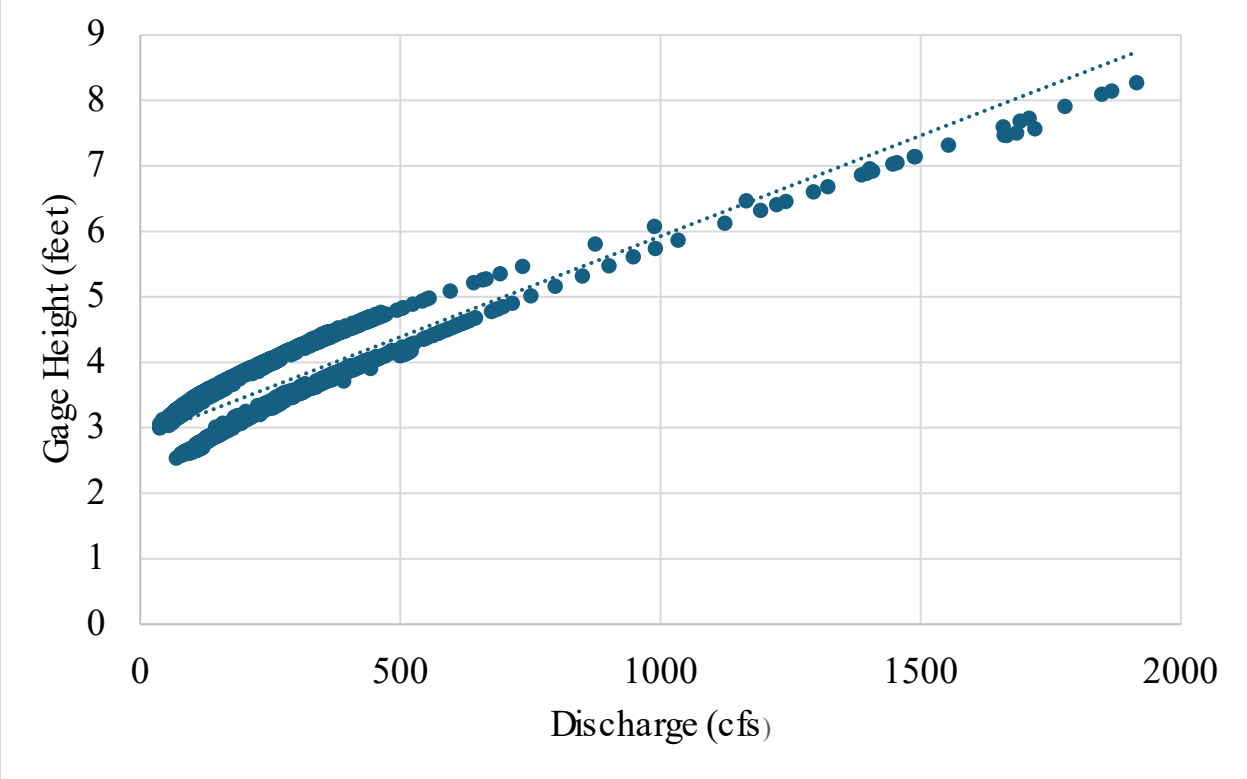
Continuous historic data from a U.S. Geological Survey (USGS) monitoring location—Spanish Fork at Castilla, Utah (USGS-10150500)—were used to evaluate how the gage height for the Spanish Fork River could change with reduced flows resulting from the Preferred Alternative. At this monitoring location, USGS collects continuous data of discharge (in cubic feet per second [cfs]) and gage height (in feet) every 15 minutes using automated sensors. For this analysis, the continuous data were compiled for every day between 2020 and 2025, and average discharges and gage heights were calculated for each day. A simple linear regression was then used to evaluate the relationship between discharge and gage height in the compiled data (sample size [n]) = 2,170).

The results showed a strong relationship between discharge and gage height; discharge explained 79% of the variation in gage height ($R2 = 0.79$, $p < 0.01$). Figure 1 provides the graphical results of the regression. The line of best fit is reflected in the following equation:

$$y = 0.0031x + 2.8511$$

where: x = discharge (cfs)
y = gage height (feet)

Figure 1
Linear Regression Relationship of Paired Daily Discharge (cfs) and Gage Height (feet) Readings from 2020 to 2025 (n = 2,170)



With the Preferred Alternative, stream flow would decrease in the Spanish Fork River between Diamond Fork Creek and the Spanish Fork River Diversion because the Preferred Alternative would convey water from Strawberry Reservoir in the Spanish Fork Canyon Pipeline and Loafer Pipeline instead of this water being conveyed in the river. To determine what stream flows might occur with the Preferred Alternative, the JLAs prepared a report for the Nebo Regional Water Project EA to determine what the historic river flows for the Spanish Fork River would have been from 2017 to 2024 without the added instream flows that are expected to be removed with the Preferred Alternative (see Appendix A, *Spanish Fork River Historic Data*, of the EA for the Proposed Project). The results of this analysis were averaged and are shown in Figure 2 and Table 1.

To better understand how the gage height might change with reduced stream flows resulting from the Preferred Alternative, the line of best fit from the regression analysis was used to predict the gage height based on the stream flow data provided in Table 1.

Figure 2
Spanish Fork River Monthly Average Discharge (2017–2024) with the No Action Alternative and the Preferred Alternative

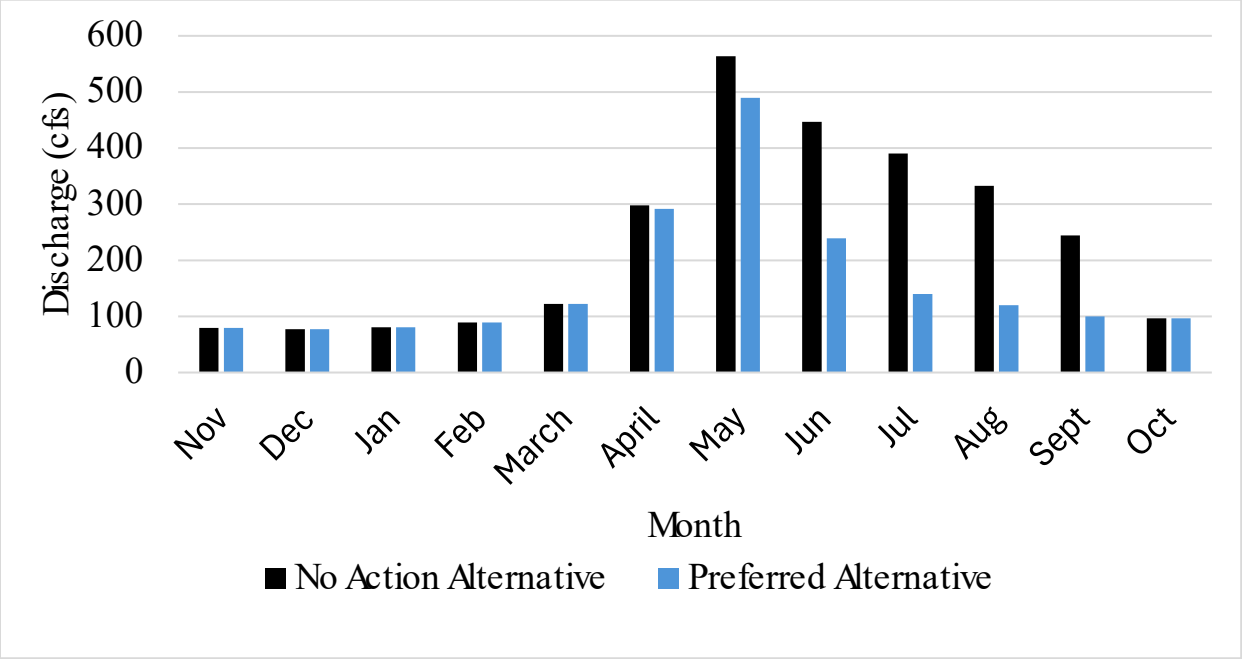


Table 1
Spanish Fork River Monthly Average Discharge (2017–2024) with the No Action Alternative and the Preferred Alternative

Month	No Action Alternative[a]	Preferred Alternative[a]	Reduction[a]	Difference
November	79.76	79.76	0	0%
December	77.36	77.36	0	0%
January	80.81	80.81	0	0%
February	89.10	89.10	0	0%
March	122.31	122.31	0	0%
April	297.89	291.66	−6.23	−5%
May	563.83	489.36	−74.47	−25%
June	447.05	238.90	−208.15	−51%
July	390.18	140.05	−250.13	−65%
August	332.48	119.81	−212.67	−64%
September	244.05	100.13	−143.92	−59%
October	96.48	96.48	0	0%

[a] Discharge unit is in cfs.

Results

With the Preferred Alternative, the average monthly water flow in the Spanish Fork River (using 2017 to 2024 historic data) could decrease by about 74 to 250 cfs (25% to 65%) between May and September. Reductions in flow would lead to accompanying reductions in gage height. The predicted gage height could decrease by about 0.23 to 0.78 foot (6% to 18%) between May and September. Figure 3 and Table 2 provide graphical and tabular output of the predicted gage height.

Figure 3
Spanish Fork River Monthly Average Gage Height (2017–2024) with the No Action Alternative and the Preferred Alternative

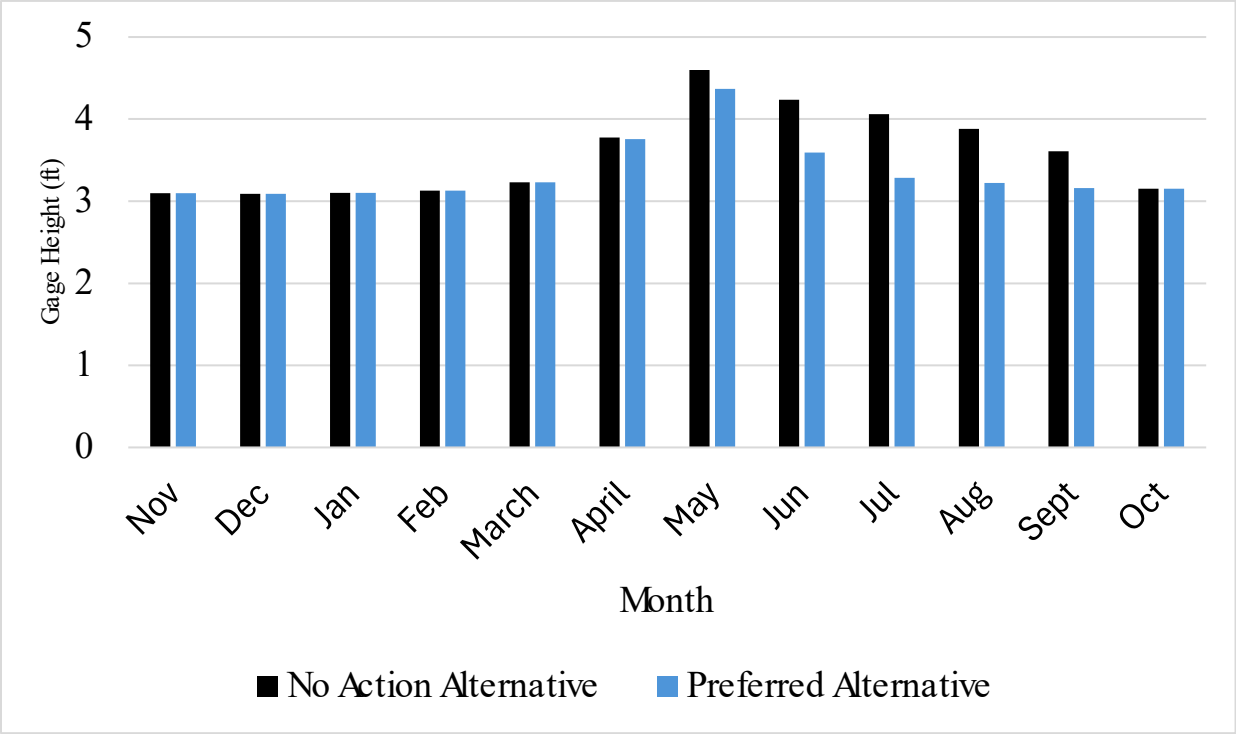


Table 2
Spanish Fork River Monthly Average Gage Height (2017–2024) with the No Action Alternative and the Preferred Alternative

Month	No Action Alternative[a]	Preferred Alternative[a]	Reduction[a]	Difference
November	3.10	3.10	0	0%
December	3.09	3.09	0	0%
January	3.10	3.10	0	0%
February	3.13	3.13	0	0%
March	2.23	2.23	0	0%
April	3.77	3.76	−0.01	−1%
May	4.60	4.37	−0.23	−6%
June	4.24	3.59	−0.65	−15%
July	4.06	3.29	−0.77	−19%
August	3.88	3.22	−0.66	−17%
September	3.61	3.16	−0.45	−12%
October	3.15	3.15	0	0%

[a] Gage height unit is in feet.