Newlands Project Planning Study
Special Report

Prepared by

Bureau of Reclamation
Mid-Pacific Region
Lahontan Basin Area Office

U.S. Department of the Interior
Bureau of Reclamation

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Executive Summary

The Newlands Project Planning Study (Study) Special Report is a study conducted by the U.S. Department of the Interior, Bureau of Reclamation (Reclamation). The Study's intent is to formulate, develop, and evaluate a range of alternatives to deliver water to Newlands Project (Project) water rights holders while also reducing risk to local communities from operating the Project's Truckee Canal. The purpose of this Special Report is to describe that process and present Study findings.

Planning studies help identify and evaluate different ways to address a problem or issue in a manner that could be supported by decision makers, stakeholders, and Congress before funding more detailed studies or projects. Thus, the results of this Study may be used to inform decisions regarding the Newlands Project, including the extent of repairs to the Truckee Canal and its future operation; the report is informational only and is not intended to provide a specific recommended action. If Congress chooses to authorize and appropriate funds in the future for a feasibility study, construction, or other activities, this report would provide important context and guidance for undertaking those activities and any related environmental reviews.

Background

The Newlands Project is one of Reclamation's first irrigation projects and nearly as old as the agency itself. Reclamation began the Project in 1903 to provide irrigation water to the Lahontan Valley, near Fallon, Nevada, and to lands in the Truckee Basin near Fernley, Nevada.

In the early morning of January 5, 2008, a 50-foot portion of the Truckee Canal embankment failed about 12 miles downstream from Derby Dam, releasing water that inundated a residential development in the City of Fernley, flooding 590 properties. No fatalities occurred, but more than $1 billion in tort claims were filed against the Federal government, local governments, and the Truckee-Carson Irrigation District (TCID), and have now been consolidated into class-action lawsuits.

Although the damaged portion of the canal embankment was soon repaired, evaluations of the canal revealed a high potential for future failure. In response, Reclamation imposed restrictions on the water surface elevation allowed in the canal and the amount of water allowed to flow through the canal. The flow restrictions were reinforced by the Federal District Court for Nevada. If not lifted, these restrictions could complicate the long-term ability of Reclamation to provide Newlands Project water rights holders with reliable supplies.

Federal authorization for the Study was provided in the *Omnibus Appropriations Act of 2009* (Public Law 111-8, 123 Statute 609), which directed Reclamation to determine the actions necessary to rehabilitate the Truckee Canal so restrictions on its operation can be removed.

Existing and Future Conditions

The primary study area for this investigation consists of the Newlands Project boundaries, TCID service area in the Newlands Project, Churchill County, the City of Fernley in northern Lyon County, the Fallon Paiute-Shoshone Indian Reservation, the Stillwater National Wildlife Refuge (NWR), and the Carson Lake and Pasture. The extended study area encompasses the broader Carson River watershed, Truckee River watershed, and Dixie Valley. These areas encompass Lake Tahoe, Pyramid Lake, a number of cities and communities, as well as the majority of the Pyramid Lake Indian Reservation. Figure ES-1 shows both the primary and extended study areas.

This Study describes existing and likely future without-action conditions in the primary and extended study areas. The description of these conditions includes information available to the Study on infrastructure; physical, biological, cultural, socioeconomic environments; and water resources.

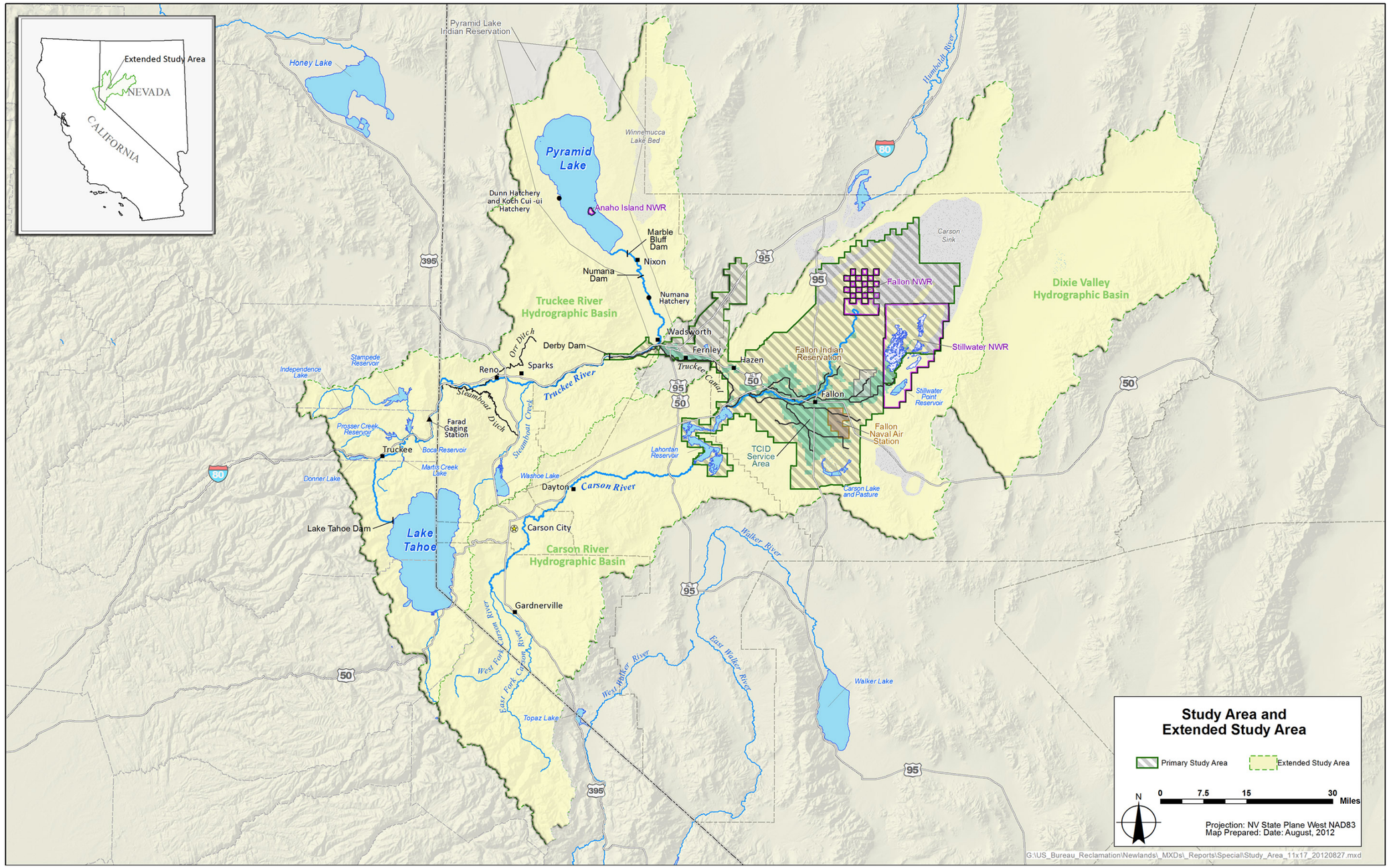

Figure ES-1. Study Areas for the Newlands Project Planning Study

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Problems, Needs, and Opportunities

Major water resources problems and needs for the Study pertain to the increasing competition for water rights in the Truckee and Carson river basins, increases in the likelihood and potential consequence of a Truckee Canal breach, and the reliability of Project water rights. Opportunities have been identified during the Study relative to Project efficiency and water quality and quantities on the Lower Truckee River.

Water Rights Related Needs

Reclamation and its local contractor, TCID, are obligated to serve Project water rights holders. However, the Project's changing makeup has complicated the delivery of water to its diverse blend of users. Over the last century, several factors, including urban growth in Fallon and Fernley and the decline of ecosystems in the primary and extended study areas, have increased competition for water in the Truckee and Carson river basins and reduced the proportion of Project water delivered for agricultural uses relative to other uses. While these changing demands are not considered a problem, serving Project water rights holders is an important need.

Truckee Canal Risk Related Problems and Needs

As evidenced by the 2008 breach, operating the Truckee Canal in its current condition to serve Project water rights holders presents large safety risks for residents and property, particularly in the Fernley area. The breach in 2008 was not the first structural failure of the Truckee Canal – eight other breaches occurred during the twentieth century. However, all of the previous breaches had occurred in rural areas or at a time when the property adjacent to the canal was uninhabited.

Since 2008, Reclamation has reviewed the risks of continuing to operate the Truckee Canal and has concluded that substantial improvements will be needed to allow the canal to safely convey as much water as it has historically. The facility's advanced age – around 110 years old – and structural issues make future breaches likely. Urbanization has increased the potential for a breach to cause damage, injuries, or deaths. The combination of failures with high likelihoods and with high consequences has led Reclamation to require extensive rehabilitation actions, especially for the urbanized portions of the Truckee Canal. In the meantime, while options for reducing risk are being formulated and discussed, Reclamation has restricted the flow stages of the Truckee Canal.

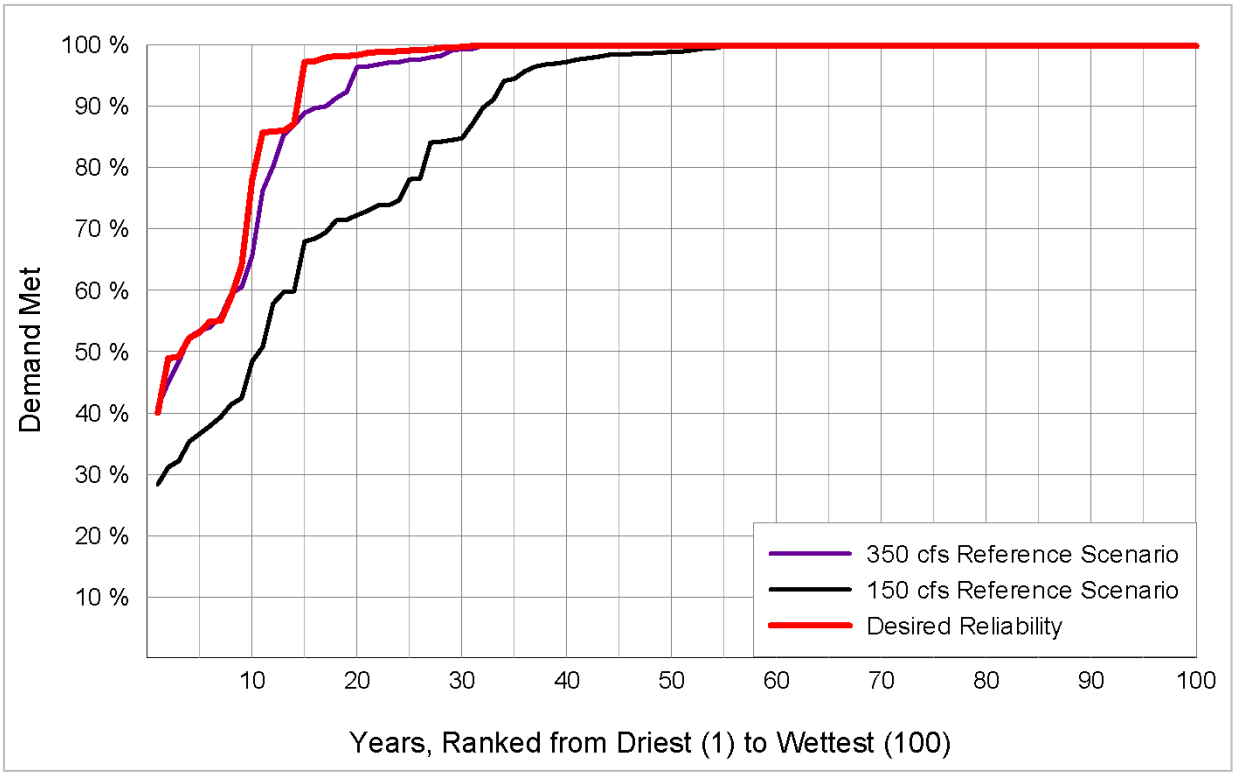
Water Supply Reliability Related Problems and Needs

Restrictions on flow through the Truckee Canal, aimed at addressing Reclamation concerns for safety and risk, could reduce Project water supply to levels below the conditions experienced by users before the 2008 Truckee Canal breach.

The potential for reduced Truckee Canal capacity to affect Project water supply is illustrated in Figure ES-2, which depicts 100 years of simulated water supply deliveries to Project water rights holders under different canal flow-stage scenarios, including:

- **Desired Reliability Scenario** – Represents the range of water supply conditions that Project water rights holders could have expected, had the 2008 canal breach not resulted in capacity restrictions.

- **150 cfs and 350 cfs Scenarios** – Illustrates the anticipated water supply conditions that Project water rights holders might experience in the future, with flow-stage restrictions on the Truckee Canal of 150 and 350 cfs. These two selected flow stages (350 and 150 cfs) bracket the range of recent and likely future without-action restrictions on the Truckee Canal, respectively.



Notes:
Simulations based on 100-year hydrology for the Truckee and Carson river basins, 1901–2000.
The Desired Reliability scenario considers the current Project demand; the other scenarios consider anticipated future demand, as discussed in Chapter 3 and Appendix C.
Key:
cfs = cubic feet per second

Figure ES-2. Potential for Restricted Truckee Canal Capacity to Affect Water Supply Reliability for the Newlands Project

Project Efficiency Related Opportunities

As Reclamation and others have long noted, many Project features and practices result in the inefficient use of Project water. For instance, the Project's aged conveyance structures, most of which are unlined, permit large amounts of water to seep into the ground before delivery. Conditions such as these present opportunities to improve the Project's efficiency by reducing delivery system losses, or otherwise improving the Project's ability to deliver more with its existing water supplies.

Lower Truckee River Related Opportunities

Conflict and litigation over surface water in the Truckee River Basin have been ongoing for more than 100 years, and the Newlands Project has been a frequent component of these disputes. Chief among these disputes is litigation stemming from reductions to Pyramid Lake elevations and fish species. A number of factors have reduced the cumulative inflows from the Truckee River to Pyramid Lake, thereby challenging the viability of these fisheries. Over time, Project diversions from the river at Derby Dam have become the focus of efforts to reverse declines in water levels at Pyramid Lake and water quality in the Lower Truckee River. The result of these efforts has been a significant reduction in Project diversions from the Truckee River, in comparison to historical practices.

Study Objectives

On the basis of specific direction in the Study's authorizing legislation, identified water resources problems and opportunities in the study areas, and other guidance, the following Study objectives were developed:

- Address Truckee Canal safety concerns in a manner that is consistent with Reclamation's preferred standards of safety for canals.

- Satisfy the exercise of future anticipated Project water rights in a manner equivalent to the level of service reliability Project users would have experienced historically, under current regulations and without restrictions on the Truckee Canal. Further, provide water rights reliability in a manner that maintains the viability of the Project, meaning that the Project's current ability to generate revenue and sustain itself is preserved.

Alternatives were formulated specifically to accomplish the Study objectives. To the extent possible, through pursuit of the Study objectives, alternatives also include features to help address the following opportunities:

- Improve the efficiency of Project water supply deliveries.

- Improve the water supply quantity and quality of the lower Truckee River.

Specific planning constraints, considerations, and criteria were also established to help guide the Investigation planning process.

Formulation and Evaluation of Alternatives

Once water resources problems, needs, and opportunities have been identified, and planning objectives, constraints, considerations, and criteria have been developed, the next major elements of the plan formulation process are identifying and screening management measures, and formulating alternatives to meet the Study objectives.

Screening Management Measures

A management measure is any structural or nonstructural action or feature that could address one or more planning objectives, consistent with other planning considerations, criteria, and constraints. At each step of the planning process, measures are reviewed, and in some cases reconsidered and incorporated into alternatives or eliminated from further consideration.

More than 50 measures were identified to address the Study objectives and opportunities, based upon previous studies, reports, public input, and meetings with stakeholders and agencies in the study area. The Study subjected all measures to a three-phased screening process that included:

- **Phase 1** – Removal of measures with seemingly intractable implementation hurdles, severe environmental effects that may outweigh safety or water supply benefits, or poor performance relative to magnitude of identified problems.

- **Phase 2** – Technical analysis of measures that passed Phase 1, but which had not been evaluated by previous studies or reports in sufficient detail for evaluating relative performance, and removal of poor performers from further consideration.

- **Phase 3** – Combination of measures into preliminary alternatives, and removal of measures that have lower performance relative to similar alternatives or compatibility problems.

Seven measures were retained for meeting the safety objective among five potential Truckee Canal conveyance capacities, and 11 additional measures were retained for meeting the water supply objective, including one measure that was retained in concept only. All measures retained for use in preliminary alternatives are listed in Table ES-1.

Table ES-1. Measures Addressing Study Objectives

Study Objective: Truckee Canal Safety[1,2]
Provide Safety at 600 cfs [1, 2]
High Density Polyethylene cutoff walls along the Truckee Canal
Provide Safety at 350 cfs [1, 2]
High Density Polyethylene cutoff walls along the Truckee Canal
Concrete/Geomembrane lining along the Truckee Canal
Provide Safety at 250 cfs [1, 2]
High Density Polyethylene cutoff walls along the Truckee Canal
Concrete/Geomembrane lining along the Truckee Canal
Provide Safety at 150 cfs [2]
Operate with Restricted Truckee Canal
Provide Safety at 0 cfs
Decommission the Truckee Canal
Study Objective: Water Supply
Develop Supplemental Sources of Water Supply
Treat and deliver City of Fernley Municipal Effluent
Import Groundwater Supplies from Dixie Valley
Construct Pipeline for Supplying Truckee Canal
Increase Delivery Efficiencies by Reducing Seepage Losses
Line Main Canals and Laterals in the Carson Division
Compact Soils of Main Canals and Laterals in the Carson Division
Concrete/Geomembrane Lining Along the Truckee Canal[1]
Compact soils of Truckee Canal
Reduce Dry-Year Agricultural Demand
Acquire and Permanently Retire Project Water Rights
Crop Insurance/Dry Year Fallowing
Partial Season Forbearance Agreements
Develop Upstream Truckee River Storage
Multi-Year Upstream Storage (*retained in concept only)*

Notes:

[1] Many measures retained for addressing Truckee Canal Safety Risks are distinguished by the type of improvements performed along the canal, but also include other structural refurbishments and non-structural activities that are consistent across all indicated measures.

[2] Aside from decommissioning the Truckee Canal, all measures retained for addressing Truckee Canal Safety Risks also have performance characteristics that help provide Newlands Project with Water Supply Reliability.

Refinement of Alternatives

As part of the measures screening process, 24 preliminary alternatives were developed for addressing the Study objectives. Figure ES-3 illustrates how measures from various subcategories were combined to achieve the water supply objective (illustrated as the Desired Reliability line). The preliminary alternatives are illustrated in ES-3 in the same sequence and order as they are described in Tables ES-2. Preliminary alternatives are labeled with a flow stage and letter (e.g. 350.a is the first preliminary alternative with a 350 cfs flow stage).

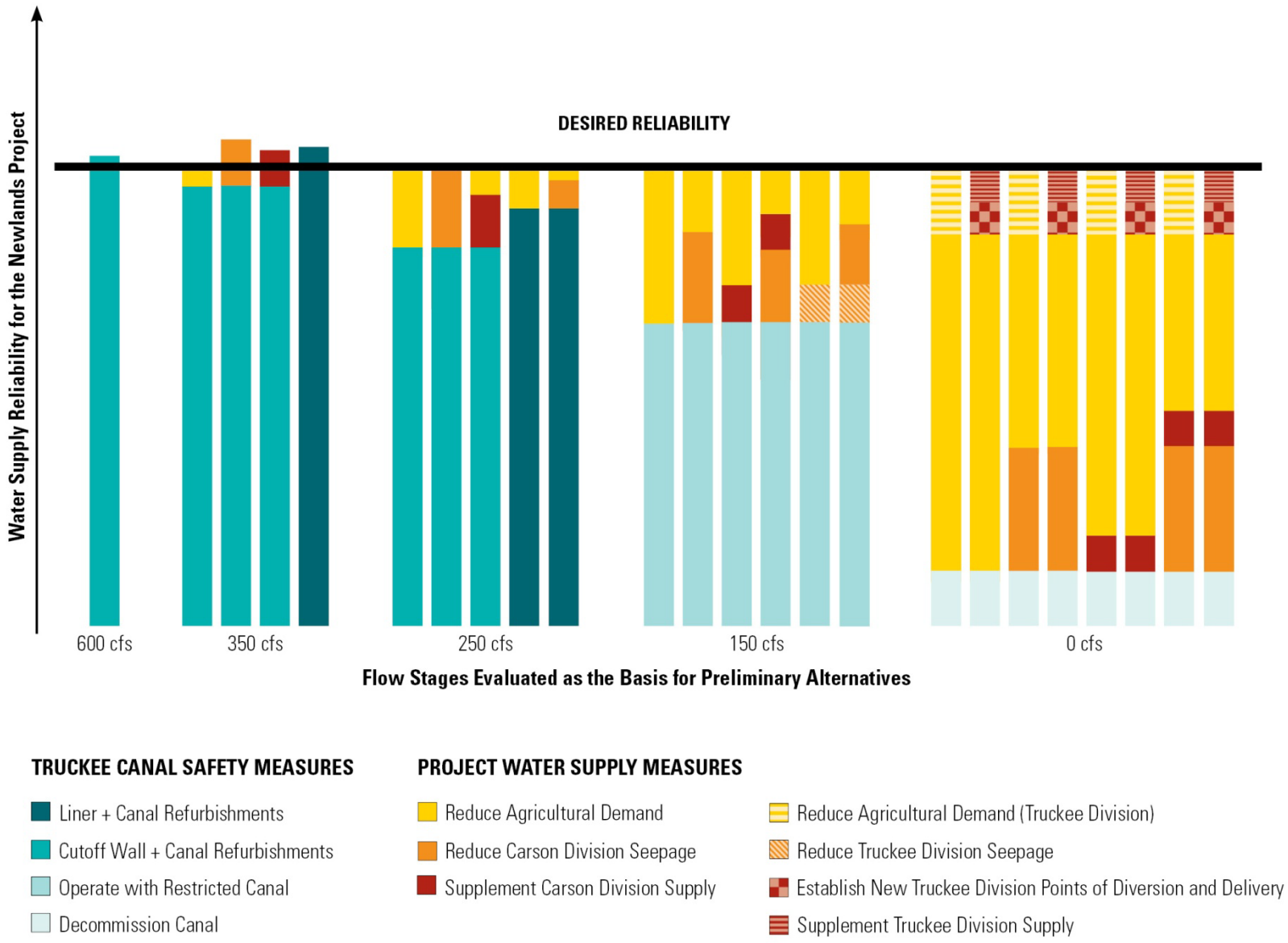


Figure ES-3. Summary of Preliminary Alternatives Assembled to Achieve Safety and Water Supply Reliability

Table ES-2. Summary of Preliminary Alternatives between Flow Stages of 600 cfs and 150 cfs

Truckee Canal Flow Stage		Measures Selected to Meet Objectives			Est. Annual Cost ($ Million)[1,2]	
		Safety	Water Supply			
			Primary Measure	Additional Measure(s)	Low	High
600 cfs		HDPE Cutoff Wall	None		$2.10	$2.10
350 cfs	a	HDPE Cutoff Wall	Reduce Agricultural Demand *(5 to 15%, 2 measures)*	None	$2.50	$3.90
	b		Reduce Carson Division Seepage *(2 measures)*	None	$2.60	$10.00
	c		Supplement Carson Division *(1 measure)*	None	$6.50	$13.00
	d	Concrete/ Geomembrane Liner	None		$2.80	$2.80
250 cfs	a	HDPE Cutoff Wall	Reduce Agricultural Demand *(20 to 25%, 2 measures)*	None	$3.70	$5.10
	b		Reduce Carson Division Seepage *(2 measures)*	None	$2.60	$10.00
	c		Supplement Carson Division Supply *(1 measure)*	ReduceAgriculturalDemand*(10to15%,2measures)*	$7.30	$15.00
	d	Concrete/ Geomembrane Liner	Reduce Agricultural Demand *(10 to 15%, 2 measures)*	None	$3.60	$5.20
	e		Reduce Carson Division Seepage *(2 measures)*	ReduceAgriculturalDemand*(0to10%,2measures)*	$3.30	$5.10

Table ES-2. Summary of Preliminary Alternatives between Flow Stages of 600 cfs and 150 cfs (contd.)

Truckee Canal Flow Stage		Measures Selected to Meet Objectives			Est. Annual Cost ($ Million)[1,2]	
		Safety	Water Supply			
			Primary Measure	Additional Measure(s)	Low	High
150 cfs	a	Maintain Flows at or Below Flow Stage	Reduce Agricultural Demand *(35 to 45%, 2 measures)*	None	$2.90	$5.30
	b		Reduce Carson Division Seepage *(2 measures)*	Reduce Agricultural Demand *(15 to 25%, 2 measures)*	$1.70	$11.00
	c		Supplement Carson Division Supply *(1 measure)*	Reduce Agricultural Demand *(25 to 35%, 2 measures)*	$6.40	$15.00
	d		Reduce Carson Division Seepage *(2 measures)*	Supplement Carson Division Supply*(1 measure)* ReduceAgriculturalDemand*(0to25%,2measures)*	$4.90	$22.00
	e		Reduce Truckee Division Seepage *(1 measure)*	Reduce Agricultural Demand *(25 to 40%, 2 measures)*	$2.20	$4.90
	f		Reduce Truckee Division Seepage *(1 measure)*	Reduce Carson Division Seepage *(2 measures)* ReduceAgriculturalDemand*(15to30%,2measures)*	$1.90	$12.00

Notes:

[1] Cost estimates have been formatted to indicate the annual cost of implementing each preliminary alternative, relative to the full range of costs developed for preliminary alternatives. Green represents lower costs (lowest being $1.7 million), red represents higher costs (highest being $22 million), and yellow represents mid-range costs.

[2] Annual costs include interest and amortization of the field cost based on the current Federal discount rate of 4 percent, over an assumed service life of the measures included (from 5 to 65 years depending on the specific measure). See Appendix E2 for additional information.

Key:

cfs = cubic feet per second

HDPE = High Density Polyethylene

Table ES-3. Components of 0 cfs Preliminary Alternatives by Division

Focus of Component		Measures to Meet the Water Supply Objective			Est. Annual Cost ($ Million)[1]	
		Primary Measure	Additional Measure(s)		Low	High
Carson Division	a	Reduce Agricultural Demand *(70 to 80%, 2 measures)*	None		$5.60	$10.00
Carson Division	b	Reduce Carson Division Seepage *(2 measures)*	Reduce Agricultural Demand *(60 to 70%, 2 measures)*		$5.20	$15.00
Carson Division	c	Supplement Carson Division Supply *(1 measure)*	Reduce Agricultural Demand *(60 to 70%, 2 measures)*		$9.10	$18.00
Carson Division	d	Reduce Carson Division Seepage *(2 measures*)	Supplement Carson Division Supply *(1 measure)*	Reduce Agricultural Demand *(50 to 60%, 2 measures)*	$8.80	$25.00
Truckee Division	y	Reduce Agricultural Demand *(100%, 1 measure)*	None		$1.00	$1.00
Truckee Division	z	Establish New Truckee Division Points of Diversion and Delivery *(1 measure)*	Supplement Truckee Division Supply *(2 measures)*		$8.40	$11.00

Note:

[1] Annual costs include interest and amortization of the field cost based on the current Federal discount rate of 4 percent, over an assumed service life of the measures included (from 5 to 65 years depending on the specific measure). See Appendix E2 for additional information.

Key:

cfs = cubic feet per second

Table ES-4. Summary of Preliminary Alternatives for a Flow Stage of 0 cfs

Truckee Canal Flow Stage		Measures Selected to Meet Objectives			Est. Annual Cost ($ Million)[1,2]	
		Safety	Water Supply			
			Components Selected		Low	High
0 cfs	ay	Decommission Truckee Canal	Carson Division 0.a	Truckee Division 0.y	$6.60	$11.00
	az			Truckee Division 0.z	$14.00	$21.00
	by		Carson Division 0.b	Truckee Division 0.y	$6.20	$16.00
	bz			Truckee Division 0.z	$13.60	$26.00
	cy		Carson Division 0.c	Truckee Division 0.y	$10.10	$19.00
	cz			Truckee Division 0.z	$17.50	$29.00
	dy		Carson Division 0.d	Truckee Division 0.y	$9.80	$26.00
	dz			Truckee Division 0.z	$17.20	$36.00

Notes:

[1] Cost estimates have been formatted to indicate the annual cost of implementing each preliminary alternative, relative to the full range of costs developed for preliminary alternatives. Green represents lower costs (lowest being $6.2 million), red represents higher costs (highest being $36 million), and yellow represents mid-range costs.

[2] Annual costs include interest and amortization of the field cost based on the current Federal discount rate of 4 percent, over an assumed service life of the measures included (from 5 to 65 years depending on the specific measure). See Appendix E2 for additional information.

Key:

cfs = cubic feet per second

Agency Review of Preliminary Alternatives and Screening Criteria

Once preliminary alternatives were developed, the Study team sought the review of agencies and tribes, which presented opportunities for these entities to:

- Understand how measures identified for consideration in the Study have been characterized and analyzed, and suggest revisions to the characterizations of particular measures used in preliminary alternatives.

- Contribute to the descriptions of the preliminary alternatives and identify the potential for benefits or negative impacts associated with each.

- Identify or clarify how screening criteria could be used in selecting and refining Study alternatives.

- Provide feedback on priorities for remaining analyses in the Study.

Inclusion of agencies in the review and assessment of the preliminary alternatives also promotes the Study's intent, which is the development of plans for meeting Study objectives that, ultimately, may be implemented by local, regional, State, and/or Federal partners.

Selection of Study Alternatives

Following the agency review of preliminary alternatives and selection criteria, the planning criteria from the *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* (P&G) was further applied to screen down the preliminary alternatives and select among them for further analysis. These criteria include completeness, effectiveness, efficiency, and acceptability.

This step reduced the number of options available for consideration before proceeding with more detailed evaluation of alternatives. It further leverages the criteria that have been used in the identification of preliminary alternatives that are the most suitable for a more rigorous analysis. The following section discusses how the preliminary alternatives were viewed under each of the planning criteria.

Table ES-5 displays the results of the process to apply the criteria to the preliminary alternatives.

Table ES-5. Summary of Preliminary Alternatives Performance Against Criteria

Alt.	Completeness	Effectiveness	Efficiency	Acceptability	Retained for Further Consideration
600	High	High	High	Varies by Stakeholder and Agency	Yes
350.a	High	High-to-Medium	High-to-Medium	Medium	Yes
350.b	High	High-to-Medium	High-to-Medium		Yes
350.c	High	High-to-Medium	Low		
350.d	High	High-to-Medium	High-to-Medium		Yes
250.a	High	High-to-Medium	High-to-Medium	Medium-to-Low	Yes
250.b	High	High-to-Medium	High-to-Medium		Yes
250.c	High	High-to-Medium	Low		
250.d	High	High-to-Medium	High-to-Medium		Yes
250.e	High	High-to-Medium	Low		
150.a	Low	Low	High-to-Medium	Varies by Stakeholder and Agency	
150.b	Low	High-to-Medium	High-to-Medium		
150.c	Low	High-to-Medium	Low		
150.d	Low	High-to-Medium	Low		
150.e	Low	High-to-Medium	Low		
150.f	Low	High-to-Medium	Low		
0.ay	Low	Low	Low	Varies by Stakeholder and Agency	
0.az	Medium-to-Low	Low	Low		
0.by	Low	Low	Low		
0.bz	Medium-to-Low	Low	Low		
0.cy	Low	Low	Low		
0.cz	Medium-to-Low	Low	Low		
0.dy	Low	Low	Low		
0.dz	Medium-to-Low	Low	Low		

Key:
Alt. = Alternative Name

Scale

Lower Performance — Higher Performance

Alternatives Evaluations and Comparisons

Once the seven Study alternatives were selected, the following evaluations were performed for each: water supply operations modeling, hydropower generation modeling, preliminary environmental and regulatory review, engineering and cost estimates, and financial and preliminary benefits estimates.

Table ES-6 summarizes the features, performance, and evaluations for each Study alternative.

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Table ES-6. Summary of Study Alternatives

		Alternative 600	Alternative 350.a	Alternative 350.b	Alternative 350.d	Alternative 250.a	Alternative 250.b	Alternative 250.d	Without-Action Alternative	Desired Reliability Scenario
Major Features	Truckee Canal Flow Stage	600 cfs	350 cfs	350 cfs	350 cfs	250 cfs	250 cfs	250 cfs	150 cfs	900 cfs
	Truckee Canal HDPE Cutoff Wall or Lining	HDPE Cutoff Wall	HDPE Cutoff Wall	HDPE Cutoff Wall	Lining	HDPE Cutoff Wall	HDPE Cutoff Wall	Lining	-	NA
	Other Features	-	-	Lining 45 miles of Carson Division canals	-	Fallowing 25% in Dry Years	Lining 45 miles of Carson Division canals	Fallowing 10% in Dry Years	-	NA
Safety		Meets RR3	Meets RR3	Meets RR3	Meets RR3	Meets RR3	Meets RR3	Meets RR3	Uncertain[1]	NA
Average Annual Project Water Delivery[2] (percent)		96.5%	95.6%	97.3%	96.3%	95.7%	96.2%	95.5%	90.5%	94.6%
Average Annual Project Water Delivery by User Category	Ag/Irrigation (TAF)	118.3	117.2	119.2	118.0	112.4	118.0	115.4	111.2	NA
	M&I (TAF)	13.3	13.3	13.4	13.3	13.3	13.3	13.3	13.2	NA
	Lahontan Valley Wetlands[3] (TAF)	68.0	67.3	68.6	67.8	67.4	67.8	67.2	63.6	NA
Annual Cost[4] (millions)		$2.90	$2.90	$15.00	$4.20	$6.50	$15.00	$5.60	NA	NA
TCID Ability-to-Pay[5] (millions)		$7.30	$6.90	$7.40	$7.20	$6.90	$7.00	$6.90	$5.00	NA[6]
Hydropower Generation Revenue (millions)		$1.35	$1.35	$1.25	$1.35	$1.30	$1.25	$1.30	$1.20	-
Environmental and Other Effects	Avg. Annual Spill to Stillwater NWR from Lahontan Dam (TAF)[7]	12.6	12.1	14.3	13.2	11.6	13.9	12.7	11.0	12.5
	Carson Division Groundwater and Agricultural Drain Flows[8]	Significant change not anticipated	Significant change not anticipated	Reduced by lining Carson Division canals	Significant change not anticipated	Reduced by fallowing	Reduced by lining Carson Division canals	Reduced by fallowing	Reduced in comparison to current conditions	Similar to current conditions
	City of Fernley Demand Met[9] (percent)	115%	108%	108%	56%	105%	105%	56%	99%	121%
	Avg. Annual Flow to Pyramid Lake (TAF)	480	487	505	491	498	512	501	516	460[10]

Notes:

[1] The 150 cfs flow stage is believed to pose a lower risk to the Fernley area because the water elevation in the canal would be maintained at a level low enough to minimize the risk of destabilizing the canal embankment. However, this is not a solution specifically designed to reduce risk of operating the canal, and thus the degree to which it meets the Study's safety objective (RR3) is unknown.

[2] Long-term average annual percent of Newlands Project demand met.

[3] Includes deliveries to Carson Lake and Pasture, the Fallon Paiute-Shoshone Tribal wetlands, and Stillwater NWR.

[4] Annual costs include interest and amortization of the capital cost estimated over 50 years at the current federal discount rate of 4 percent. Costs also include annual operations and maintenance estimated at 0.2 percent of the field cost. For some alternatives with the dry-year fallowing, annual costs for the program were estimated at $100 per acre of land fallowing plus an administrative cost at 20 percent of the fee. For additional information, see Appendix E3.

[5] Ability to pay estimates represents potential maximum increases to charges that TCID could apply to their customers while maintaining farm profitability, and are not reasonable to use as the sole basis for capital investment decisions. Ability to pay has been estimated using Reclamation guidelines and relies substantially upon the 5-year average for crop prices, which are volatile and presently on the higher end of historical ranges. For example, if alfalfa prices fell from current levels ($155/ton) to levels experienced a decade ago ($125/ton), TCID ability to pay could be reduced by as much as $8.7 million per year. The estimated current ability of TCID to pay for projects and improvements beyond current obligations is $6.50 million per year. (See Appendix G.)

[6] Assessment of financial conditions was not conducted for the Desired Reliability scenario. This scenario was developed to estimate a historical water supply reliability under current regulations and does not represent a current or future ability to pay.

[7] Spills are not considered a Project delivery, but are included in the calculation of benefits to wetlands.

[8] Effects of alternatives on Carson Division groundwater and agricultural drain flows are not quantifiable, and are described in comparison to current conditions.

[9] The City of Fernley's municipal supply relies on groundwater available through incidental recharge from the Truckee Canal. While this is not a valid Project delivery, some alternatives would have the effect of reducing the availability of this groundwater. The demand met for the City of Fernley is noted as an environmental outcome. For additional information on how the Study evaluated the effects of Study alternatives on Fernley's ability to meet future demand, see Appendix B4.

[10] Because the Desired Reliability scenario is based upon current demands, which are greater than the future demands used for Study alternatives, the flow to Pyramid Lake will automatically be somewhat higher for the alternatives than for the Desired Reliability scenario.

Key:

Ag. = agricultural

Avg. = average

M&I = municipal and industrial

RR = risk rating

TAF = thousand acre-feet

TCID = Truckee Canal Irrigation District

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Comparison Based on Federal Planning Criteria

Table ES-7 compares the Study alternatives using the four P&G planning criteria: (1) completeness, (2) effectiveness, (3) efficiency, and (4) acceptability (WRC 1983).

Table ES-7. Summary of Alternatives Comparison Against Federal Planning Criteria

		600	350.a	350.b	350.d	250.a	250.b	250.d	Without-Action
Completeness		High	High	High	High	Medium-to-Low	High	High-to-Medium	Does not achieve Study objectives
Effectiveness		High	High	High	High	High-to-Medium	High	High	
Efficiency		High	High	Medium-to-Low	Medium	Medium	Medium-to-Low	Medium	
Acceptability	M&I Users	High	High	Medium	Low	High	Medium	Low	Low
	Wetlands Users	High	High	Medium	High	Medium-to-Low	Medium	High	Low
	Agricultural Users	High	High	High-to-Medium	High	Medium-to-Low	High	Medium	Low
	Truckee River WQSA Interests	Low	Medium-to-Low	Medium-to-Low	Medium	Medium	Medium	Medium	High

Key:
M&I = municipal and industrial
WQSA = Water Quality Settlement Agreement

Findings and Future Actions

Findings regarding Study alternatives, other aspects of the Project, and potential future actions are described below.

Key Findings

The research and analysis conducted to support the planning process uncovered a number of other findings that are likely to be important considerations for additional studies related to the Project or to any alternative going forward. The Study's key findings are summarized as follows:

- **Canal Repairs are Possible to Address Safety Concerns** – The repair of the Truckee Canal such that it meets the Federal safety performance level (RR3) has been found technically possible in previous studies (see Chapter 1).

- **Project Demand Will Remain Steady** – While the complexion of the Project continues to change through ongoing water rights retirement and transfer programs, the fulfillment of these programs will not substantially diminish the potential volume of future water demand by Project water rights holders (see Chapter 3 and Appendix C).

- **Without Action, Canal Safety Issues Will Continue to Worsen** – A continuing significant need exists to implement actions to provide safety for the Truckee Canal. Without significant investments to improve the canal, its condition is expected to gradually worsen (see Chapter 3).

- **Action is Necessary to Preserve Water Supply Reliability** – Without addressing safety issues on the Truckee Canal, more stringent restrictions to canal conveyance capacities may gradually be implemented as the canal's condition worsens. These restrictions will significantly reduce the reliability of Project water supplies (see Chapter 2 and 3).

- **Alternatives Exist for Meeting Both Study Objectives** – Seven Study alternatives have been identified to satisfy the Study's objectives of safety and water supply, and are recommended for further development (see Chapter 5). The development of these alternatives revealed many constraints and potential opportunities for meeting the Study objectives, including:

  - **The Truckee Canal is Fundamental to the Project** – Plans that included either: (1) decommissioning the Truckee Canal and Derby Dam, or (2) allowing the canal conveyance capacity to be reduced over time to 150 cfs as a result of insufficient progress toward Reclamation safety requirements; were eliminated as viable alternative plans because the resulting conditions require far more extensive and expensive programs to support Project water rights than refurbishing the canal. For example, decommissioning the canal requires that between 50 percent and 80 percent of the Project's agricultural water rights would need to be retired permanently to meet the necessary level of reliability for the Project's remaining users, and cost 3- to 18-times as much as the cheapest alternative (see Chapter 4 and Appendix D3).

  - **Upstream Storage Looks Promising** – The use of upstream storage on the Truckee River for Project water was not evaluated, but appears very promising as an option for achieving the water supply objective. Allowing for Project credit water to be stored in Truckee River reservoirs may be a low-cost option for making flow stages below 600 cfs viable, but require substantial discussion with stakeholders to frame operational conditions (see Chapter 4 and Appendix D6).

  - **OCAP Limits Enhancements to Lahontan Reservoir Storage** – The regulations in OCAP that limit diversions from the Truckee River relative to storage targets in Lahontan Reservoir also limit the value of developing additional storage in Lahontan Reservoir. For example, a larger Lahontan Reservoir does capture more water during wet conditions but, because of OCAP storage target limitations, higher carry-over storages result in lower Truckee River diversions instead of higher water supply availability for the Project (see Chapter 4 and Appendix D7).

  - **Enhancing Carson River Inflows to Lahontan Reservoir Would Yield Marginal Benefit** – Acquisition of water rights from lower segments of the Carson River was considered because these would be the easiest to transfer to the Project; however, these rights are the least secure and provide little assistance during dry years, when additional supplies are needed most. The *Alpine* Decree prevents the secure transfer of rights from upper segments to Lahontan Reservoir, but even if it were possible, OCAP storage targets would reduce Truckee River diversions instead of improving Project supplies (see Appendix D5).

- **Study Alternatives Present Complex Tradeoffs** – Each of the alternatives is expected to appeal to different stakeholders and potential cost-share partners in different ways. Selection of any alternative for implementation would also require balancing tradeoffs among broader, related issues within the region. For example:

  - **Higher Truckee River Flows Have Highest Cost** – Alternatives that increase flows to Pyramid Lake also have the highest costs. Conversely, the alternative with the lowest cost results in the lowest flow to Pyramid Lake (see Chapter 5).

  - **Some Alternatives Reduce Ancillary Supplies** – Alternatives that reduce diversions from the Truckee River also reduce spills from Lahontan Reservoir, which reduces the overall supply for the Lahontan Valley wetlands. Likewise, alternatives that include efficiency improvements may reduce regional groundwater resources (see Chapter 5 and Appendix F).

- **Reclamation is a Required Partner** – The implementation of any alternative to improve safety of the Truckee Canal and serve Project water rights will require leadership from Reclamation, due to the Federal government's: interest in serving water rights of Project users; interest in serving water rights to Tribes and Stillwater NWR; interest in operations that affect habitat for listed or special status species at Pyramid Lake; and, ownership of facilities requiring rehabilitation, such as the Truckee Canal.

- **Implementation will Require Partners and Proponents** – Benefits of alternatives affect more than one party, and include: public safety, water supply reliability, and the possibility of addressing other related regional issues. Further, it is uncertain whether any singular entity is capable of paying for the alternatives identified by the Study. Potential cost-share partners with Reclamation include:

  – **TCID** and the Project's water right holders, for their shared interest in maintaining Project water supply reliability;

  – **City of Fernley**, for their shared interest in improving the safety of the Truckee Canal along its corridor through the city; and

  – **Pyramid Lake Paiute Tribe**, for their potential interest in how various alternatives influence flows on the lower Truckee River and other related issues, such as endangered species recovery and recoupment.

Potential Next Steps for Implementing an Action

This Study identifies a range of alternatives for reducing risk from the Truckee Canal while providing for the reliable exercise of Project water rights in the future. Funding and legal authorization would need to be specified for any role that Reclamation plays in the implementation of a Study alternative. Depending on the project and the source of authorization, some level of environmental compliance review will also be required.

At this time, Reclamation does not have funding allocated for the implementation of Study alternatives. Additionally, it is likely that any funding made available for Reclamation participation or implementation of any Study alternative would require both cost-share partnership(s) and repayment for Federal participation.

Some Study alternatives could be implemented under existing Reclamation authorizations, while others would require a new congressional authorization. Specific features of Study alternatives affect the ability of Federal and non-Federal partners to fund, finance, and implement them.

Considerations for Future Study

Based on the public comments on the Draft Special Report that Reclamation received in February 2013, stakeholders and the public have identified a number of considerations for future studies focused on refining or implementing any Study alternative. These comments, which appear in Appendix H (Public Participation and Outreach Report), suggest the following activities be in future studies:

- Develop information to provide greater detail regarding the effects of alternatives on:
  - Specific water quality objectives in the Truckee River (WRWC 2013).
  - Regional air quality (Churchill County 2013; City of Fernley 2013).
  - Recreation at Lahontan Reservoir (CWSD 2013; Churchill County 2013; TCID 2013).
  - Habitat and vegetation at Lahontan Reservoir (Churchill County 2013).
  - Wildlife at Lahontan Valley wetlands (Churchill County 2013).
  - Groundwater and agricultural return flows within the Carson Division (CWSD 2013; Churchill County 2013; TCID 2013).
  - Water supply reliability for the City of Fernley (TCID 2013; City of Fernley 2013) and the cost of resolving the city's potential future shortages (City of Fernley 2013).
  - Regional partners' financial conditions and ability to pay (CWSD 2013; Churchill County 2013; City of Fernley 2013).
- Identify the requirements of consultation in regards to CWA and other regulations with the USACE, USFWS, tribes, and other agencies for implementation of alternatives (NDEP 2013; Pyramid Lake Paiute Tribe 2013).
- Provide further consideration for the assumptions surrounding the appropriate extent of water rights that will need to be met in the future for the Newlands Project (Pyramid Lake Paiute Tribe 2013).
- Explore the suitability and possibility of upstream Truckee River credit storage for the Project, in coordination with appropriate regional stakeholders (CWSD 2013; Churchill County 2013; TCID 2013).
- Provide a cost-allocation recommendation that appropriately characterizes the relative benefits received by implementing alternative plans, and each beneficiary's ability to pay (CWSD 2013).
- Determine the economic benefits of increased flows in the Truckee River and to Pyramid Lake (WRWC 2013).

- Evaluate the potential effects of climate changes on hydrology in the Carson River Basin (CWSD 2013).