CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION

MEETING OF OCTOBER 31, 2023
SOUTH LAKE TAHOE, CA

ITEM 6
WEST FORK CARSON RIVER VISION PLAN

CHRONOLOGY	
2002-2014	West Fork Carson River water quality is assessed, resulting in placements on the 303(d) list for various pollutant-waterbody combinations during the 2002, 2010, 2012, and 2014 assessment cycles. The Lahontan Region Surface Water Ambient Monitoring Program has been the primary data source, to date, for these assessments. The 2018 Integrated Report included an update to the mapped segments assessed.
Summer 2017	West Fork Carson River (WFCR) water quality issues are identified as a candidate for an alternative restoration approach to address the impairments. The approach is termed a 'Vision Plan' because it follows the United States Environmental Protection Agency (U.S EPA) 2013 Long-Term Vision for Assessment, Restoration, and Protection under the Clean Water Act Section 303(d) Program (The Vision).
Summer 2018	West Fork Carson River Watershed Tour and project kickoff with representatives from the Washoe Tribe, USFS, Alpine Watershed Group, Alpine County Board of Supervisors
September 2020-March 2022	Alpine Watershed Group hosts a series of 4 Vision Project Stakeholder Forums. Roads and Water Quality in September 2020, Restoration Projects in the WFCR Watershed in November 2020, Recreation: Trends, Impacts, and Solutions for the WFCR watershed in March 2021, and Ranching for Improved Waters Quality in March 2022.
Summers 2022 and 2023	Site tours with Water Board staff and stakeholders to learn about pollutant source categories and pollutant reduction opportunities
July 2023	Draft West Fork Carson River Vision Plan circulated for public review. Seven comment letters received.
October 2023	West Fork Carson River Vision Plan presented to the Water Board. Board considered adopting a resolution in support of the Plan.

BACKGROUND

The West Fork Carson River (WFCR) flows from its headwaters through Alpine County, California to the Nevada state line. The WFCR's watershed is a rural area, mostly consisting of forestland and alpine meadows, with minimal development and land use dominated by recreation and open space. Additional land uses include active rangelands and residences. The WFCR has multiple water quality impairments, likely resulting from a combination of historic logging, mining, grazing, and hydromodification, as well as current grazing, road maintenance, recreational activities, septic tanks, and water management. These impairments are included on the State's Clean Water Action Section 303(d) List which recognizes that the WFCR exceeds standards for nutrients, turbidity, salts, iron, sulfate, and bacteria.

Under Clean Water Act requirements, states must develop Total Maximum Daily Loads (TMDLs) to address impairments where water quality standards are not being met. USEPA's 2022-2032 Vision for the Clean Water Act Section 303(d) Program (EPA Vision) (USEPA, 2022) recognizes that, in addition to TMDLs, other types of plans or actions may be more immediately beneficial or practicable for restoring water quality, encourages the most effective approaches for restoring water quality and acknowledges how vital creativity and collaboration are for successful restoration. If advance restoration plans are successful, and standards are attained, then TMDLs may not be needed.

The West Fork Carson River was selected by the staff of the Lahontan Water Board for development of an advance restoration plan, consistent with the USEPA Vision, because there are significant ongoing and historical water quality monitoring efforts, regulatory programs, and voluntary activities by stakeholders to restore and protect water quality in the WFCR. The WFCR Vision Plan does not establish or change any existing regulations but rather it references existing regulatory and non-regulatory actions that are expected to result in attainment of Water Quality Standards in the WFCR.

This Vision Plan also describes planned monitoring and assessment activities to track progress implementing the actions described in the plan and to track water quality improvements, both of which will inform adaptive management decisions. The Vision Plan has a ten-year timeframe for attainment of water quality objectives in the WFCR by October 2033.

The Carson Water Subconservancy District's Carson River Watershed Adaptive Stewardship Plan (CRASP) covers the entire Carson River Watershed and serves as a 9 - Element Watershed-Based Plan for the Carson River Watershed in Nevada. A goal of this Vision Plan is to serve as a 9-Element Watershed Based Plan for the WFCR portion of the Carson River Watershed in California, which will enable projects in the watershed to be eligible for Clean Water Act section 319(h) nonpoint source pollution reduction grant funding.

ISSUES

Should the Water Board adopt a resolution indicating support of the Vision Plan?

The WFCR is listed as impaired on the Clean Water Act 303d List. This item presents an advance restoration plan that relies on ongoing and expected actions to improve water quality in the WFCR in advance of TMDLs. Should these actions be implemented by watershed stakeholders, staff reasonably expect WFCR water quality to improve and WQOs to be met. By approving the proposed resolution, the Board will indicate support of the Vision Plan as presented. Factors supporting the likelihood of success include the identification of primary sources of pollution to the WFCR, existing programs, ongoing restoration, protection and restoration efforts by watershed and environmental groups, agencies, and stakeholders, availability of grant funds and technical expertise available to assist in implementation of actions to improve water quality and the inclusion of monitoring and reporting and an adaptive management framework in the Vision Plan.

Issues raised by stakeholders include concern about the potential costs of implementing management practices and projects for water quality improvement and the desire for more information and specificity in the WFCR Vision Plan.

DISCUSSION

The Vision Plan is somewhat complex because of the multiple pollutants and pollutant sources it addresses, so it provides a high-level overview of the sources and actions needed to address them. While staff believe the overall framework provided by the Vision Plan is sound. Implementation actions identified in the Vision Plan have a reasonable probability of restoring water quality, and projects to address the water quality impairments have a reasonable likelihood of securing funding. To ensure progress addressing pollutants from multiple source categories, the Vision Plan will require significant follow-up by staff to ensure actions are clearly defined and supported.

Development and implementation of this Vision Plan does not remove the waterbody from the 303(d) list and does not remove the requirement to develop a TMDL for the impairments. Development and implementation of the Vision Plan does result in the WFCR impairments to be a low priority for developing TMDLs for the 303(d) listings. If Vision Plan implementation is successful in achieving water quality standards, then the Water Board will recommend removal of the waterbody from the 303(d) list and no TMDL will be required. If the Vision Plan does not result in sufficient water quality improvements to recommend removal from the 303(d) list, then staff would consider other approaches described in the Vision Plan, such as developing a TMDL, revising water quality objectives, or a combination of such actions.

SUSTAINABLE GROUNDWATER MANAGEMENT ACT BASINS

The focus of the Vision Plan is attainment of water quality objectives in the WFCR watershed. The Vision Plan does not focus on discharges to groundwaters or any specific groundwater basin.

CLIMATE CHANGE RESPONSE

In the WFCR watershed, as elsewhere in the Lahontan Region, impacts of climate change include increasing frequency of extreme weather events such as extreme storm events and extended drought, and prolonged fire seasons with larger and more intense fires. The Vison Plan recognizes that climate change and other factors can contribute to the water quality impairments in the WFCR and supports efforts to reduce those potential impacts.

This Vision Plan includes actions that implement two of the Policy Statements from Resolution R6T-2019-0277, the Water Board's Climate Change Mitigation and Adaption Action Plan, namely Protection of Wetlands, Floodplains and Headwaters, and Protection of Headwater Forests and Promoting Fire Resiliency.

The erosion control actions and restoration projects proposed in the Vision Plan will help buffer the effects of climate-driven increases in erosion, decreases in watershed function, and flooding. Given the potential devastating impacts of wildfire on water quality in the WFCR watershed, this Vision Plan recognizes the water quality benefits of ongoing and future projects that reduce fuels and otherwise decrease the potential for wildfires.

PUBLIC OUTREACH

Outreach to stakeholders and the public has been made at various occasions over the life of the project, as outlined in the Project Chronology included above. Staff have developed a dedicated project email subscription list to share project information and project notices. In addition, there is a project website: https://www.waterboards.ca.gov/lahontan/water_issues/programs/tmdl/bishopcreek.html which includes pertinent project information and project documents, and includes a portal to subscribe to the email subscription service. The website includes access to a Story Map describing the watershed, its water quality impairments, and the approach to address the listings.

From September 2020 through March 2022, Alpine Watershed Group hosted a series of four Vision Project Stakeholder Forums at which staff presented and discussed the development of the Vision Plan with stakeholders. The subjects of these forums were Roads and Water Quality, Restoration Projects in the WFCR Watershed, Recreation: Trends, Impacts, and Solutions for the, and Ranching for Improved Waters Quality.

On July 13th, 2023, the draft Vision Plan and circulated via email to the email subscription list. The draft Vision Plan was subsequently sent directly via email to

PUBLIC OUTREACH

project stakeholders who have been regularly engaged with Vision Plan development. The draft Vision Plan was also posted on the project webpage.

Seven comment letters were received regarding the draft Plan (Enclosure 3). Pertinent suggestions have been incorporated into the final Plan. A response to comments document has also been developed (Enclosure 4).

In August 2023 staff gave a presentation on the draft Vision Plan to the Alpine County Board of Supervisors and discussed the Supervisors' concerns about the draft Plan.

The draft final Vision Plan and response to comments was circulated to stakeholders and the public with the Board agenda notice for the October 2022 Board meeting.

Future public outreach will occur as implementation strategies outlined in the Vision Plan progress.

PRESENTERS

1. Danny McClure, Water Resource Control Engineer

RECOMMENDATION

Adopt the proposed Resolution.

ENCLOSURE	ITEM	BATES NUMBER
1	Proposed Resolution	**6 - 7**
2	West Fork Carson River Vision Plan	**6 - 13**
3	Stakeholder comment letters	**6 - 157**
4	Response to Comments	**6 - 181**

ENCLOSURE 1

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION

RESOLUTION No. R6T-2023-0XXX (PROPOSED)

SUPPORTING IMPLEMENTATION OF THE WEST FORK CARSON RIVER VISION PLAN

WHEREAS, the California Regional Water Quality Control Board, Lahontan Region (Water Board) finds that:

1. Federal Clean Water Act (CWA) Section 303(d) requires States to identify waterbodies that do not meet water quality standards and to take appropriate actions to remedy those impairment(s); and

2. The three reaches of the West Fork Carson River (WFCR) are identified on California's CWA Section 303(d) List (303(d) List) as impaired, as indicated by elevated levels of pollutants; and

3. The segment of the WFCR from its headwaters to Hope Valley is identified on California's 303(d) List as impaired by nitrate, total Kjeldahl nitrogen, phosphorus, and sulfate; and

4. The segment of the WFCR from Hope Valley to Woodfords is identified on California's 303(d) List as impaired by chloride, nitrogen, nitrate, total Kjeldahl nitrogen, phosphorous, sulfate, total dissolved solids, and turbidity; and

5. The segment of the WFCR from Woodfords to the Nevada state line is identified on California's 303(d) List as impaired by fecal indicator bacteria, iron, nitrogen, nitrate, total Kjeldahl nitrogen, phosphorous, sulfate, total dissolved solids, and turbidity; and

6. Water Board staff assembled and considered all readily available data to assess water quality conditions of the WFCR to evaluate the 303(d) listings, consistent with the 'Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List' (Listing Policy); and

7. Under CWA Section 303(d), the Water Board is required to establish a Total Maximum Daily Load (TMDL) for those pollutants identified as causing impairment of waters on the 303(d) List; and

8. USEPA's 2022-2032 Vision for the Clean Water Act Section 303(d) Program (EPA Vision) recognizes that, in addition to TMDLs, other types of plans may be more

immediately beneficial or practicable for restoring water quality, encourages the most effective approaches for restoring water quality and acknowledges how vital creativity and collaboration are for successful restoration; and

9. Consistent with The EPA Vision, the Water Board developed a Water Quality Improvement Plan (Vision Plan) to address the impairments in the WFCR. The Vision Plan is intended to include the 9 elements of a US EPA Non-Point Source Watershed Plan, allowing stakeholders to apply for Clean Water Act section 319h funding opportunities to support Vision Plan implementation; and

10. This Vision Plan does not establish or change any existing regulations but rather references existing regulatory and non-regulatory actions that are expected to result in attainment of Water Quality Standards in the West Fork Carson River; and

11. The Vision Plan describes pollutant sources to the WFCR and describes ongoing and expected implementation actions to reduce pollutant loading. The Vision Plan identifies historical impacts, roads and road maintenance activities, recreational activities and camping, onsite wastewater treatment systems (OWTS), grazing, hydrologic modification, climate change, fire, and invasive species as potential causes of pollution to the WFCR and outlines actions to reduce potential pollutant discharges due to all of these causes and sources; and

12. Ongoing and expected actions by numerous parties in the WFCR watershed are expected to continue to improve and protect water quality in the WFCR. These parties include the Washoe Tribe of Nevada and California, the Humboldt-Toiyabe National Forest, Alpine Watershed Group, the Carson Water Subconservancy District, the Carson River Coalition, Friends of Hope Valley, American Rivers, Caltrans, National Resource Conservation Service, California Department of Fish and Wildlife, South Tahoe Public Utilities District, and private landholders; and

13. The Vision Plan identifies the Water Board's existing regulatory tools and other means for achieving pollutant reductions and identifies other potential mechanisms for achieving pollutant reductions should implementation actions not be pursued or if these measures do not effectively reduce pollutant levels to meet water quality objectives in the ten-year scheduled period of implementation and review; and

14. The Vision Plan identifies sources of funding for implementation of actions to improve WFCR water quality. To the extent feasible, the Water Board will commit technical resources and work with stakeholders to obtain funding for the actions identified in the Vision Plan; and

15. The Vision Plan includes a commitment to ongoing water quality monitoring and collection of information about sources and actions being implemented to protect water quality in the WFCR. The data and information collected will allow the Water Board to assess effectiveness of the actions being implemented and verify attainment of water quality objectives; and

16. Water Board staff has conducted outreach to stakeholders in the WFCR watershed beginning in 2018 and some parties have already begun implementation efforts. Thus, this non-TMDL advance restoration plan is appropriate for continued efforts addressing the impairments in the WFCR; and

17. Development and implementation of the Vision Plan does not eliminate the requirement to develop TMDLs. If water quality objectives for constituents of concern in the WFCR are not attained within 10 years, the Water Board will consider prioritization of completion of TMDLs for the constituents causing the remaining impairments. Staff will provide an annual report of the status of implementation to the Water Board and will provide a comprehensive 5-year review in 2029, and a 10-year review in 2034; and

18. Whereas U.S. EPA is required to approve a TMDL, it is not required to approve the Vision Plan; and

19. The Water Board's support for the Vision Plan for the WFCR is not a "project" as defined in the California Environmental Quality Act (CEQA) (Pub. Res. Code § 21065) because the Plan is not an "activity which may cause either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment." (Pub. Res. Code § 21065). The Vision Plan identifies and discusses ongoing and expected actions to remedy the impairment in the WFCR but does not mandate compliance activities.

THEREFORE, BE IT RESOLVED that the Water Board:

1. Supports implementation of the Vision Plan which, is reasonably expected to achieve water quality objectives in the WFCR, as documented in the Vision Plan.

2. Directs staff to transmit the Vision Plan to U.S. EPA.

I, Mike R. Plaziak, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of a Resolution adopted by the California Regional Water Quality Control Board, Lahontan Region, on October 31, 2023.

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(for) Mike R. Plaziak
Executive Officer

ENCLOSURE 2

CALIFORNIA Water Boards

Gavin Newsom
GOVERNOR

Yana Garcia
SECRETARY FOR
ENVIRONMENTAL PROTECTION

Lahontan Regional Water Quality Control Board

West Fork Carson River Vision Plan

A water quality improvement plan to address multiple pollutants in the West Fork Carson River in Alpine County, California

October 2023

Executive Summary

The West Fork Carson River Vison Plan (Vision Plan) describes present and future actions that will be taken to restore and protect water quality in the West Fork Carson River (WFCR). The WFCR flows from its headwaters through Alpine County, California to the Nevada state line. The WFCR's watershed is a rural area, mostly consisting of forestland and alpine meadows, with minimal development and land use dominated by recreation and open space. Additional land uses include active rangelands and residences. As a result of historic logging, mining, grazing, and hydromodification, as well as current grazing, road maintenance, recreational activities, septic tanks, and water management, the WFCR has multiple water quality impairments. Water quality data show that the WFCR exceeds standards for nutrients, turbidity, salts, iron, sulfate, and bacteria. Stakeholders, stakeholder groups, nongovernmental organizations, and government agencies active in the watershed of the WFCR, and the greater Carson River Watershed as a whole, are implementing several projects to restore water quality, habitat, and recreational beneficial uses in the river.

Existing plans for the Carson River include Carson Water Subconservancy District's Carson River Watershed Adaptive Stewardship Plan (CWSD 2007, 2017) and the Nevada Division of Environmental Protection's (NDEP's) Alternative Restoration Plan for Improving Water Quality in Segments of the Carson River System in Carson Valley, Nevada (NDEP, 2022). This Vision Plan provides additional detail about activities in the WFCR watershed, and contains, for the WFCR, the 9 key elements recommended by USEPA for Watershed-Based plans (USEPA, 2002), which are a prerequisite for receiving Clean Water Act section 319 grant funding for projects to reduce nonpoint source water pollution.

This Vision Plan was developed as an advance restoration plan for attaining water quality standards, consistent with USEPA's 2022-2032 Vision for the Clean Water Act Section 303(d) Program (EPA Vision) (USEPA, 2022). Under Clean Water Act requirements, States must develop Total Maximum Daily Loads (TMDLs) to address impairments where water quality standards are not being met. The EPA Vision recognizes that, in addition to TMDLs, other types of plans may be more immediately beneficial or practicable for restoring water quality, encourages the most effective approaches for restoring water quality, and acknowledges how vital creativity and collaboration are for successful restoration. If advance restoration plans are successful, and standards are attained, then TMDLs may not be needed.

The West Fork Carson River was selected by the staff of the Lahontan Water Board for development of an advance restoration plan because there are significant ongoing and historical water quality monitoring activities, and significant efforts by stakeholders to restore and protect water quality in the WFCR. This Vision Plan does not establish or

change any existing regulations but rather it references existing regulatory and non-regulatory actions that are expected to result in attainment of Water Quality Standards in the WFCR. Development and implementation of this Vision Plan does not remove the waterbody from the 303(d) list and does not remove the requirement to develop a TMDL for the impairments. Development and implementation of the Vision Plan does provide a reason for the state to lower the priority for developing TMDLs for the 303(d) listings. If Vision Plan implementation is successful in achieving water quality standards, then the Water Board will recommend removal of the waterbody from the 303(d) list. This Vision Plan also describes planned monitoring and assessment activities to track progress in implementation of the actions described in the plan and improvements in water quality.

This Vision Plan was developed with the assistance and collaboration of stakeholder groups and agencies in the Carson River Watershed, including the Alpine Watershed Group, the Carson Water Subconservancy District, Nevada Division of Environmental Protection, and the US Forest Service.

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List of Acronyms and Abbreviations

AMMM – annual mean of monthly means

AWG – Alpine Watershed Group

BDAs – Beaver Dam Analogues

BMPs – Best Management Practices

Caltrans – California Department of Transportation

CAO – Cleanup and Abatement Order

CEDEN – California Environmental Data Exchange Network

CDFW - California Department of Fish and Wildlife

CDWR – California Department of Water Resources

Cl - chloride

CRASP - Carson River Watershed Adaptive Stewardship Plan

CRC – Carson River Coalition

CWSD – Carson Water Subconservancy District

FIB – fecal indicator bacteria

FOHV – Friends of Hope Valley

HAB – Harmful Algal Bloom

HTNF – Humboldt-Toiyabe National Forest

LWB – Lahontan Water Board

mg/L – milligrams per liter

NDEP – Nevada Division of Environmental Protection

NFWF - National Fish and Wildlife Foundation

NO2 – nitrite

NO3 – nitrate

NH3 – ammonia

LAMP – Local Agency Management Plan

MAA – Management Agency Agreement

MOU – Memorandum of Understanding

NRCS – Natural Resources Conservation Service

NTU – nephelometric turbidity units

ORV – off road vehicle

OWTS – onsite wastewater treatment systems

P - phosphorous

STV – statistical threshold value

S.V. – single value

RWQP – Ranch Water Quality Plan

STPUD – South Tahoe Public Utilities District

SWAMP – Surface Water Ambient Monitoring Program

SWRCB – State Water Resources Control Board

SO4 – sulfate

TAP – Travel Analysis Process

TDS – total dissolved solids

TKN – total Kjeldahl nitrogen

TMDL – Total Maximum Daily Load

UCCE – University of California Cooperative Extension

USEPA – United States Environmental Protection Agency

USFS – United States Forest Service

QAPP – Quality Assurance Project Plan

WDR – Waste Discharge Requirements

WFCR – West Fork Carson River

WQO – Water Quality Objective

WRR - Wastewater Reclamation Requirements

1. Introduction

The West Fork Carson River Vision Project Plan (Vision Plan) documents a process to address multiple pollutants affecting water quality in the West Fork Carson River (WFCR) in Alpine County, California. The WFCR is listed on the State of California's Clean Water Act Section 303(d) list (SWRCB, 2018) as exceeding water quality standards for multiple pollutants. Under Clean Water Act Requirements, the listing of these pollutants on the 303(d) list requires development of Total Maximum Daily Loads, or TMDLs. USEPA's 2022-2032 Vision for the Clean Water Act Section 303(d) Program (EPA Vision) (USEPA, 2022) recognizes that, in addition to TMDLs, other types of plans may be more immediately beneficial or practicable for restoring water quality. The EPA Vision encourages the most effective approaches for restoring water quality and acknowledges how vital creativity and collaboration are for successful restoration.

The Vision Plan is an advance restoration plan to address water quality impairments and help protect against future impairments in the WFCR. The Vision Plan does not establish any new regulatory requirements but discusses existing California Regional Water Quality Control Board, Lahontan (Lahontan Water Board) programs and ongoing and expected future actions which are reasonably expected to result in attainment of water quality standards in the WFCR. When data demonstrates these pollutants are no longer exceeding standards, these waterbodies will be recommended for removal, or delisting, from the Clean Water Act Section 303(d) List. If delisted, TMDLs will no longer be required under the Clean Water Act.

The WFCR was selected by the staff of the Lahontan Water Board for development of an advance restoration plan because there are significant ongoing and historical water quality monitoring, and significant efforts by stakeholders to restore and protect water quality in the WFCR, as well as the greater Carson River system through the implementation of the Carson River Watershed Adaptive Stewardship Plan (CRASP) (CWSD, 2006, 2017).

1.1. Vision Plan Goals and Objectives

The overall goal of the Vision Plan is the attainment of all water quality standards in the WFCR in a reasonably expeditious manner. The Vision Plan sets out a 10-year timetable for implementation, with a goal of attaining water quality objectives by October 2033.

Objectives related to attaining that goal are:

A. To meet the overall goal in the most efficient manner possible, by utilizing a less resource-intensive advance restoration plan which could result in the attainment of water quality objectives before proceeding with full TMDL development, and

B. To include the 9 key elements for watershed-based plans recommended by the USEPA Nonpoint Source (Clean Water Act Section 319) Program. This is an important objective because it maps out a process recommended for ensuring standards attainment, and because inclusion of these 9 key elements will make projects addressing nonpoint source pollution in the WFCR watershed eligible for Clean Water Act section 319 grant funding. The 9 key watershed-based plan elements are:
    1) An identification of the causes and sources that need to be controlled.
    2) An estimate of the load reductions expected.
    3) A description of management measures that will need to be implemented to achieve load reductions.
    4) An estimate of the technical and financial assistance needed.
    5) An information and education component
    6) A schedule for implementation
    7) A description of measurable milestones for implementation
    8) Criteria to measure progress towards attaining standards.
    9) A monitoring program to evaluate effectiveness

1.2. Document Organization

This Vision Plan is organized as follows:

- Section 1 Introduces the West Fork Carson River Vision Plan need, goals, and objectives.
- Section 2 Provides background information about the West Fork Carson River Watershed.
- Section 3 Provides information on water quality standards.
- Section 4 Contains a summary of the relevant water quality monitoring data, and load reductions needed to attain standards.
- Section 5 Describes the causes and sources of the relevant water quality issues (addressing watershed-based plan key element #1).
- Section 6 Details the implementation plan to address the impairment by source, an estimate of the technical and financial assistance needed, and information and education component and a schedule (addressing watershed-based plan key elements #2, 3, 4, 5, and 6).
- Section 7 Provides details of stakeholder communications undertaken in the development of this Vision Plan.
- Section 8 Provides details of the monitoring and reporting required to achieve Vision Plan goals. (Addressing watershed-based plan key element #9).

- Section 9 Includes information for Vision Plan evaluation and adaptive management strategies over the life of the Vision Plan (addressing watershed-based plan key elements #7 and 8).

2. Background: Watershed and Hydrology

The West Fork Carson River (WFCR) flows northeast from its headwaters high in the Sierra, through Alpine County to the Nevada State line. The WFCR combines with the East Fork Carson River near Genoa, Nevada to form the Carson River which flows northeast into its eventual terminus at the Carson Sink, as shown in Figure 2-1. This Vision Plan focuses on the WFCR and its watershed in California, shown in Figure 2-2, which is all located in Alpine County (hereafter referred to as the WFCR watershed). For the purposes of this Vision Plan the WFCR watershed includes all lands draining to the WFCR in California. There are additional lands in Alpine County that drain to the WFCR in Nevada that are not included in the scope of this plan. A description of the entire Carson River Watershed including more information about its flora and fauna is available through the Carson River Watershed Adaptive Stewardship Plan (CWSD, 2006,2017).

The WFCR watershed is within the ancestral territory of the Washoe Tribe of Nevada and California, who are the original inhabitants of Lake Tahoe and all lands surrounding it (Washoe Tribe, 2021). The Washoe were traditionally divided into three groups; the northerners or Wel mel ti, the Pau wa lu who lived in the Carson Valley in the east, and the Hung a lel ti who lived in the south in an area which includes the WFCR watershed. The Washoe currently have lands in multiple areas within their ancestral territory, including an area known as the Woodfords community, which is immediately south of the WFCR watershed.

The WFCR begins at over 8,000 feet along the crest of the Sierra Nevada near Carson Pass at Lost Lakes, then flows north through Faith Valley. After Faith Valley, the WFCR flows north and then east through Hope Valley. After Hope Valley, starting near Pickett's Junction, the WFCR flows northeast through a steep canyon, until it enters the southern part of the Carson Valley near the community of Woodfords and continues north to the Nevada State line. The WFCR then roughly parallels Highway 88 from Hope Valley until the state line, crossing under the highway multiple times. The WFCR is fed by several smaller tributaries along its route, including, from upstream to downstream, Forestdale Creek, Red Lake Creek, Hawkins Creek, Willow Creek, and Horsethief Creek. The WFCR's watershed is in a rural area, mostly consisting of forestland and alpine meadows, with minimal development and land use dominated by recreation and open space. Most of the WFCR watershed is in the Humboldt-Toiyabe National Forest (HTNF). There is dispersed camping on the HTNF land, especially near Scotts Lake, Red Lake, and Hope Valley and Faith Valley. There is one active grazing allotment on HTNF land in Hope Valley and areas upstream of the valley. In addition, there are dispersed residences, two minor residential areas (Woodfords and Mesa Vista), one

vacation resort, and a few campgrounds in the watershed downstream of Hope Valley. Most of these land uses occur along the river. Downstream of Woodfords, there are rangelands used for cattle grazing in the watershed, many of which are adjacent to the river.

Flows in the WFCR consist mostly of snowmelt, baseflow from groundwater and, to a much lesser extent, releases from reservoirs in its headwaters: East and West Lost Lakes, Red Lake, Crater Lake, and Scotts Lake. Collectively, these reservoirs which are all upstream from Woodfords, can store about 2,000 acre-feet of water (Hess, 1996). The water rights for Lost Lakes are held by the Carson Water Subconservancy District (CWSD), which makes water releases late in the season to ensure there are adequate flows in the WFCR for downstream users. Crater Lake and Scotts Lake releases are managed for downstream agricultural users. Water Rights for Red Lake are held by the California Department of Fish and Wildlife (CDFW). Red Lake is managed as part of the Red Lake Wildlife Area for fishing and does not have a regular flow release regime. Water from the WFCR is diverted by pumping, as well as a system of multiple ditches which divert water from the WFCR in its lower reaches, starting just upstream of Woodfords. This water is used to irrigate pasturelands along the river and as a source of water for Indian Creek Reservoir. Some of the irrigation water may return to the river as tailwater via surface runoff or where the ditches drain to the river on their downstream end.

A US Geological Survey flow gauge at on the WFCR Woodfords provides a long running record of flows in the WFCR, from 1901 through the present. Data from this gauge is available at https://waterdata.usgs.gov/ca/nwis/uv/?site_no=10310000.

Based on data from this gauge from 1901 through 2021, WFCR flows typically peak in May with snowmelt. The median of the annual maximum daily average flow is around 600 cubic feet per second (cfs). The flow in the WFCR then rapidly decreases after its peak in May through September. The median of the annual minimum daily average flow is around 14 cfs. After the minimum flow in September, the flow in the WFCR rises and falls, with a gradual overall rise resulting from storm runoff events from October until March, when snowmelt causes a rapid rise in flows until peaking again around May. Maximum flows in the period of record are caused by rain-on-snow events, the highest daily average flow of 5,500 cfs was recorded on January 2, 1997. The highest instantaneous streamflow of 8,100 cfs was measured on January 1, 1997. Annual average flows range from 30 to over 263 cfs, with a median annual average flow of 86 cfs which is equivalent to about 62,000 acre-feet per year. A detailed description of flows, geology, and channel conditions in the WFCR is available in the Upper Carson River Watershed Stream Corridor Assessment (MACTEC Engineering and Consulting, et al., 2004).

Reservoir releases and water withdrawals in the WFCR are regulated according to the Alpine Decree (*U.S. v. Alpine Land and Reservoir Co.*, 1980). The Alpine Decree is administered by a Federal Water Master who is appointed by the Federal District Court.

The Federal Water Master employs a staff that maintains the records of each claim contained in the Alpine Decree and several ditch riders that monitor and administer the diversion of water from the Carson River.

Recycled water from the Tahoe Basin is used to irrigate rangelands in the WFCR watershed. Advanced secondary treated effluent from the South Tahoe Public Utilities District (STPUD) wastewater treatment plant in South Lake Tahoe is pumped out of the Tahoe Basin over Luther Pass and into Harvey Place Reservoir in Diamond Valley, which is adjacent to the WFCR basin. This recycled water from Harvey Place Reservoir is then delivered via Diamond Valley Ditch to irrigate surrounding pastures, including rangelands along the WFCR.

In addition to government agencies, the Washo Tribe and multiple groups are active in the stewardship of the WFCR watershed. Ongoing coordination and collaboration with the government agencies, the Washoe Tribe, and the groups active in the watershed will be critical to the success of this Vision Plan.

The Washoe Tribe of Nevada and California has an Environmental Protection Department with eleven full-time staff members who run a variety of programs and projects focused on ecosystem protection and restoration. These programs and projects include river restoration of the Carson River and its tributaries, native species propagation, invasive species management, post-fire restoration, fire resiliency efforts and the promotion of environmental stewardship through awareness and education.

The CWSD is a unique bi-state non-regulatory agency which is funded by ad valorem taxes. CWSD develops watershed-wide planning documents, such as the Carson River Watershed Adaptive Stewardship Plan (CRASP) (CWSD, 2006, 2017), which help to coordinate regional efforts and are essential for obtaining federal grant monies. The CRASP serves as a 9 - Element Watershed-Based Plan for the Carson River Watershed in Nevada. A goal of this Vision Plan is to function as a 9-Element Watershed Based Plan for the WFCR portion of the Carson River Watershed in California. CWSD also provides grant funding to local entities for project implementation and implements watershed monitoring, education, and restoration activities. Finally, CWSD serves as the coordinating agency for the Carson River Coalition (CRC), a large stakeholder group of federal, state, county, and tribal agencies, non-governmental entities, private citizens, and landowners.

The Alpine Watershed Group (AWG) is a small local nonprofit watershed group in Alpine County, CA. As a watershed group they are a locally organized, voluntary, non-regulatory group established to assess the condition of the watershed. They implement monitoring, restoration, and education programs to protect, conserve and restore the watersheds of Alpine County, which includes headwaters of the Carson, Upper Truckee, Stanislaus, Mokelumne, and American Rivers. They are a key partner to the CWSD in implementing the CRASP in Alpine County.

Friends of Hope Valley (FOHV) is a non-profit organization dedicated to protecting and preserving the scenic beauty, recreational opportunity and historic value of Hope Valley and eastern slope of the Sierra Nevada in Alpine County. They have helped protect Hope Valley from development and have implemented many projects such as willow plantings along the WFCR.

CWSD,AWG, and FOHV work with numerous other government agencies and stakeholders in their stewardship activities in the WFCR watershed, including Alpine County, the Carson Ranger District of the Humboldt-Toiyabe National Forest, California Department of Fish and Wildlife (CDFW), the Washoe Tribe of Nevada and California, the National Fish and Wildlife Foundation, American Rivers, the Sierra Nevada Conservancy, and numerous local volunteers. There are several past and ongoing restoration projects in the WFCR watershed which are expected to improve long-term water quality in the WFCR. Many of these projects are described at https://www.alpinewatershedgroup.org/restoration.

WFCR Restoration projects are also listed in the Carson River Watershed Adaptive Stewardship Plan (CRASP) (CWSD, 2006, 2017), and will be available on CWSD's web viewer (under development).

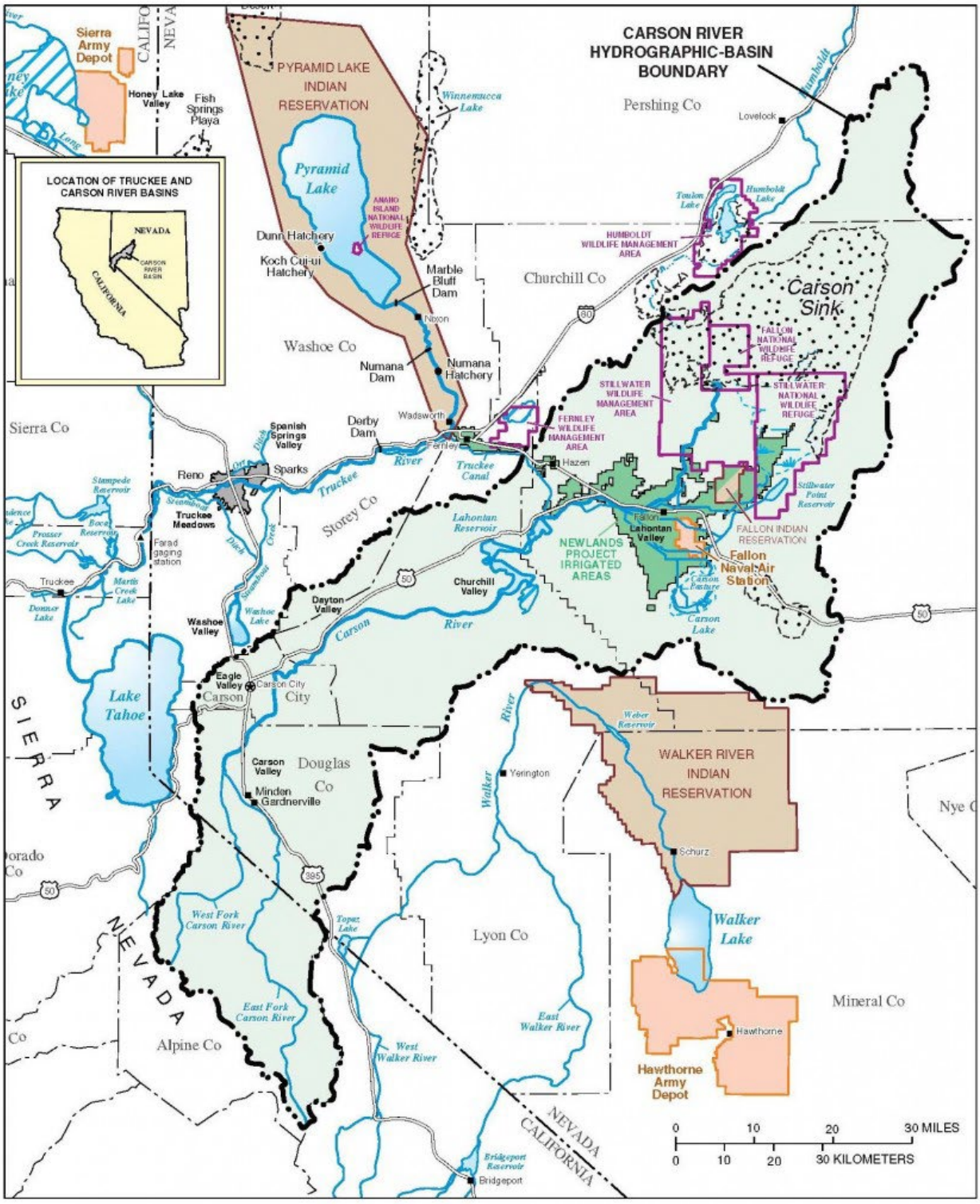

Figure 2-1. Carson River Watershed (map provided by USGS)

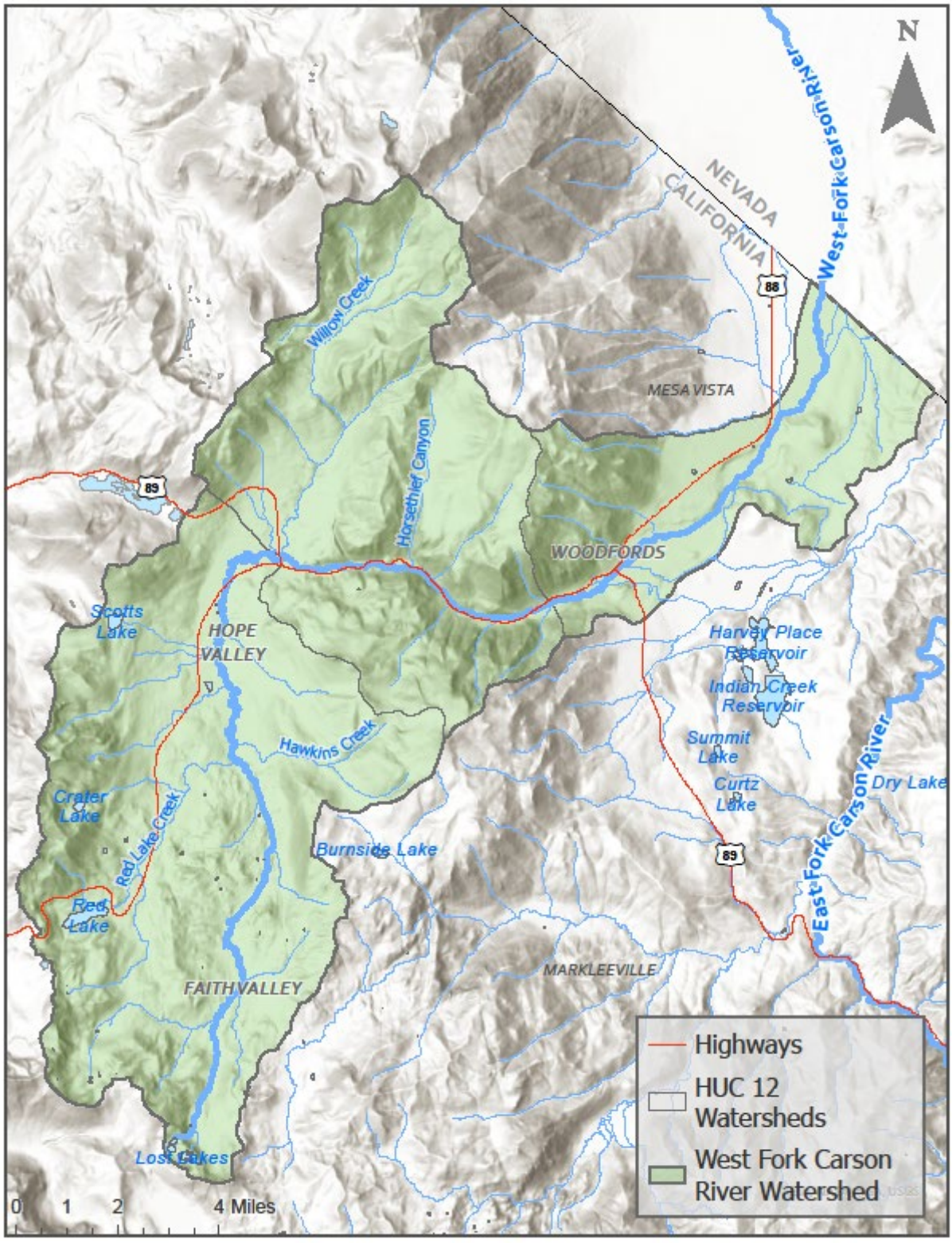

Figure 2-2. West Fork Carson River Watershed

3. Water Quality Standards

Water quality standards for the West Fork Carson River are principally established in the Lahontan Water Board's Water Quality Control Plan for the Lahontan Region (Basin Plan) (CRWQCB-LR, 2021). Additional water quality standards applicable in the Lahontan Region are established by the State Water Resources Control Board in the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California and in the California Toxics Rule promulgated by the United States Environmental Protection Agency (USEPA, 2001).

Water quality standards include beneficial uses of a waterbody (such as uses for drinking water, aquatic habitat, recreation, and agriculture), water quality objectives (WQOs), which are numeric and/or narrative water quality conditions protective of those uses (such as maximum concentrations of pollutants), along with antidegradation provisions that limit degradation of high-quality waters.

The West Fork Carson River is designated with fourteen (14) beneficial uses; information about these can be found in Table 2-1 op Page 2-17 in Chapter 2 of the Basin Plan. These designated beneficial uses include municipal and domestic drinking water supply, agriculture, water contact recreation, noncontact water recreation, commercial and sportfishing, and cold freshwater habitat.

WQOs for the WFCR in the Basin Plan include the following:

- General WQOs that apply to all Lahontan Region surface waters including the WFCR, on pages 3-3 through 3-6,
- WQOs for the WFCR on page 3-9, and
- Site specific WQOs for two sites on the WFCR in Table 3-14 on page 3-40.

Additionally, the State Water Resources Control Board has established fecal indicator bacteria (FIB) WQOs applicable to the WFCR in the Bacteria Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California – Bacteria Provisions (SWRCB, 2018).

A Basin Plan Amendment that proposes to remove the fecal coliform WQOs from the Basin Plan was adopted by the Lahontan Water Board in June 2023, and is expected to be considered for approval by the State Water Resources Control Board, Office of Administrative Law and finally USEPA in 2024. More information on this Basin Plan Amendment can be found at the Water Board's Basin Planning webpage.

Tables 3-1, 3-2, and 3-3 summarize the WQOs associated with the 303(d) impairment listings for WFCR. It should be noted that there are other WQOs applicable to the WFCR.

Table 3-1 WFCR Water Quality Objectives from Basin Plan Pages 3-4 and 3-9 that are Associated with the Impairment

Constituent	Water Quality Objective
Iron	0.3 mg/L (drinking water maximum contaminant limit incorporated by reference on Basin Plan page 3-4)
Fecal coliform	The fecal coliform concentration during any 30-day period shall not exceed a log mean of 20/100 ml, nor shall more than 10 percent of all samples collected during any 30-day period exceed 40/100 ml.
Turbidity	2 nephelometric turbidity units (NTU), mean of monthly means

Table 3-2. WFCR Water Quality Objectives from Basin Plan Table 3-14 that are Associated with the Impairment
(All values shown are mean of monthly means for the period of record)

Surface Waters	TDS (mg/L)	Cl (mg/L)	SO_4 (mg/L)	Total P (mg/L)	Total N (mg/L)	TKN (mg/L)	NO_3-N (mg/L)
West Fork Carson River at Woodfords	55	1.0	2.0	0.02	0.15	0.13	0.02
West Fork Carson River at Stateline	70	2.5	2.0	0.03	0.25	0.22	0.03

Cl = Chloride
N = Nitrogen, Total
SO_4 = Sulfate
TDS = Total Dissolved Solids
NO_3-N = Nitrate as Nitrogen
TKN = Total Kjeldahl Nitrogen
P = Phosphorus, Total

Table 3-3. WFCR WQOs Established by State Board that are Associated with the Impairment

Constituent	Water Quality Objective
E. coli	≤100 colony forming units (CFU) /100 mL six-week geometric mean, calculated weekly Single threshold value - No more than 10% of samples >320 CFU/100 mL in any calendar month

In addition to the standards applicable to the WFCR in California, the water quality standards shown in Table 3-4 are established by NDEP for these constituents and are applicable to the WFCR at the state line where it flows into Nevada. Note this list is not

exhaustive but focused on the parameters addressed in the Plan. The NDEP standards can be found at https://www.leg.state.nv.us/nac/nac-445a.html#NAC445ASec1796 and https://www.leg.state.nv.us/nac/nac-445a.html#NAC445ASec1236

Table 3-4. Selected State of Nevada Water Quality Standards applicable to the WFCR at the State Line (Nevada Administrative Code, 445A.1796)

Constituent	Water Quality Criteria
Iron, dissolved (mg/L)	96-hour average < 1
Fecal Coliform (no/100 ml)	S.V.≤ 1,000
Turbidity (NTU)	Single Value (S.V.) ≤ 10
TDS (mg/L)	Annual average. ≤ 500
Cl (mg/L)	S.V.≤ 250
SO_4 (mg/L)	S.V. ≤ 250
Total P	Annual average ≤ 0.10
NO_3-N	S.V.≤ 10
E. coli	Geometric mean ≤ 126 S.V. ≤ 410

The State of Nevada has different 303(d) listings for the WFCR at the state line, due to the different water quality standards in Nevada. None of parameters which are 303(d) listed in California for the WFCR are 303(d) listed in Nevada. The State of Nevada's 303(d) listings for the WFCR at state line, and applicable Water Quality Criteria established in Nevada for these constituents, are shown in Table 3-5. It should be noted that these impairments are considered low priority by the State of Nevada, as discussed in section 4.1 below.

Table 3-5. State of Nevada 303(d) Listings for the WFCR at the State Line (NDEP and Associated State of Nevada Quality Criteria (Nevada Administrative Code, 445A.1796)

Constituent	Water Quality Criteria
Temperature (degrees C)	Single Value (S.V.) Nov-May ≤ 13 S.V. Jun ≤ 17 S.V. Jul ≤ 21 S.V. Aug-Oct ≤ 22 ΔT ≤ 2
Cadmium	1 hour average and 96-hour average concentration as defined by USEPA Aquatic Life Ambient Water Quality Criteria for Cadmium. 2016
Silver	1-hour average as defined in U.S. Environmental Protection Agency, National Recommended Water Quality Criteria, May 2009.
Beryllium	0 mg/L

4. WFCR Water Quality

This section summarizes the water quality for the WFCR with a focus on constituents causing the water quality impairments which are addressed in this Vision Plan. Available data are summarized and compared to the applicable WQOs described above, and estimations of pollutant reductions needed to attain standards are calculated.

As discussed in Section 4.1, there are multiple water quality impairments in the WFCR. However, as shown in the sections below, the magnitude and frequency of WQO exceedances causing the impairments in the WFCR are not extreme or very frequent. Additionally, data show that WQOs related to multiple other constituents (such as dissolved oxygen, toxicity, pesticides, and other organic pollutants) are attained in the WFCR (SWRCB, 2021). It also should be noted that the watershed is recovering from the impacts of the historical activities discussed in Section 5.1, which were much greater than the impacts of any current activities (MACTEC et al., 2004).

Generally, pollutant concentrations in the Carson River system increase in the downstream direction as discussed in this section for the WFCR, and in Glancy and Katzer (1975) and Alvarez and Seiler (2004). Therefore, water quality improvements in the WFCR can help address downstream impairments and protect against potential future water quality impairments.

4.1. Water Quality Impairments in the WFCR

Water quality data for the Lahontan Region is assessed in comparison to water quality standards during the development of the Clean Water Act section 303(d) list, which is prepared under the State's Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (Listing Policy), (SWRCB, 2015). The 303(d) list is part of the State of California's Integrated Report for Clean Water Act Sections 305(b) and 303(d) (Integrated Report), (SWRCB, 2020).

In the current (2018) Integrated Report, the WFCR is assessed in three segments. These three segments, and the primary monitoring stations used to assess their water quality, are shown in figure 4-1. Constituents listed as exceeding WQOs, or "impairments" for these segments, are listed in Table 4-1. The first WFCR segment begins at the headwaters and extends to the downstream end of Hope Valley. The second segment begins at the downstream end of Hope Valley and extends to Woodfords. The third segment extends from Woodfords to the Nevada state line. The WFCR was segmented this way for assessment because of the distinct land uses and hydrogeology of each segment.

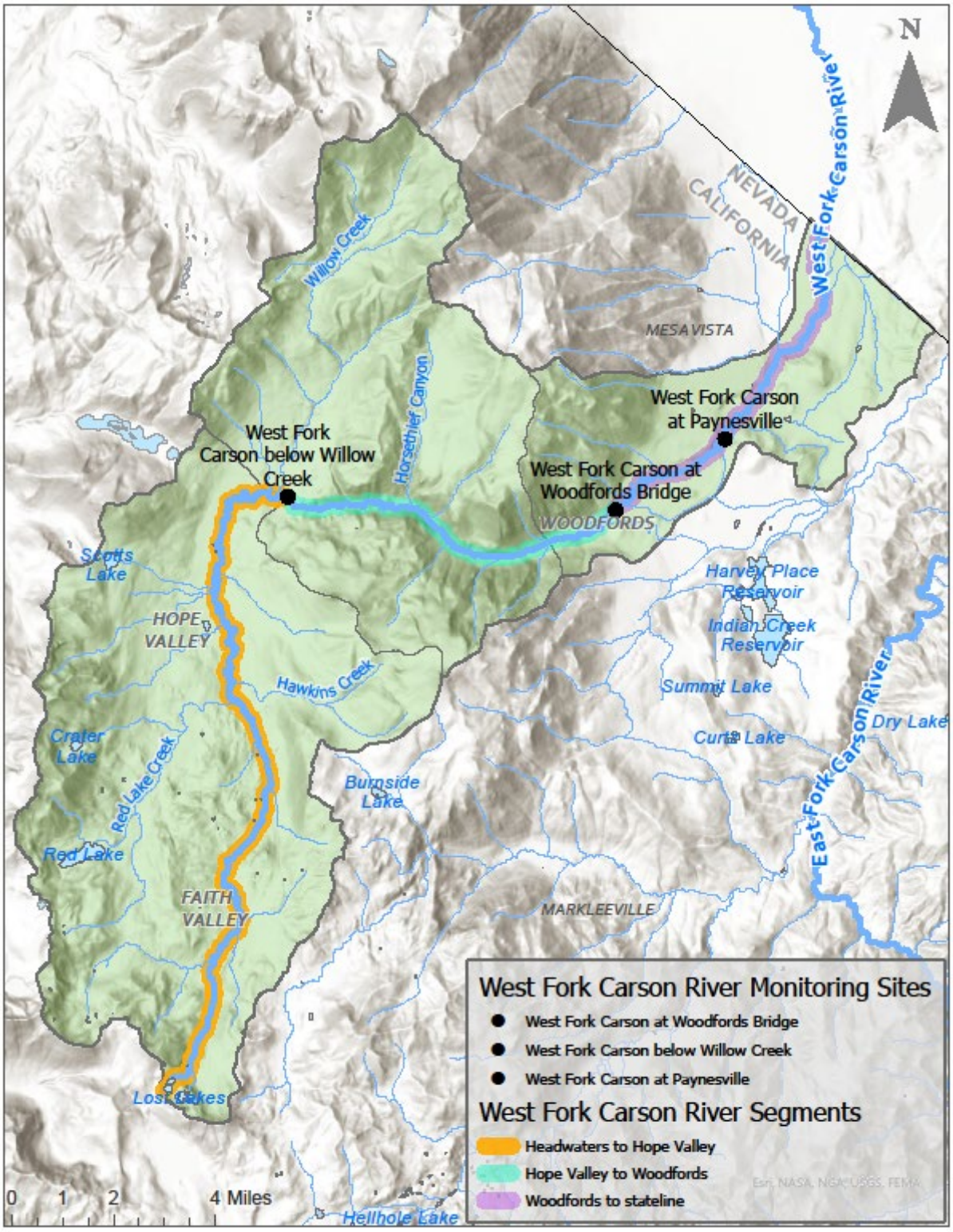

Figure 4-1. West Fork Carson River Segments and Primary Monitoring Stations

Table 4-1 WFCR Segments and 303(d)-Listed Impairments

WFCR Segment	Water Quality Impairments
Headwaters to Hope Valley	Nitrogen (Nitrate, TKN), Phosphorous, Sulfates
Hope Valley to Woodfords	Chloride, Nitrogen (N, Nitrate, TKN), Phosphorous, Sulfates, Total Dissolved Solids, Turbidity
Woodfords to State Line	Fecal Indicator Bacteria, Iron, Nitrogen (N, Nitrate, TKN), Sulfates, Total Dissolved Solids, Turbidity

The impairments of the WFCR shown in Table 4-1 are all associated with potential impacts to aquatic life beneficial uses of the WFCR, except for the fecal indicator bacteria impairment, which is associated with the water contact recreation beneficial use, and the iron impairment, which is associated with the municipal and domestic supply beneficial use. Additionally, the Nevada Division of Environmental Protection's most recent Integrated Report has multiple listed impairments for the WFCR at the state line, as shown in table 4-2.

Table 4-2. NDEP 303(d)-listed impairments for the WFCR at State Line (from NDEP, 2022b, Attachment 2B).

Standard	Impaired Use	TMDL Priority	NDEP Priority Reason
Cadmium 1-hour	Aquatic Life	Low	Natural background
Cadmium 96-hour	Aquatic Life	Low	Natural background
Silver 1-hour	Aquatic Life	Low	Natural background
Temperature Single Value	Aquatic Life	Low	
Beryllium	Municipal or Domestic Supply	Low	The water quality standard needs to be revised

NDEP's current Integrated Report lists the WFCR at state line as impaired by temperature, cadmium, silver, and beryllium (NDEP, 2022b). These impairments are all listed as low priority for TMDL development by NDEP. The cadmium and silver listings are considered natural background concentrations. NDEP is currently developing a Use Attainability Analysis (UAA) to revise the subcategory of designated aquatic life use, from cold-water to warm-water fishery, for segments of the Carson River in the Carson Valley. NDEP also classifies their beryllium listings as a standards issue, as Nevada's current standard is 0 µg/L, whereas the standard for the most sensitive beneficial use

for the protection of drinking water standard is 4 µg/L, and there are no exceedances of the 4 µg/L drinking water protection standard.

NDEP has also finalized TMDLs for the Carson River for phosphorus (NDEP, 2005) and turbidity and Total Suspended Solids (NDEP, 2007) to address impairments for these constituents downstream in the Carson River. However, because nonpoint sources are the primary contributor to these impairments, TMDLs by themselves were ineffective at resolving these impairments under Nevada's legal and regulatory structure (NDEP, 2002a). Therefore, these constituents are also a focus of the NDEP's Alternative Restoration Plan for the Carson River (NDEP, 2022a) which takes advantage of work being done under NDEP's Nonpoint Source Program and under the Carson River Watershed Adaptive Stewardship Plan (CWSD 2006,2017). The NDEP TMDLs for the Carson River noted that the concentrations and number of exceedances for these constituents increase in a downstream direction. These TMDLs did not require any reductions for the WFCR at the state line, since the WFCR met NDEP standards for these constituents at the state line. Nevertheless, further reductions of TSS, turbidity, and phosphorus in the WFCR in California to meet California standards will help reduce downstream concentrations. For these TMDL constituents, high flow conditions were associated with the majority of the pollutant load, indicating that restoring riverbanks and preventing erosion will be the most effective way to achieve water quality standards for these constituents in the Carson River (NDEP 2022).

4.2. Available Water Quality Data and Studies

There are currently four monitoring programs collecting water quality data in the West Fork Carson River, as well as historical monitoring by the US Geological Survey. The data these programs generated in the WFCR are summarized in Table 4-3.

A description of these monitoring programs and completed monitoring studies in the Carson River watershed is available in Chapter 7 of the CRASP (CWSD, 2017). Table 4-4 contains a summary of studies in the WFCR. Table 4-4 is adapted from and can considered an update/addendum to table 7.2.12-1 of the CRASP, focused on the WFCR. All available data for WFCR water quality from these sources were compiled and used in the subsequent analysis in developing this Vision Plan. The data set used for the Vision Plan includes WFCR data that was not used in the most recent (2018) Integrated Report update. Recommendations for coordinating ongoing monitoring and integration of the data are included in Section 9 of this Vision Plan.

Table 4-3. West Fork Carson Water Quality Data Sources

Organization	Program	Primary WFCR Locations	Timing and Frequency	Data Source
Lahontan Water Board	Surface Water Ambient Monitoring Program (SWAMP)	Downstream of Willow Creek, Woodfords, Paynesville	Quarterly 2010-present	CEDEN
Nevada Division of Environmental Protection (NDEP)	Ambient Monitoring	Woodfords, Paynesville	Approximately quarterly 1966-present	NDEP Water Quality Data Warehouse
Alpine Watershed Group	Upper Carson River Monitoring	Pickett's Junction, Woodfords, Paynesville	Approximately quarterly 2004-present	CEDEN
South Tahoe Public Utility District	Alpine County Surface Water Monitoring	Downstream of Willow Creek, Woodfords, Paynesville	Monthly, 1980-present	Provided by STPUD
US Geological Survey	NAWQA	Downstream of Willow Creek	Quarterly, 2003-2005	USGS water data library

Table 4-4. WFCR (in CA) Water Quality Completed Studies (Adopted from CWSD, 2017 Table 7.2.12-1, with updates)

Title/Program	Locations	Dates	Lead Organization & Partners	Description (reference)
Upper Carson River Water Quality Monitoring Program	East Fork, West Fork	March 2007	Alpine County, CWSD, STPUD, DRI	The goal of the project was to provide baseline water quality data. Final report completed in June 2007.
Characterization of Turbidity and Total Suspended Solids in the Upper Carson River, Nevada	East Fork, West Fork, Carson River	September 2007	DRI, NDEP	Report of monitoring done at four sites: Diamond Valley (West Fork); Riverview (East Fork); Genoa Lakes (Carson River); and Brunswick Canyon (Carson River). (Susfalk et al., 2008)
Analysis of Streamflow Trends, Groundwater and Surface Water Interactions, and Water Quality in the Upper Carson River Basin, Nevada, and California	Upper Carson River Basin, Nevada and California	2008	USGS	USGS Scientific Investigations Report 2008-5238
Alternative Restoration Plan for Improving Water Quality in Segments of the Carson River System in Carson Valley, Nevada	Carson Valley	Completed 2022	NDEP	Vision Plan for the Carson River in Nevada. Addresses NDEP TMDLs and impairments for the Carson River. Discusses upstream sources from the WFCR and East Fork Carson River. (NDEP, 2022a)

4.3. Sediment and Turbidity

While turbidity levels are more variable in the upstream segments, turbidity in the WFCR generally increases as it flows downstream. The two lower segments of the WFCR (Hope Valley to Woodfords and Woodford to the state line) are listed on the 303(d) list as impaired for turbidity. The watershed-wide objective for turbidity in the West Fork Carson River hydrologic unit, including the WFCR, as stipulated in the Lahontan Basin Plan page 3-9, is a mean-of-monthly means not to exceed 2 NTU. For purposes of the Integrated Report assessments, the mean of monthly means is calculated on an annual basis, giving a single annual mean of monthly means (AMMM) for each year with available data. Figure 4-2 shows boxplots of AMMM turbidity for each reach of the WFCR. The State of Nevada's turbidity water quality criteria of 10 NTU for the WFCR at state line as a single maximum value was rarely exceeded. Turbidity measurements from the WFCR from the Woodfords to state line exceeded the 10 NTU criterion concentration 27 times in over 1,500 measurements (approximately 2%), with 53 years of available data.

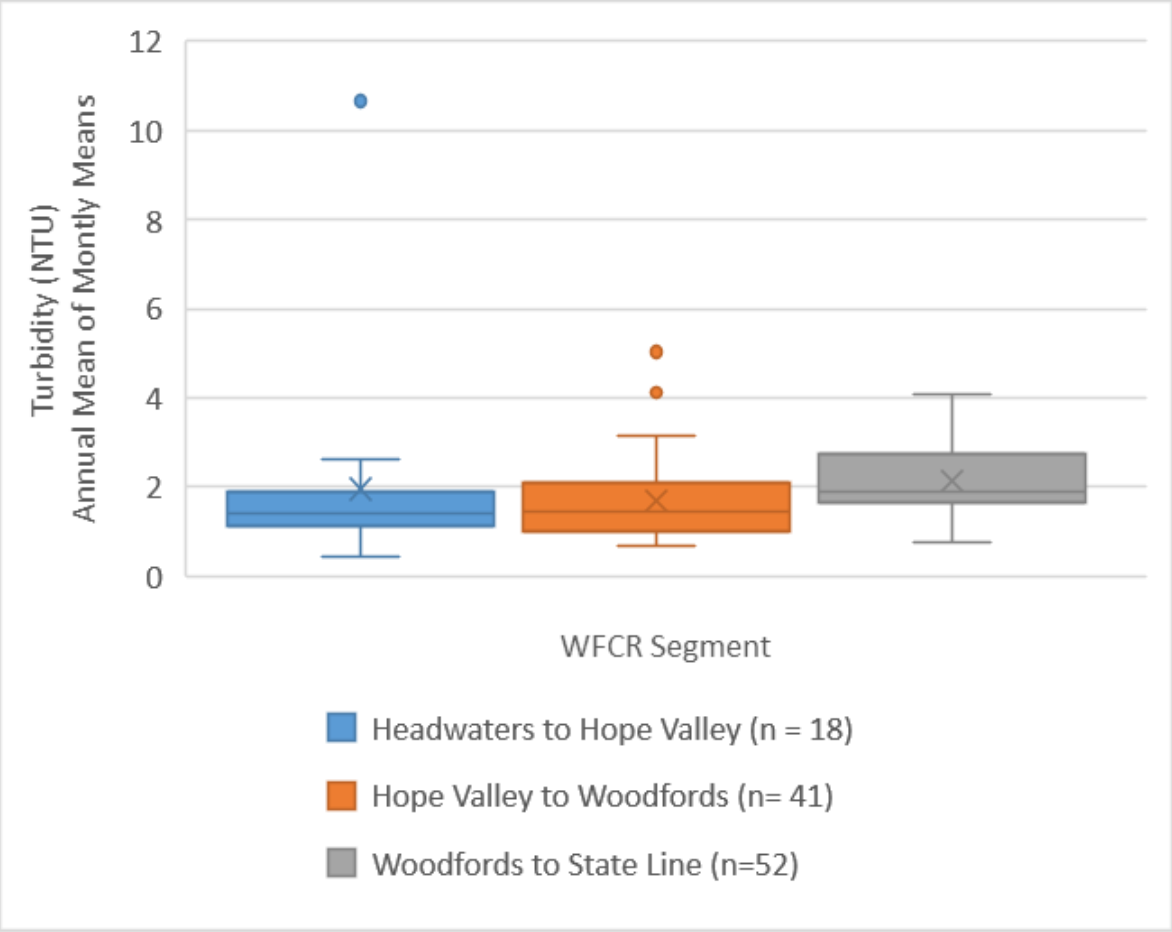

Figure 4-2. WFCR Turbidity Boxplot[1]

[1] *Explanation of the box plot:* The rectangular part (box) of the plot extends from the lower quartile (25th percentile) to the upper quartile (75th percentile), covering approximately the center half of the data. The horizontal lines within each box show the value of the median sample concentration. The whiskers extend from the box to the minimum and maximum concentration values, unless there are any values 'outside' 1.5 times the interquartile range (the range between the 25th and 75th percentile values, i.e., the inter-quartile range [IQR]). If there are concentration values beyond (above) 1.5 times the IQR, the whisker ends at the value equal to 1.5 times the IQR, and 'Outside' concentration values are plotted above or below the whisker as individual dots. The X shows the mean value.

Monthly average turbidity for all stations in the WFCR is shown in Figure 4-3. Turbidity in the WFCR peaks with high flows in May. Elevated turbidity continues through late summer and early autumn, when flows are lower, but conditions favor algal growth in the river and its tributary streams and reservoirs. These algae may also contribute to turbidity, but the main cause appears to be sediment.

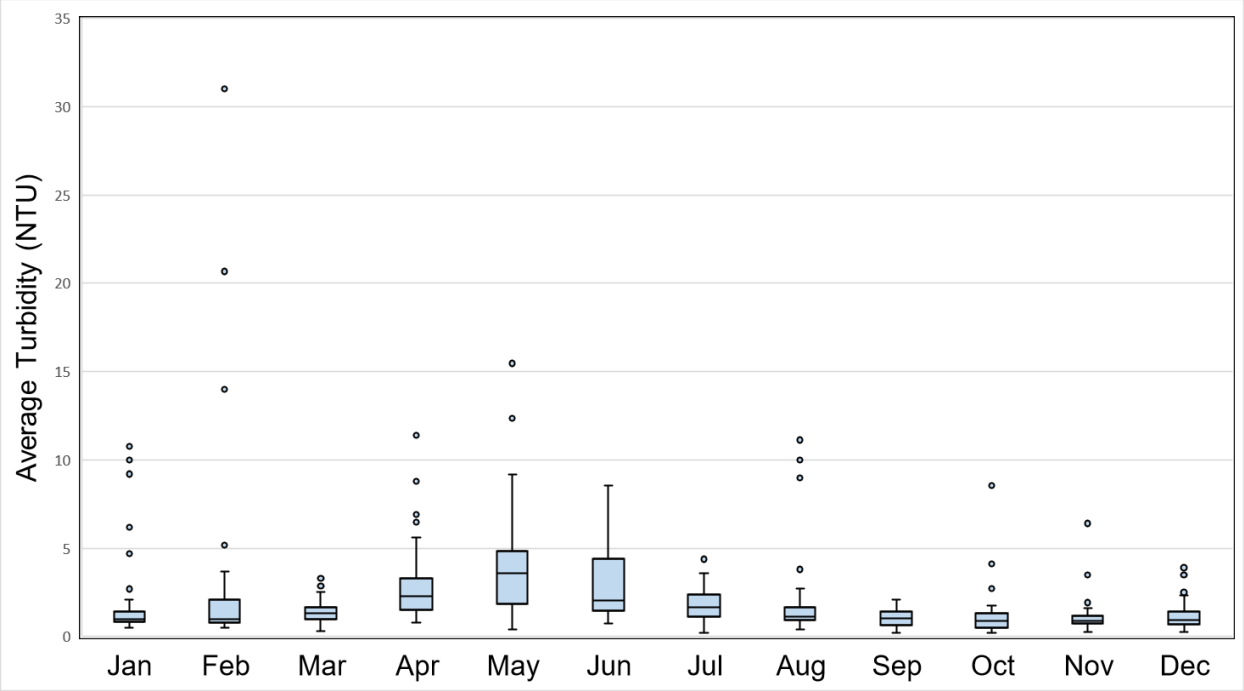

Figure 4-3. Monthly Average Turbidity for All WFCR Stations

The Listing Policy (SWRCB, 2015, Tables 3.2 and 4.2) gives the maximum number of allowable exceedances below which a segment is considered in attainment of standards for conventional pollutants. The number of exceedances from the Listing Policy can be used as a basis for adding or removing waterbody segment pollutant combinations from the 303(d) List. Table 4-5 shows the number of exceedances for each segment, the number of years with AMMM turbidity data, and the maximum number of allowable exceedances from the Listing Policy. Table 4-5 also shows the percent reduction of the AMMM turbidity that would result in a reduction in the number of exceedances to support de-listing – based on the existing AMMM turbidity data. Table 4-2 also includes descriptive statistics for the turbidity in each segment.

Table 4-5. WFCR Turbidity

WFCR Segment	WFCR Headwaters to Hope Valley	Hope Valley to Woodfords	Woodfords to State Line
Years with AMMM Turbidity Data[2]	18 (2002-2019)	41 (1981-2021)	52 (1969-2021, except 1980)
Years with AMMM Turbidity > 2 NTU WQO	4	11	23
Maximum Exceedances to Delist	4	6	8
Median AMMM Turbidity	1.4	1.5	1.9
90th Percentile AMMM Turbidity	3.4	3.0	3.2
Maximum AMMM Turbidity	10.7	5.0	4.1
Approximate % reduction needed to delist	NA	24%	33%

The maximum reduction required was for the Woodfords to State Line segment, where a 33% reduction in AMMM Turbidity would reduce the number of exceedances from 23 to 8, which would support delisting of that segment.[3] Therefore a 33% reduction in turbidity concentrations would be expected to result in the turbidity standard being consistently attained in all three segments of the WFCR. During extremely high flow events or other times with high turbidity, the turbidity would still occasionally exceed the WQO, but if the WQO is attained during most years, the water quality standard could be considered in attainment.

The seasonality of the data, as well as the correlation of turbidity with total suspended solids (TSS) and flows indicate that sediment is the main cause of turbidity exceedances in the WFCR. Later in the year, algae contribute to the turbidity, but sediment appears to be the dominant source of turbidity. Flow, turbidity, and TSS correspond very well for the WFCR (Susfalk, et al., 2008) with TSS and turbidity increasing due to more erosion during high flow events. No clear long-term trend in TSS or turbidity was observed in the historical data.

[2] For the purposes of this report, water quality data through 2021 was used. Water quality data beyond 2021 continues to be collected by the Lahontan Water Boad, NDEP and STPUD.
[3] The percent reduction was estimated using the historical data and the Excel “Goal Seek” analytical tool, which iteratively applied an increasing percent reduction in concentrations until the number of exceedances were reduced to a number that would support delisting.

To estimate the sediment reductions needed to consistently attain the turbidity water quality objective, a relationship of total suspended solids to turbidity was determined, and then load reduction estimates were determined using the TSS and the available flow data from the Woodfords gauge.

A TSS to turbidity correlation was determined using linear regression for data for all stations on the WFCR. There were 1,913 occasions when TSS and turbidity data were both available for the same site and collection time. A linear regression on these data pairs yielded the following relationship:

TSS (mg/L) = 2.4 * Turbidity (NTU)

This regression had an r squared value of 0.67, meaning 67% of the variability in TSS is explained by the variability in turbidity. This relationship is adequate for providing an estimate of the sediment reductions needed to attain the turbidity standards for the WFCR. More complex models relating turbidity to sediment could produce a tighter correlation should data and resources be available in the future to refine this relationship.

Given the linear relationship between TSS and turbidity, the 33% reduction in turbidity needed to attain the turbidity WQO in the WFCR corresponds to approximately 33% reduction in TSS, or sediment loading.

Historic loading rates were calculated for the WFCR at Woodfords and the WFCR at Stateline using flow data from the USGS Gauge at Woodfords and TSS data collected at Woodfords, and in the WFCR from between Woodfords and the State Line (near Paynesville and at State Line). Annual loads were calculated by multiplying flow data and TSS concentrations, applying a conversion factor to get daily loads, daily loads were used to estimate monthly loads and monthly loads were summed to obtain annual TSS/sediment loads. The estimated annual loading rates are summarized in Table 4-6. Since there is not a flow gauge at State Line, the flow at Woodfords was used to estimate the loads there. There are not any significant tributaries entering the WFCR between Woodfords and the State Line, but there are diversions from the WFCR in that reach during summer and fall months. Therefore, the flows in those reaches might be overestimated, although these lower flow months have less of an effect on annual loading. This potential overestimation does not affect the estimates of sediment reductions needed, as the overall load would need to be reduced to bring concentrations down in the river with or without the diversions. The annual loading rates calculated here were compared to those developed using more rigorous methods by Susfalk, et al. (2008), who estimated sediment loads in the WFCR at Diamond Valley (near Paynesville) for water years 1995-2006 and are found to be similar for those years. Because turbidity and TSS tend to increase with flow, the monthly sediment loading follows a similar pattern as monthly flows, with the greatest average sediment loads occurring in May with high flows from snowmelt.
Table 4-6 also includes targets for the Median and 90th percentile sediment loads in the

WFCR based on a 24% and 33% TSS reduction needed to attain the Turbidity WQO in the WFCR at Woodfords and Stateline, respectively. As discussed above, some extreme events would still result in occasional exceedances, so no target is included for reducing loading above the 90th percentile.

Table 4-6. Annual TSS Loading and Reductions Targets

	WFCR at Woodfords	WFCR at Stateline
Years included[4]	1981-2021	1980-2021
Minimum loading (Metric tons/Year)	60	69
Median TSS load (Metric tons/Year)	723	1,013
90th Percentile TSS Load (Metric tons/Year)	3,199	3,749
Maximum TSS Load (Metric tons/Year)	7,820	10,215
Target % Reduction (from Table 4-5)	24%	33%
Target Median Loading (based on target % of reduction) (Metric tons/Year)	549	679
Target Median Sediment Reduction (based on target % reduction) (Metric tons/Year)	173	334
Target 90th Percentile Loading (based on target % reduction) (Metric tons/Year)	2,431	2,512
Target Reduction in 90th Percentile Load (based on target % reduction) (Metric tons/Year)	768	1,237

4.4. Phosphorous

Like turbidity, phosphorous tends to increase in the downstream direction in the WFCR (Alvarez and Seiler, 2004; NDEP, 2005; NDEP, 2022a), although concentrations are

[4] For the purposes of this report, water quality data through 2021 was used. Water quality data beyond 2021 continues to be collected by the Lahontan Water Boad, NDEP and STPUD.

more variable in the most upstream reach. The two upper segments of the river are identified as impaired by phosphorus on the most recent 303(d) list. As discussed below, the downstream reach of the WFCR from Woodfords to the state line also consistently exceeds the water quality objective when looking at a more complete data set than was used in the most recent 303(d) list update. The WQO for both the Headwaters to Hope Valley segment and the Hope Valley to Woodfords segment is 0.02 mg/L phosphorus expressed as a mean of monthly means. The WQO for the Woodfords to the state line is 0.03 mg/L, expressed as a means of monthly means. For purposes of the Integrated Report assessments, the mean of monthly means is calculated on an annual basis, giving a single annual mean of monthly means (AMMM) for each year with available data. Figure 4-4 shows boxplots of AMMM phosphorous for each reach of the WFCR.

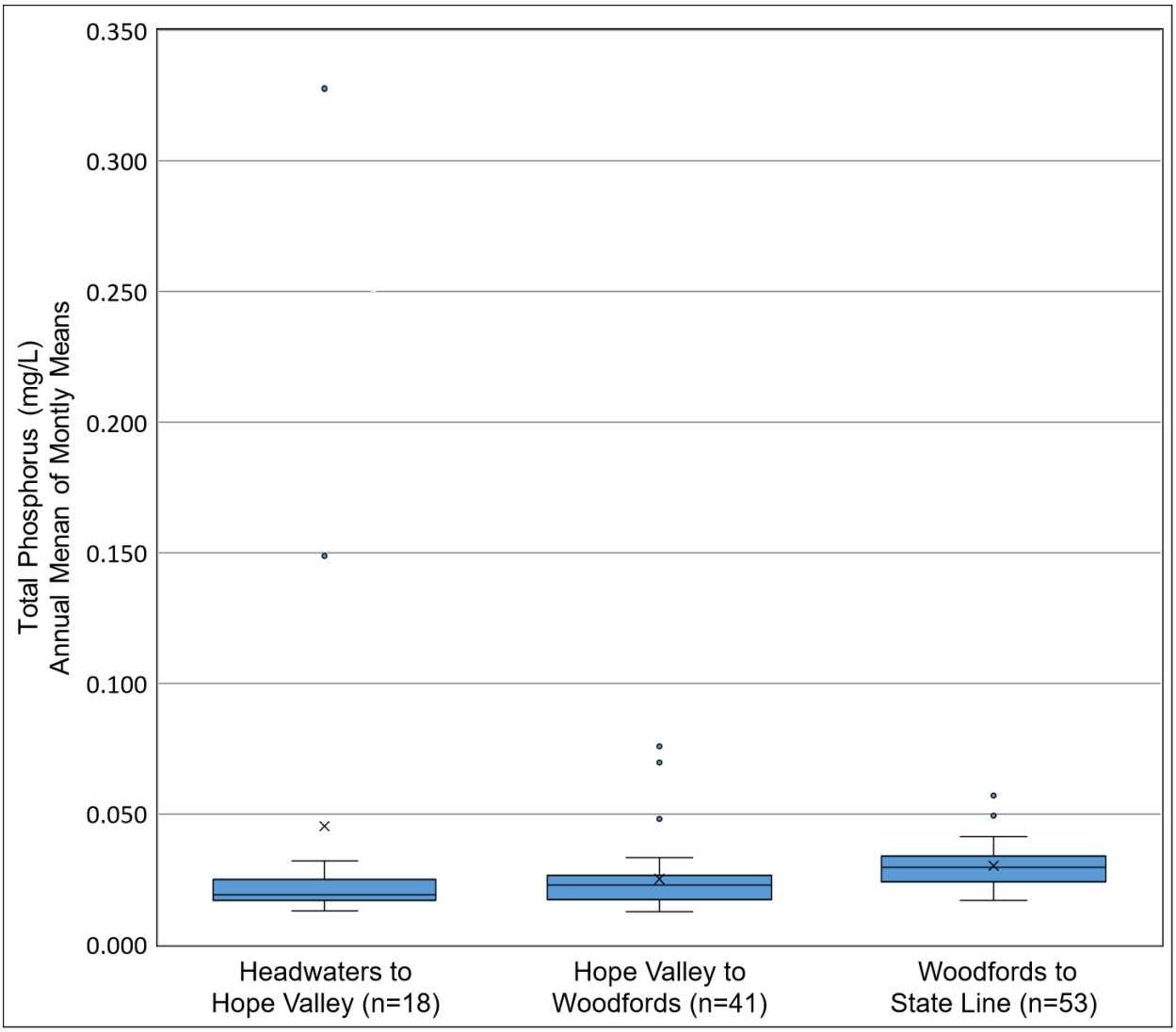

Figure 4-4. Phosphorous Concentrations in the WFCR by Reach (Annual Mean of Monthly Means)

A USGS report produced in 2004 (Alvarez and Seiler, 2004) describes likely sources of phosphorus to the WFCR. Those include natural inputs associated with the local geology which include granitic and volcanic bedrock formations that contain phosphorus. These bedrock formations are more prevalent in the upper portion of the WFCR watershed upstream of Woodfords. Sediment in runoff from nonpoint sources is another likely source of phosphorus together with erosion of unstable streambanks. Additional sources are seasonal inputs from agricultural return flow and the use of treated effluent for irrigation, grazing livestock, and inputs from onsite wastewater treatment systems located near the river. It is also possible that nutrients from recreational uses associated with the improper disposal of gray water or human and pet wastes can also be a source of phosphorus to the WFCR. The USGS report considers

whether atmospheric deposition may contribute to phosphorus in the Carson River and concludes that it is not likely to be a significant source.

Figure 4-5 shows average WFCR phosphorus concentrations for each month, using all available data. The concentrations follow a similar pattern as sediment concentrations, peaking in May at the time when flows in the WFCR are highest due to spring snowmelt. No long-term temporal trend was observed in the phosphorus data.

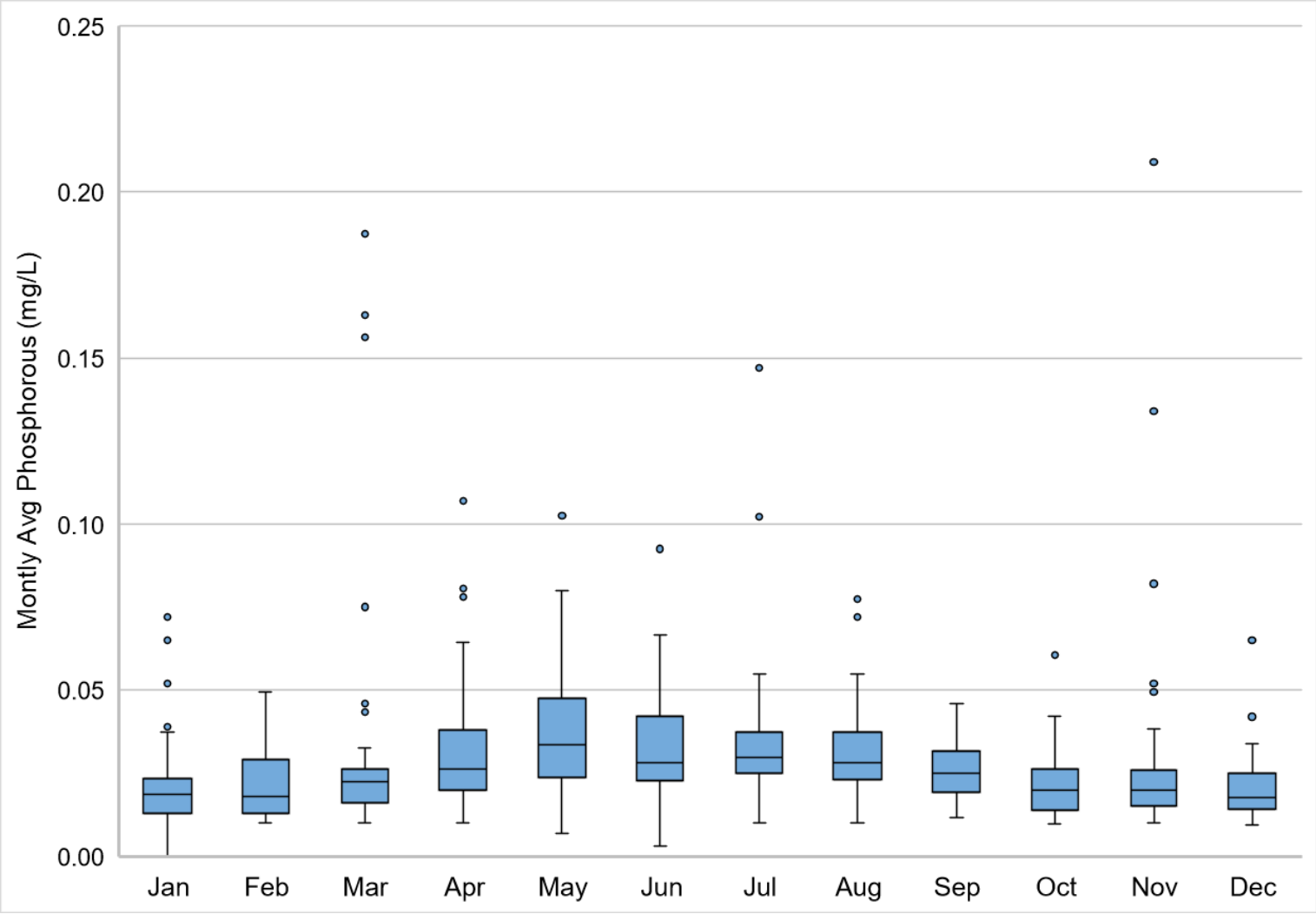

Figure 4-5. Monthly Average WFCR Phosphorus Concentrations[5]

[5] For readability, one outlier of 0.57 mg/L from June 2017 is not shown in the graph.

The State of Nevada's phosphorous water quality criteria for the WFCR at state line of 0.1 mg/L as an annual average was never exceeded in the 53 years for which phosphorous data were available. NDEP has developed a TMDL for phosphorous for downstream reaches of the Carson River in Nevada, and phosphorus reductions are a focus of the NDEP's Alternative Restoration Plan for the Carson River.

The Listing Policy (SWRCB, 2015, Tables 3.1 and 4.1) give the maximum number of allowable exceedances below which a segment is considered in attainment of standards for nutrients, such as phosphorous[6]. The number of exceedances from the Listing Policy can be used as a basis for adding or removing waterbody segment pollutant combinations from the 303(d) List. Table 4-7 shows the number of exceedances for each segment, the number of years with AMMM phosphorus data, and the maximum number of allowable exceedances from the Listing Policy. Table 4-7 also shows the percent reduction of concentrations that would result in a reduction in the number of exceedances to support de-listing – based on the existing AMMM phosphorus data and calculated as described above for turbidity. Table 4-7 also includes descriptive statistics for the phosphorus in each segment.

Table 4-7. WFCR Phosphorous Data Summary

WFCR Segment	WFCR Headwaters to Hope Valley (WQO 0.02 mg/L)	Hope Valley to Woodfords (WQO 0.02 mg/L)	Woodfords to State Line (WQO 0.03 mg/L)
Years with AMMM Phosphorus Data	18 (2002-2019)	41 (1981-2021)	53 (1969-2021)
Years with AMMM Phosphorous>WQO	6	26	24
Maximum Exceedances to Delist	2	3	4
Median AMMM P	0.02	0.02	0.03
90th Percentile AMMM P	0.2	0.03	0.04
Maximum AMMM P	0.33	0.08	0.05
Approximate % reduction needed to delist	44%	43%	27%

Historic loading rates were calculated for the three WFCR segments using flow data from the USGS Gauge at Woodfords and phosphorus data collected in these three segments. Annual loads were calculated using the same method as described above for TSS loads. The estimated annual loading rates are summarized in Table 4-8.

[6] Nutrients are included in the definition of toxicants in the Listing Policy, so Tables 3.1 and 4.1 provide the applicable exceedance frequencies.

Table 4-8 also includes targets for the Median and 90th percentile phosphorus loads in the WFCR based on the target reductions needed to attain the WQOs in the WFCR from Table 4-7. As discussed above, some extreme events would still result in occasional exceedances, so no target is included for reducing loading above the 90th percentile.

Table 4-8. WFCR Phosphorous Annual Load Estimates

Segment	Headwaters to Hope Valley	Hope Valley to Woodfords	Woodfords to State Line
Years with annual loads estimated	18 (2002-2019)	41 (1981-2021)	53 (1969-2001)
Minimum (kg/yr.)	131	369	439
Median (kg/yr.)	1,079	2,567	3,080
90th Percentile (kg/yr.)	42,692	9,240	5,887
Maximum (kg/yr.)	194,891 (2017)	40,222 (2017)	34,118 (2017)
Target % Reduction	44%	43%	27%
Target Median Loading (based on target % reduction) (kg/yr.)	604	1,462	2,245
Target Median Sediment Reduction (based on target % reduction) (kg/yr.)	475	1,105	835
Target 90th Percentile Loading (based on target % reduction) (kg/yr.)	23,908	5,262	4,291
Target Reduction in 90th Percentile Load (based on target % reduction) (kg/yr.)	18,785	3,978	1,596

4.5. Nitrogen

Nitrogen impairments identified for the WFCR include listings for nitrate and total Kjeldahl nitrogen (TKN) for all three segments, while the lower two segments are also listed for total nitrogen. Potential sources of nitrogen to the river include natural sources and channel erosion, runoff from areas enriched by historic livestock, wastes from recreational users (including improper disposal of grey or blackwater), recreational users' pets and livestock, grazing livestock, and runoff of treated effluent for irrigation and onsite wastewater treatment systems located near the river. As with TSS and P,

concentrations of all three of these forms of nitrogen tend to increase as the river flows downstream, as demonstrated by the summary statistics in Tables 4-10,11 and 12, below.

The objectives for total nitrogen and TKN, and nitrate (as N) in the West Fork Carson River hydrologic unit, including the WFCR, are shown in Table 4-9. These are established as a mean of monthly means. For purposes of the Integrated Report assessments, the mean of monthly means is calculated on an annual basis, giving a single annual mean of monthly means (AMMM) for each year with available data.

Table 4-9. Nitrogen, TKN, and NO3-N WQOs for the WFCR

Surface Waters	Total Nitrogen (mg/L) Mean of monthly means	TKN (mg/L) Mean of monthly means	NO3-N (mg/L) Mean of monthly means
West Fork Carson River at Woodfords	0.15	0.13	0.02
West Fork Carson River at Stateline	0.25	0.22	0.03

There appears to be an overall downward trend in nitrogen. Figure 4-6, below, shows AMMM total nitrogen data from the WFCR – Woodfords to Stateline segment. This segment has the most data, going back to 1978. Similar trends are also apparent for TKN and nitrate. These reductions indicate that the system is recovering from historic impacts and that practices and infrastructure are improving.

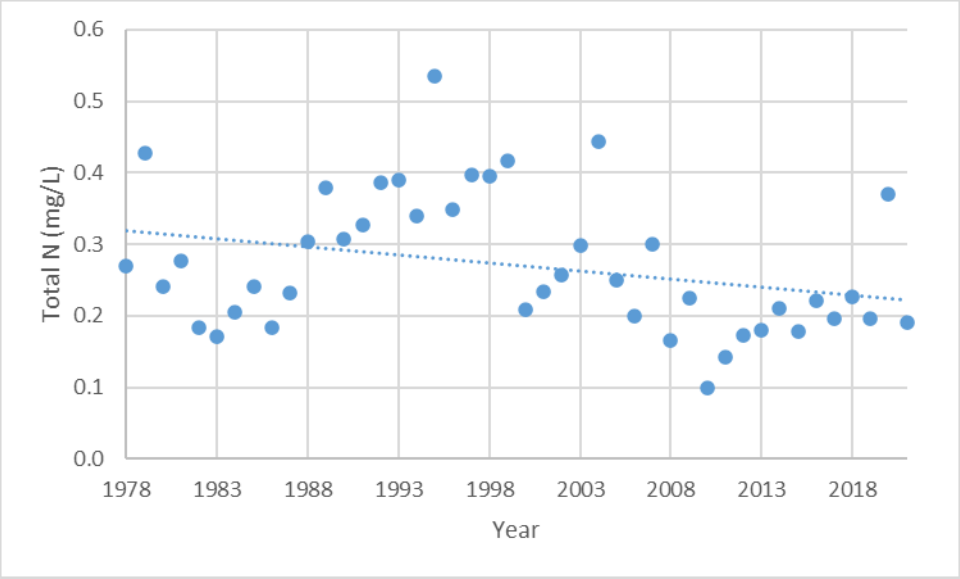

Figure 4-6. Total Nitrogen in the WFCR, Woodfords to Stateline Segment, Annual Mean of Monthly Means 1978-2021

The Listing Policy (SWRCB, 2015, Tables 3.1 and 4.1) identifies the maximum number of allowable exceedances below which a segment is considered in attainment of standards for nutrients, such as nitrogen, nitrate, and TKN[7]. The number of water quality objective exceedances identified in the Listing Policy can be used as a basis for adding or removing waterbody segment pollutant combinations from the 303(d) List, based on the number of samples.

Tables 4-10 – 4-12 summarize for total N, TKN, and nitrate, the number of exceedances for each segment, the number of years with AMMM data, and the maximum number of allowable exceedances from the Listing Policy. Tables 4-10 – 4-12 also show the percent reduction of concentrations that would result in a reduction in the number of exceedances to support de-listing – based on the existing data and calculated as described in section 4.3 for turbidity. Tables 4-10 – 4-12 also include descriptive statistics for nitrate in each segment. The data set used for the Vision Plan includes WFCR data that were not used in the most recent (2018) Integrated Report update. Based on the data available, it appears that the Headwaters to Hope Valley segment should also be listed for total N. Due to limited data for the headwaters to Hope Valley segment, statistics and percent reductions for nitrate and TKN were not calculated for that segment, but the concentrations and reductions needed for that segment are expected to be similar or less than those needed for the Hope Valley to Woodfords segment, since concentrations tend to increase downstream in the WFCR.

[7] Nutrients are included in the definition of toxicants in the Listing Policy, so Tables 3.1 and 4.1 provide the applicable exceedance frequencies.

Table 4-10. WFCR Total Nitrogen Data Summary

WFCR Segment	Headwaters to Hope Valley (WQO 0.15 mg/L)	Hope Valley to Woodfords (WQO 0.15 mg/L)	Woodfords to State Line (WQO 0.25 mg/L)
Years with AMMM Total N Data	8 (2012-2020)	13 (2001-2004, 2012-2021)	44 (1978-2022)
Years with AMMM Total N >WQO	3	7	20
Maximum Exceedances to Delist	2	2	3
Median AMMM Total N (mg/L)	0.13	0.15	0.24
90th Percentile AMMM Total N (mg/L)	0.3	0.24	0.40
Maximum AMMM Total N (mg/L)	0.44	0.36	0.54
Approximate % reduction needed to delist	11%	36%	40%

Table 4-11. WFCR Nitrate Data Summary

WFCR Segment	Hope Valley to Woodfords (WQO 0.02 mg/L)	Woodfords to State Line (WQO 0.03 mg/L)
Years with AMMM Nitrate Data	37 (1984-2021, except 1997)	38 (1983-2021)
Years with AMMM >WQO	13	22
Maximum Exceedances to Delist	3	3
Median AMMM Nitrate (mg/L)	0.02	0.04
90th Percentile AMMM Nitrate (mg/L)	0.03	0.06
Maximum AMMM Nitrate (mg/L)	0.04	0.07
Approximate % reduction needed to delist	34%	55%

Table 4-12. WFCR TKN Data Summary

WFCR Segment	Hope Valley to Woodfords (WQO 0.13 mg/L)	Woodfords to State Line (WQO 0.22 mg/L)
Years with AMMM TKN Data	41 (1981-2021)	44 (1978-2021)
Years with AMMM >WQO	31	11
Maximum Exceedances to Delist	3	3
Median AMMM TKN (mg/L)	0.15	0.19
90th Percentile AMMM TKN (mg/L)	0.23	0.25
Maximum AMMM TKN (mg/L)	0.32	0.33
Approximate % reduction needed to delist	46%	23%

Historic nitrogen loading rates were calculated for the three WFCR segments using flow data from the USGS Gauge at Woodfords and total nitrogen data collected in these three segments. Annual loads were calculated using the same method as described above for TSS loads. The estimated annual loading rates are summarized in Table 4-13. Loadings are determined in terms of total nitrogen, since this incorporates all nitrogen loading in the system, whereas nitrate and TKN are subject to natural transformation from one form to another as the river flows downstream.

Table 4-13 also includes targets for the Median and 90th percentile total nitrogen loads in the WFCR based on the target reductions needed to attain all nitrogen related WQOs. The target reductions used in Table 4-13 were the largest percent reductions of those estimated for either total nitrogen, TKN, or nitrate for each segment from Tables 4-10, 4-11 and 4-12.

Table 4-13. WFCR Annual Total Nitrogen Load Estimates

Segment	Headwaters to Hope Valley	Hope Valley to Woodfords	Woodfords to State Line
Years with annual loads estimated	7 (2011-2016, 2019)	11 (2001, 2012-2021)	37 (1978-2004, 2012-2021)
Minimum (kg/yr.)	2,073	2,820	4,879
Median (kg/yr.)	8,004	16,337	18,365
90th Percentile (kg/yr.)	18,387	30,300	45,260
Maximum (kg/yr.)	20,967	31,304	81,211
Target % Reduction	46% (based on TKN[8])	46% (based on TKN)	55% (based on nitrate)
Target Median Loading (based on target % reduction) (kg/yr.)	4,322	8,822	8,264
Target Median Sediment Reduction (based on target % reduction) (kg/yr.)	3,682	7,515	10,101
Target 90th Percentile Loading (based on target % reduction) (kg/yr.)	NA	16,362	20,367
Target Reduction in 90th Percentile Load (based on target % reduction) (kg/yr.)	NA	13,938	24,893

4.6. Salt (TDS and chloride)

Salt related impairments identified for the WFCR are listings for TDS and chloride in the middle (Hope Valley to Woodfords) segment and a listing for TDS in the Woodfords to Stateline segment of the WFCR. Potential sources of salts include salt used for road de-icing, nonpoint source runoff, and onsite wastewater treatment systems located near the river.

The Listing Policy (SWRCB, 2015, Tables 3.2 and 4.2) give the maximum number of allowable exceedances below which a segment is considered in attainment of standards

[8] For the Headwaters to Hope Valley segment where there was minimal TKN and nitrate data, the percent reduction for TKN for the Hope Valley to Woodfords segment was used in Table 4-13.

for TDS and chloride[9]. The number of exceedances from the Listing Policy can be used as a basis for adding or removing waterbody segment pollutant combinations from the 303(d) List, based on the number of samples.

Table 4-14 and 4-15 summarize, for TDS and chloride, the number of years with AMMM data, the number of exceedances for each segment, and the maximum number of allowable exceedances from the Listing Policy. Tables 4-14 and 4-15 also show the percent reduction of concentrations that would result in a reduction in the number of exceedances to support de-listing – based on the existing data and calculated as described above for turbidity. Tables 4-14 and 4-15 also include descriptive statistics for chloride in each segment. A preliminary review of the data did not reveal any immediately apparent spatial or long-term temporal trends. TDS and EC concentrations were generally lower in the spring and summer months, and higher in winter.

Based on the data available (which includes data that were not used in the most recent (2018) Integrated Report update) it appears that the Headwaters to Hope Valley segment should also be listed for TDS and the other two segments should remain listed. A reduction of approximately 14% would result in consistent attainment of standards and delisting for TDS in the Headwaters to Hope Valley segment. A 5% and 1% reduction would result in consistent attainment of standards and delisting for TDS in the Hope Valley to Woodfords and Woodfords to state line segments, respectively.

Based on the data available, it appears that the Headwaters to Hope Valley segment should also be listed for chloride, the Hope Valley to Woodfords segment should remain listed for chloride, and the Woodfords to state line segment should remain unlisted for chloride. A reduction of approximately 12% would result in consistent attainment of standards and delisting for TDS in the Headwaters to Hope Valley segment. A reduction of approximately 41% would be needed for consistent attainment of standards and delisting for TDS in the Hope Valley to Woodfords segment.

It should be noted, however, that the WQOs for chloride in the WFCR (1 and 2.5 mg/L) are orders of magnitude lower than drinking water, aquatic life, or agricultural use protection-based criteria. Additionally, the non-attainment is all due to exceedances of the upstream WQO of 1 mg/L.

[9] TDS and chloride are considered conventional pollutants in the Listing Policy, so Tables 3.2 and 4.2 provide the applicable exceedance frequencies.

Table 4-14 WFCR TDS Data Summary

WFCR Segment	WFCR Headwaters to Hope Valley (WQO 55 mg/L)	Hope Valley to Woodfords (WQO 55 mg/L)	Woodfords to State Line (WQO 70 mg/L)
Years with AMMM TDS Data	17 (2003-2019)	41 (1981-2021)	54 (1968-2021)
Years with AMMM TDS >WQO	12	18	9
Maximum Exceedances to Delist	4	6	8
Median AMMM TDS (mg/L)	59	55	64
90th Percentile AMMM TDS (mg/L)	67	58	71
Maximum AMMM TDS (mg/L)	74	63	85
Approximate % reduction needed to delist/not list	14%	5%	1%

Table 4-15 WFCR Chloride Data Summary

WFCR Segment	WFCR Headwaters to Hope Valley (WQO 1.0 mg/L)	Hope Valley to Woodfords (WQO 1.0 mg/L)	Woodfords to State Line (WQO 2.5 mg/L)
Years with AMMM Cl Data	13 (2004, 2006-2011, 2013-2017, 2019)	39 (1983-2021)	38 (1984-2021)
Years with AMMM Cl >WQO	7	31	6
Maximum Exceedances to Delist	4	5	6
Median AMMM Cl (mg/L)	1.0	1.3	1.8
90th Percentile AMMM Cl (mg/L)	1.5	1.8	2.7
Maximum AMMM Cl (mg/l)	1.6	2.2	3.5
Approximate % reduction needed to delist	12%	41%	NA

Historic TDS and chloride loading rates were calculated for the three WFCR segments using flow data from the USGS Gauge at Woodfords and TDS, and chloride data collected in these three segments. Annual loads were calculated using the same method as described above for TSS loads. The estimated annual loading rates are summarized in Tables 4-16 and 4-17. Tables 4-16 and 4-17 also include targets for the Median and 90th percentile total loads in the WFCR based on the target reductions needed to attain the TDS and chloride WQOs from Tables 4-14 and 4-15.

Table 4-16. WFCR Annual TDS Load Estimates

Segment	Headwaters to Hope Valley	Hope Valley to Woodfords	Woodfords to State Line
Years with annual loads estimated	17 (2003-2019)	41 (1980-2021)	54 (1968-2021)
Minimum (metric tons/yr.)	874	1,318	1,602
Median (metric tons/yr.)	2,506	3,599	4,067
90th Percentile (metric tons/yr.)	8,665	7,042	7,418
Maximum (metric tons/yr.)	8,669	11,459	11,167
Target % Reduction (from Table 4-14)	14%	5%	1%
Target Median Loading (based on target % reduction) (metric tons/yr.)	2,155	3,419	4,027
Target Median Sediment Reduction (based on target % reduction) (metric tons/yr.)	351	180	41
Target 90th Percentile Loading (based on target % reduction) (metric tons/yr.)	7,452	6,690	7,344
Target Reduction in 90th Percentile Load (based on target % reduction) (metric tons/yr.)	1,213	352	74

Table 4-17. WFCR Annual Chloride Load Estimates

Segment	Headwaters to Hope Valley	Hope Valley to Woodfords	Woodfords to State Line
Years with annual loads estimated	13 (2004, 2006-2011, 2013-2017, 2019)	39 (1983-2021)	38 (1984-2021)
Minimum (metric tons/yr.)	23	24	38
Median (metric tons /yr.)	52	82	36
90th Percentile (metric tons /yr.)	122	160	98
Maximum (metric tons /yr.)	143	180	178
Target % Reduction	12%	41%	NA
Target Median Loading (based on target % reduction) (metric tons /yr.)	46	48	NA
Target Median Sediment Reduction (based on target % reduction) (metric tons /yr.)	6	34	NA
Target 90th Percentile Loading (based on target % reduction) (metric tons /yr.)	107	95	NA
Target Reduction in 90th Percentile Load (based on target % reduction) (metric tons /yr.)	15	66	NA

4.7. Iron

The WFCR is listed as impaired for iron in the lower segment of the river between Woodfords and Stateline due to exceedance of the WQO for Iron of 0.3 mg/L, which is evaluated as a not-to-exceed limit, rather than a mean of monthly means. The iron WQO is for protection of the Municipal and Domestic Supply (MUN) beneficial use. Potential sources of iron include weathering of iron bearing rocks and minerals, erosion, and nonpoint sources such as stormwater runoff from roadways.

The Listing Policy (SWRCB, 2015, Tables 3.1 and 4.1) give the maximum number of allowable exceedances below which a segment is considered in attainment of standards for metals, such as iron[10]. The number of exceedances from the Listing Policy can be

[10] Metals are included in the definition of toxicants in the Listing Policy, so Tables 3.1 and 4.1 provide the applicable exceedance frequencies.

used as a basis for adding or removing waterbody segment pollutant combinations from the 303(d) List, based on the number of samples.

Table 4-18 summarizes, for iron in samples from the WFCR, Woodfords to state line, the number of exceedances of the WQO, the number of samples, and the maximum number of allowable exceedances from the Listing Policy. Table 4-18 also shows the percent reduction of iron concentrations that would result in a reduction in the number of exceedances to support de-listing of this segment – based on the existing data and calculated as described above for turbidity. Table 4-18 also includes descriptive statistics for iron in each segment, but minimal data were available for the upstream segments. A preliminary review of the data did not reveal any immediately apparent long-term or seasonal temporal trends. The lack of upstream data also precluded looking at any spatial variation.

Based on the available data, a reduction of approximately 47% would result in consistent attainment of standards and delisting for iron. It should be noted, however, that the current WQO is very conservative in that it applies secondary MCL directly to unfiltered samples from surface waters. This secondary MCL was developed for regulation of drinking water supplied to consumers for the reduction of taste and odors in drinking water. As in most surface waters, the majority of the total iron measured in unfiltered samples from the WFCR is not in dissolved form. Therefore, most of the iron would be removed by filtration in any drinking water use. Additionally, the exceedance frequency for individual samples applied to iron is also very protective.

Table 4-18. WFCR Iron Data Summary

WFCR Segment	Headwaters to Hope Valley (WQO 0.3 mg/L)	Hope Valley to Woodfords (WQO 0.3 mg/L)	Woodfords to State Line (WQO 0.3 mg/L)
Iron samples	4	2	70
Years with data	2007-2008	1999,2018	1979-2020
Exceedances of the WQO (0.3 mg/L secondary MCL)	1	1	21
Maximum Exceedances to Delist	NA	NA	6
Median iron concentration (mg/L)	0.20	NA	0.20
90th Percentile iron concentration (mg/L)	0.37	NA	0.49
Maximum iron concentration (mg/l)	0.45	0.39	1.6
Approximate % reduction needed to delist	NA	NA	47%

Historic iron loading rates were calculated for the WFCR from Woodfords to the State Line using flow data from the USGS Gauge at Woodfords and iron data from the WFCR Woodfords to State Line segment. Annual loads were calculated using the same method as described above for TSS loads. The estimated annual loading rates are summarized in Table 4-19. Since iron concentration data were only available once or twice per year, these load estimates have a very low level of precision. Table 4-19 also includes targets for the Median and 90th percentile total loads in the WFCR based on the target reductions needed to attain the Iron WQO from Table 4-18.

Table 4-19. WFCR Annual Iron Load Estimates

Segment	Woodfords to State Line
Years with Annual Loads Estimated	40 (1979-2020, except for 1986 and 2010)
Minimum Annual Loading (kg/yr.)	474
Median Annual Loading (kg/yr.)	8,540
90th Percentile Annual Loading (kg/yr.)	75,496
Maximum Annual Loading (kg/yr.)	116,887
Target % Reduction	47%
Target Median Loading (based on target % reduction) (kg/yr.)	4,526
Target Median Sediment Reduction (based on target % reduction) (kg/yr.)	4,014
Target 90th Percentile Loading (based on target % reduction) (kg/yr.)	40,013
Target Reduction in 90th Percentile Load (based on target % reduction) (kg/yr.)	35,483

4.8. Sulfate

All three segments of the WFCR are listed as impaired for sulfate (SO4) based on exceedances of the WQO for sulfate of 2 mg/L expressed as a mean of monthly means, assessed on an annual basis. Potential sources of sulfate in surface waters include inputs from groundwater, the weathering of minerals (especially volcanic rocks), and the bacterial decomposition of organic matter. Atmospheric deposition can also be another possible source of sulfate to surface waters.

The Listing Policy (SWRCB, 2015, Tables 3.2 and 4.2) give the maximum number of allowable exceedances below which a segment is considered in attainment of standards for conventional pollutants, such as sulfate. The number of exceedances from the Listing Policy can be used as a basis for adding or removing waterbody segment pollutant combinations from the 303(d) List, based on the number of samples.

Table 4-20 summarizes, for sulfate in samples from the WFCR, the number of exceedances of the WQO, the number of samples, and the maximum number of allowable exceedances from the Listing Policy. Table 4-20 also shows the percent reduction of sulfate concentrations that would result in a reduction in the number of exceedances to support de-listing of this segment – based on the existing data and calculated as described above for turbidity. Table 4-20 also includes descriptive statistics for sulfate in each segment. Sulfate concentrations tend to increase in a downstream direction in the WFCR. Sulfate concentrations are lower in the early spring and summer, and higher in the winter. There was an overall downward trend in sulfate concentrations over the years sampled.

Based on the available data, a reduction of approximately 15%, 51%, and 62% would result in consistent attainment of standards and delisting for sulfate in the three segments of the WFCR. It should be noted, however, that the WQO for sulfate in the WFCR (2 mg/L) is orders of magnitude lower than drinking water or aquatic life protection-based criteria.

Table 4-20. WFCR Sulfate Data Summary

WFCR Segment	WFCR Headwaters to Hope Valley WQO (2.0 mg/L)	Hope Valley to Woodfords WQO (2.0 mg/L)	Woodfords to State Line WQO (2.0 mg/L)
Years with AMMM SO4 Data	18 (2002-2019)	35 (1987-2021)	35 (1987-2021)
Years with AMMM >WQO (2.0 mg/L)	10	24	23
Maximum Exceedances to Delist	4	5	5
Median AMMM SO4 (mg/L)	2.15	2.22	2.76
90th Percentile AMMM SO4 (mg/L)	2.40	4.12	5.37
Maximum AMMM SO4 (mg/l)	2.54	4.88	6.18
Approximate % reduction needed to delist	15%	51%	62%

Historic sulfate loading rates were calculated for the three segments of the WFCR using flow data from the USGS Gauge at Woodfords and sulfate data from each segment. Annual loads were calculated using the same method as described above for TSS loads. The estimated annual loading rates are summarized in Table 4-21. Table 4-21 also includes targets for the Median and 90th percentile total loads in the WFCR based on the target reductions needed to attain the sulfate WQO from Table 4-20.

Table 4-21. WFCR Annual Sulfate Load Estimates

Segment	Headwaters to Hope Valley	Hope Valley to Woodfords	Woodfords to State Line
Years with annual loads estimated	18 (2002-2019)	35 (1987-2021)	35 (1987-2021)
Minimum (kg/yr.)	20,259	47,583	67,624
Median (kg/yr.)	95,298	143,479	165,000
90th Percentile (kg/yr.)	241,050	368,212	370,310
Maximum (kg/yr.)	251,474	1,248,391	1,172,051
Target % Reduction	15%	51%	62%
Target Median Loading (based on target % reduction) (kg/yr.)	81,004	70,305	62,700
Target Median Sediment Reduction (based on target % reduction) (kg/yr.)	14295	73174	102,300
Target 90th Percentile Loading (based on target % reduction) (kg/yr.)	204,892	180,424	140,718
Target Reduction in 90th Percentile Load (based on target % reduction) (kg/yr.)	36,157	187,788	229,592

4.9. Fecal indicator bacteria

At the time of the development of the most recent update for the Integrated Report for the Lahontan Region in 2018, there were two numeric fecal indicator bacteria (FIB) WQOs, one for fecal coliform bacteria from the Basin Plan and a statewide standard for E. coli from the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SWRCB, 2018). The downstream segment of the WFCR, Woodfords to state line, is listed as impaired by fecal indicator bacteria, based on exceedances of the Basin Plan WQO for fecal coliform bacteria.

A Basin Plan Amendment proposing to remove the fecal coliform WQOs from the Basin Plan was adopted by the Lahontan Water Board in June 2023, and is expected to be considered for approval by the State Water Resources Control Board, Office of Administrative Law and finally USEPA in 2024. More information on this Basin Plan Amendment can be found at the Water Board's Basin Planning webpage.

Table 4-22 summarizes available water quality data for E. coli in the WFCR in comparison to the E. coli WQO. The E. coli WQO has two parts. The first is a maximum six-week rolling geometric mean of 100 colony forming units (CFU)/100, calculated weekly and a single threshold value. The second part is a single threshold value (STV) - that no more than 10% of samples can be above 320 CFU/100 mL in any calendar month. While there are some very infrequent exceedances of the WQO in the most downstream segment, the data indicate overall attainment of the E. coli WQO.

If the Lahontan Water Board removes its fecal coliform water quality objective as proposed, the FIB impairment for the WFCR on the 303(d) list would likely be recommended for de-listing. It should still be noted, however, due to land uses and occasional exceedance of E. coli WQO concentrations, that there still is some potential for FIB issues in the WFCR. Therefore, ongoing efforts that protect the WFCR from FIB contamination should continue.

Table 4-22. WFCR E. Coli Data Summary

WFCR Segment	WFCR Headwaters to Hope Valley	Hope Valley to Woodfords	Woodfords to State Line
Number of samples	66	125	177
Years with data available	2013-2019	2010-2019	2010-2019
Exceedances of WQO STV (320 CFU/100 ml)	0	0	5
Maximum allowable exceedances	10	20	29
Median E. coli (CFU/100 ml)	2.5	2	30
90th Percentile E. coli (CFU/100 ml)	18	10.6	147
Maximum E. coli (CFU/100 ml)	34	143	1,100
Number of 6-week averages of E. coli	24	62	87
Exceedances of WQO 6-wk geomean (320 CFU/100 ml)	0	0	0
Maximum allowable exceedances of 6-wk. geomean	4	10	14
Median 6- wk. geomean E. coli (CFU/100 ml)	14	13	13
90th Percentile 6-week geomean E. coli (CFU/100 ml)	18	21	21
Maximum 6- week geomean E. coli (CFU/100 ml)	21	26	26

5. Causes and Sources

This section identifies and discusses the probable causes and sources of pollution contributing to the water quality impairments in the WFCR that need to be controlled to attain WQOs. In addition to probable sources, climate change and fire are also identified and discussed as factors with potential to contribute to water quality impairments in this Vision Plan. Actions that reduce potential impacts of climate change and fire will make the improvement and protection of water quality in the WFCR more robust and comprehensive.

5.1. Historical Activities

The WFCR watershed has been impacted by historical activities, which, despite decades of recovery, continue to affect the river and its watershed function. A more detailed description of these historical activities and impacts is available in the Upper Carson River Watershed Stream Corridor Assessment (Upper Watershed Assessment, MACTEC, et al., 2004) among other sources.

The WFCR watershed is within the ancestral territory of the Washoe Tribe of Nevada and California, who are the original inhabitants of Lake Tahoe and all lands surrounding it (Washoe Tribe, 2021). The Washoe were traditionally divided into three groups; the northerners or Wel mel ti, the Pau wa lu who lived in the Carson Valley in the east, and the Hung a lel ti who lived in the south in an area which includes the WFCR watershed. The Washoe were intimately connected to the land where they practiced hunting and gathering and managed the land sustainably since time immemorial.

The arrival of Europeans radically changed the landscape, greatly impacting the WFCR and its watershed. In the 1800's the entire watershed was logged, mostly to supply timber for the mines outside of the WFCR watershed. While previously forested, through the 1920's, the country was described as an area covered by brush and non-marketable woodlands. The river was used to transport logs downstream for use in the mines, and these log drives caused significant impacts to the channel. Log drives on the Carson River often damaged bridges, roads, and buildings and agricultural lands in the Carson Valley.

Beginning in the late 1800's heavy grazing by sheep and cattle became common in the watershed. Before the establishment of the Forest Service and Grazing Service in the early 1900's, grazing activities were largely unregulated. In 1870 thousands of sheep were grazing in Alpine County (MACTEC et al., 2004). Livestock numbers and impacts have been reduced over the twentieth century as the Forest Service and Bureau of Land Management exerted increased control over the number of animals and season of use.

These historical activities have impacted the hydrology of the river and its watershed, compacting soils, decreasing infiltrations, increasing stream incision, reducing the

connection between the river and its floodplains, decreasing baseflows, and increasing peak flows, thus increasing the erosive potential of the river and affected tributaries. Additionally, nitrogen concentrations in soil could be elevated in areas with historic high grazing animal concentrations, thus contributing to increased nitrogen concentrations in the WFCR. The Upper Watershed Assessment (MACTEC, et al., 2004). indicated that management actions and resource utilization 150 years ago probably had a greater impact on the geomorphology of streams in the watershed than grazing or other land uses that had occurred over the 20 years prior to that assessment.

5.2. Roads and Road Maintenance

There are several roads traversing and paralleling watercourses in the watershed. Roads can be a source of sediments due to erosion, suspended solids from sand and cinder used as abrasives for traction during icy conditions, and salts applied to reduce ice. An important source of sediment from roads is where culverts fail, due to clogging by wood and/or sediment and/or high flows, or when undersized culverts increase downstream energy and channel erosion.

The Upper Watershed Assessment (MACTEC et al., 2004) recommended that a detailed assessment of road conditions be prepared that identifies potential sources of sediment along roadways in the vicinity of Blue Lakes Road and Burnside Lake Road.

The 2004 Upper Carson River Watershed Stream Corridor Assessment Identified a list of bridges for hydrologic analysis. For the WFCR these were the Highway 88 bridge over the WFCR in Hope Valley upstream of the 88/89 Intersection at Pickett's Junction and the Highway 88 bridge over the WFCR at Woodfords. The Hope Valley Bridge over the WFCR on Highway 88 was found to have adequate capacity for 100-year flow but was found to restrict the flow of the river, thus increasing its erosion potential. The Woodfords Bridge on Highway 88 was found to have adequate capacity to convey the 100-year event without overtopping the roadway and did not appear to narrow the flow path of the river (MACTEC Engineering and Consulting, et al., 2004).

A 2019 study by the State Water Resources Control Board (Hanks, 2019) characterizes road coverage in the watershed, and assessed where state highways and county roads crossed watercourses in the watershed.

Table 5-1 summarizes miles of roads and number of watercourse crossings in the watershed.

Table 5-1. WFCR Watershed Road Stream Crossings (From Hanks, 2019)

Roadway	Watercourse Crossings	Miles of Roadways
County Roads	29	37.3
Forest Service Roads	43	75.4
Trails	12	16.8
Highways	36	24.3
Private Roads	9	17.6
Other Federal Roads	10	14.8
Private Driveways	0	0.7
Shared Driveways	0	0.3
Total	**139**	**187.2**

There are 187 total miles of roads and 139 watercourse crossings within the watershed. There are 24 miles of highways in the watershed. The two highways passing through the watershed, Highways 88 and 89, are owned and operated by the California Department of Transportation (Caltrans). Alpine County and the WFCR watershed are in Caltrans District 10.

There are 90 miles of roads within the watershed that are Forest Service and/or other federally maintained roads. There are 37.3 miles of county-maintained roads, 17.6 miles of private roads and 16.8 miles of trails. Private and shared driveways collectively make up 1 mile of road within the watershed. All highways are paved, all trails are unpaved, and forest service roads are a mix of paved and unpaved. Unpaved forest service roads are made of native material and paved forest service roads are made of asphalt or bituminous surface treatment (Hanks, 2019). There are 36 highway watercourse crossings, 12 trail watercourse crossings, and 43 Forest Service road watercourse crossings.

Table 5-2 summarizes the 69 road watercourse crossings assessed in Hanks, 2019. Of the 86 county road and highway watercourse crossing sites identified for assessment, 69 were accessible and assessed. Assessment included written field assessment and photo monitoring at each site. Of the 69 county road and highway watercourse crossing sites assessed, 25 (36%) were flagged for qualitative indicators of failure (13 county roads crossings and 12 highway crossings).

Table 5-2. Summary of Road Watercourse Crossings from Hanks, 2019

Road Type	Number Assessed	Qualitative Indicators of Failure Observed	Poor Inlet Condition	Poor Outlet Condition	Poor size of the stream crossing in comparison to the stream channel at the inlet	Poor size of the stream crossing in comparison to the stream channel at the outlet
Highways	37	13	8	10	2	4
County Roads	32	12	6	9	2	3

Caltrans applies sand, cinders, and salt which are diluted with water into a 23% brine (Brewer, 2022) according to standard procedures as outlined in the Caltrans Maintenance Manual Volume 1 Chapter R (Caltrans, 2023). Caltrans ran a three-year study on the amount of brine created for State Route 89 in Alpine County. The three-year average of de-icing salt bulk came out to 1,131.9 tons per year (Brewer, 2022). While not directly applicable to the WFCR watershed, this gives a relative estimation of the amounts applied to Highways 88 and 89 in Alpine County, since it did not include Highway 88, and did include parts of Highway 89 not in the WFCR watershed.

5.3. Onsite Wastewater Treatment Systems (OWTS)

Onsite wastewater treatment systems, also known as septic systems, can be a source of nitrogen, bacteria, salts, and other anthropogenic pollutants to nearby streams. Downstream of Hope Valley, there are several residences as well as camping areas and rental properties immediately along the WFCR. Most of these are along the Hope Valley to Woodfords reach of the WFCR. The watershed is not serviced by a regional wastewater collection and treatment system. OWTS, mainly septic tanks, are the main method utilized to treat human waste. Some facilities have human waste removed and hauled to treatment plants outside the watershed. Due to their proximity to the river, local densities, systems age, and known performance issues with some local OWTS, OWTS are a probable source of nitrogen, phosphorous, bacteria, and salts to the WFCR.

In addition to individual residential systems, one resort facility along the river has had historical issues with its OWTS. In the past failure of its OWTS resulted in discharges of partially-treated wastewater to the river during wet years.

5.4. Grazing

In addition to the significant impacts from historic grazing activities to the WFCR, current grazing in the watershed can be a source of sediment, trace elements, nutrients, and

bacteria. Grazing can result in direct erosion via cattle in the channel and can contribute to erosion by promoting compaction and incision.

Starting near Woodfords, there is grazing on several parcels of private land, many of which are along the river. Given their proximity to the WFCR, these parcels have the potential to contribute to sediment/turbidity, nitrogen, and salt impairments in the WFCR. Some of the grazing lands along the WFCR receive irrigation water from STPUD, which is treated effluent from South Lake Tahoe stored in Harvey Place Reservoir and delivered to ranchers along the WFCR. This irrigation water is much higher in nutrients than the WFCR and is thus a potential source of nutrients to the WFCR. Some of the ranchers along the WFCR have installed management practices, such as riparian fencing, alternative water supplies, and limiting cattle access to the river to reduce potential impacts.

On the USFS land in the watershed, there is one active grazing allotment. Grazing in this allotment is regulated under a Term Grazing Permit issued by the HTNF (HTNF, 2014) and Annual Operating Instructions available online at https://www.fs.usda.gov/detail/htnf/landmanagement/resourcemanagement/?cid=fseprd640556#Carson%20RD dictate the conditions that must be followed during grazing on the allotment. The current permit allows 106 cow-calf pairs (212 animals). Cattle initially start grazing the Scott's Lake Unit in late June until mid-August and then are gathered at the holding pasture on Luther Pass and split into two groups. Half go up to Willow Creek Rd. within the Horse Meadows Unit, and half go up to Horsethief Canyon. They are fenced out of state land and cannot directly access the WFCR. There are a few other allotment areas on USFS land in Hope Valley. However, these have been vacant since the late 1990s and would require a completed analysis to authorize grazing again. (C. Ghiglieri, personal communication on 2/17/2022).

5.5. Camping and Recreational Use

Much of the WFCR's upper watershed is publicly-owned land (mostly USFS) which is popular for recreational use, including off-road vehicle use and dispersed camping. As the area has become more popular, and population in general in the region has increased, recreational use in the watershed has been increasing. Therefore, there is potential for impacts from these uses to increase. Vehicle use can increase erosion which can be a source of sediment/turbidity/TSS and other trace minerals, as discussed in the Roads and Road Maintenance section. Human and animal waste associated with recreational use can be a source of nutrients and bacteria. Improperly buried human waste as well as improper disposal of greywater and blackwater by campers in the area are a likely source of nitrates and bacteria to the WFCR. Potential contributing factors to illegal dumping of greywater and blackwater are lack of knowledge of their potential impacts and the lack of a facility to dispose of these wastes in the local area. The

nearest sanitary dump stations for greywater or blackwater are either in South Lake Tahoe or down in the Carson Valley.

Areas of particular concern are along Blue Lakes Road in Hope Valley and Faith Valley along the WFCR. These areas are popular for dispersed camping, some of which is long-term (Eddy, 2022). There have been reports of campers in these areas emptying their greywater and blackwater onto the ground. Another area of heavy use where waste disposal is a concern is the area around Scotts Lake. USFS has limited resources to patrol these lands, making these impacts more likely. Efforts are underway to increase the USFS presence in these areas and to install vault toilets at Scotts Lake, discussed in Section 6, below.

CDFW also manages lands within the watershed including the Hope Valley Wildlife Area, along the river near Pickett's Junction. The Hope Valley Wildlife Area is managed for day use and backpack camping only, and CDFW contracts with Desolation Hotels Hope Valley to maintain sanitation facilities at their parking lot near Pickett's Junction. Therefore, recreation in these areas is not currently identified as a source of pollution to the WFCR.

5.6. Hydrologic Modification

While the WFCR is in a largely rural area, the watershed has been significantly altered. As an effect of the impacts discussed in the Historical Activities section, the river has been channelized and separated from its floodplain, and its floodplain damaged. This results in increased flows during high flow periods, and reduced baseflows later in the year. Multiple reservoirs have been constructed in the WFCR headwaters, including Lost Lakes, Red Lake, and Scotts Lake. It should be noted, however, that the overall capacity of these reservoirs is small relative to the total discharge in the watershed. The reservoirs change the hydrology, reducing peak runoff flows and increasing flows when releases are occurring. Retention of water in lakes further into the summer affects stream temperature, reservoir temperature, and growth of algae. Recently, there have been harmful algal blooms (HABs) in Red Lake in August and September of most years. Releases from Red Lake go into Red Lake Creek which is a significant tributary to the WFCR. Algae and other constituents in Red Lake, entering the WFCR via Red Lake Creek, can significantly affect water quality in the WFCR, contributing to elevated turbidity and other effects.

There are several withdrawals of water from the WFCR, via riparian well pumping and diversion of river flows into adjacent ditches/canals. River withdrawals and reduced baseflow due to the hydrologic impacts such as those discussed in section 5.1 can result in lower flows in the summer and fall. Lower flows in the WFCR during the summer and fall can result in higher pollutant concentrations, higher temperature, lower dissolved oxygen, and increased potential for eutrophic conditions. There are also several flow diversion structures in the WFCR channel. These structures can slow flows, increasing eutrophication potential, and contribute to channel erosion.

5.7. Climate Change, Fire, and Other Factors

This Vision Plan recognizes that other factors can contribute to the water quality impairments in the WFCR. Identified factors for potential impacts are climate change, fire, invasive species, and development in the WFCR watershed.

Foremost are the potential impacts of two related factors, climate change and fire. In the WFCR watershed, as elsewhere in the Lahontan Region, impacts of climate change include increasing frequency of extreme weather events such as extreme storm events and extended drought, and prolonged fire seasons with larger and more intense fires. Changes in hydrology include more precipitation falling as rain versus snow, declining snowpack, and changes in the timing and volume of peak runoff (Scribe, 2021). These can result in erosion, flooding, and related risks to water supply and wastewater infrastructure.

Wildfires pose a substantial risk to water quality in the WFCR, and climate change is expected to increase that risk. Wildfires can lead to severe flooding, erosion, and delivery of sediment, nutrients, and metals to receiving waters. The Tamarack Fire, which occurred in the summer of 2021, only burned a small amount of the WFCR watershed, but provided a local example of potential wildfire impacts on rivers and watershed. The fire burned a significant amount of land in the East Fork Carson River Watershed. In summer of 2022, a summer storm resulted in flash flooding and mudslides coming out of the burn scar which impacted the town of Markleeville and washed out a portion of Highway 89. These flows also severely impacted water quality in the East Fork Carson River.

Other factors that contribute to increased constituents include development in the watershed which can reduce riparian areas and connection to floodplains and increase concentrations of pollutants associated with stormwater flows such as sediment, metals, bacteria, and trace elements. Finally, invasive species in the watershed can increase fire risk and increase erosion potential.

6. Implementation Actions for Attainment of Water Quality Standards

This chapter outlines implementation actions for restoring water quality in the WFCR to meet the overall Vision Plan goal of attainment of all water quality standards in the WFCR by October 2033.

The overall approach, Lahontan Water Board authorities and role, and potential funding sources are described. Management measures to achieve the reductions identified in Chapter 4 are described for all identified sources, estimates of financial and technical assistance needed are provided, an information and education component is provided, and a schedule for implementation of actions is provided. Table 6.1 Summarizes impairments in the WFCR and Management Measures to address those impairments.

Table 6-1 Management Measures [11]

Segment	Impairments from CA Integrated Report	Potential Sources/ Contributing Factors	Management Measures	Performance Indicator for Implementation	Performance Indicators for Progress Towards Attaining WQOs
Headwaters to Hope Valley	Nitrogen (Nitrate, TKN), Phosphorous, Sulfates	Historical logging, grazing, road building, channel alteration. Roads and road maintenance. Camping and recreational use. Water management. Climate change, wildfire, invasive species, development	Stream channel restoration Road/culvert maintenance/ Improvements Salt management Recreation management and education Sanitation facilities improvements Improved water management to reduce eutrophication Fuels reductions Invasive species removal	Development of plans for recreation management, road management, salt management, stream restoration. Linear feet or miles of channel restored, Miles of roads improved/removed. Number of culverts maintained/restored, Improvement in salt management, Increase in recreation management staffing, Increase in education outreach, Decrease in fuels, invasive species presence, Acres of floodplain preserved.	Decreasing annual loading, frequency of standards exceedances

[11] While this Vision Plan is an independent document, it is useful to note that information about management measures was previously provided in the WFCR section of Table 8.2 in the CRASP (CWSD, 2017; https://www.cwsd.org/wp-content/uploads/2017/12/Final-CRWASP-2017-Update-Plan-Part-1.pdf , page 74).

Segment	Impairments from CA Integrated Report	Potential Sources/ Contributing Factors	Management Measures	Performance Indicator for Implementation	Performance Indicators for Progress Towards Attaining WQOs
Hope Valley to Woodfords	Chloride Nitrogen (Nitrate, TKN) Phosphorous, Sulfates Total Dissolved Solids Turbidity	Historical logging, grazing, road building, channel alteration Roads and road maintenance Camping and recreational use. Water management Climate change, wildfire, invasive species, development OWTS	Stream channel restoration Road/culvert maintenance/ Improvements Salt management Recreation management and education Sanitation facilities improvements Improved water management to reduce eutrophication Fuels reductions Invasive species removal OWTS maintenance and improvements	Development of plans for recreation management, road management, salt management, stream restoration Miles of channel restored Miles of roads improved/removed. Number of culverts maintained/restored Improvement in salt management Increase in recreation management staffing Increase in education outreach Decrease in fuels, invasive species presence Number of OWTS systems upgraded/improved Acres of floodplain preserved	OWTS LAMP revisions/implementation improvements, permits. Decreasing annual loading, frequency of standards exceedances
Woodfords to State Line	Indicator Bacteria Iron Nitrogen (Nitrate, TKN), Sulfates	Historical logging, grazing, road building, channel alteration Roads and road maintenance Camping and recreational use	Stream channel restoration Road/culvert maintenance/ improvements Salt management. Recreation management and education	Development of plans for recreation management, road management, salt management, stream restoration OWTS LAMP revisions/implementation improvements, permits	Decreasing annual loading, frequency of standards exceedances

Segment	Impairments from CA Integrated Report	Potential Sources/ Contributing Factors	Management Measures	Performance Indicator for Implementation	Performance Indicators for Progress Towards Attaining WQOs
	Total Dissolved Solids Turbidity	Water management Climate change, wildfire invasive species Development OWTS Grazing	Sanitation facilities improvements Improved water management to reduce eutrophication Fuels reductions Invasive species removal OWTS maintenance and improvements Grazing BMPs (see appendix B)	Grazing management plans Miles/feet of channel restored Miles of roads improved/removed Number of culverts maintained/restored Improvement in salt management Increase in recreation management staffing Increase in education & outreach Decrease in fuels Decrease in invasive species Invasive species management projects implementation and planning Number of OWTS systems upgraded/improved Acres of rangeland under plans & specific BMPs: Miles of rangeland with riparian fencing Acres of rangeland with off channel stock watering Acres of floodplain preserved	

Table 6-2, 6-3, and 6-4 summarize completed, ongoing, proposed, and potential future projects in the WFCR which have and/or are expected to improve water quality. Tables 6-2 (Completed WFCR Watershed Projects), 6-3 (Ongoing WFCR Watershed Projects) and 6-4 (Proposed and Potential Future WFCR Watershed Projects) can be used in conjunction with Table 6.1 (Management Measures to be Implemented), as these are projects to implement the management measures in Table 6.1.

Table 6-2. Completed WFCR Watershed Projects[12][13]

Waterbody Reach(es)	Location	Project Title	Lead Organization/ Partners	Implementation Date(s)	Budget	Funding Source
All		Upper Carson River Watershed Stream Corridor Condition Assessment (MACTEC,	Sierra Nevada Alliance, AWG, LWB	2004	~	CA Prop 13
All		American River's Carson Meadows Assessment	American Rivers, NFWF	2014-2018	$45,000	NFWF
WFCR Headwaters to Hope Valley	Hope Valley	American River's Hope Valley Meadow Restoration	American Rivers/ USFS, CWSD, FOHV, Alpine County, Trout Unlimited, Institute for Bird Populations	2012-2015 (planning) 2015- 2016 (implementation)	$870,000	NFWF, CA Wildlife Conservation Board, Wildlife Conservation Society, Department of Water Resources, Sierra Nevada Conservancy, Bella Vista Foundation

[12] While this Vision Plan is an independent document, it is useful to note that information about completed studies/projects was previously provided in the WFCR section of CRASP Table 8.5, (CWSD, 2017; https://www.cwsd.org/wp-content/uploads/2017/12/Final-CRWASP-2017-Update-Plan-Part-1.pdf.

[13] ~ indicates the information has not yet been collected.

Waterbody Reach(es)	Location	Project Title	Lead Organization/ Partners	Implementation Date(s)	Budget	Funding Source
WFCR Headwaters to Hope Valley	Hope Valley	AWG's Hope Valley Restoration and Aquatic Habitat Enhancement Project	AWG/CDFW, FOHV, American Rivers, CWSD, HTNF, SWRCB	2020 (Monitoring Through 2024)	$244,000 Implement ation	Phase 1 - planning SWRCB, Phase 2 Implementation NFWF , CDFW, Phase 3 - Monitoring and adaptive mgmt. - Funded by NFWF, CDFW
WFCR Headwaters to Hope Valley	HTNF-Alpine County	2013 Route Adjustment EA	HTNF/Alpine County, CWSD, AWG, FOHV	2013	~	~
WFCR Woodfords to State Line	Ace Herford Ranch	Rivers and Ranches - Ace Hereford Ranch Meadow Rehabilitation/ Water Quality Enhancement	Ace Hereford Ranch/AWG, LWB, SBC	2016	~	CA proposition
Carson River Watershed	~	Low Impact Development (LID) in the Carson River Watershed white paper.	CWSD	2015	~	~

Waterbody Reach(es)	Location	Project Title	Lead Organization/ Partners	Implementation Date(s)	Budget	Funding Source
Upper Carson - East and West Fork	Alpine County	Alpine County Hazardous Fuels Reduction & Healthy Watershed Project	AWG, Alpine County, Sierra Nevada Conservancy, Alpine Fire Safe Council, American Rivers, HTNF, CWSD, Eastern Alpine County Volunteer Fire Department, Washoe Tribe of Nevada and California, Woodfords Washoe Community Council	2017	~	~

Table 6-3. Ongoing WFCR Watershed Projects[14]

Waterbody Reach(es)	Location	Title	Lead Organization/Partners	Dates	Budget	Funding Source(s)
WFCR Headwaters to Hope Valley	Faith Valley	Faith Valley Meadow Restoration	American Rivers/ USFS, Wildlife Conservation Board, National Fish and Wildlife Foundation, FOHV, AWG, CDFW, Institute for Bird Populations, Trout Unlimited	2016-2023	$900,000	National Fish and Wildlife Foundation, California Wildlife Conservation Board (Prop. 68), CDFW, California Climate Investments
WFCR Headwaters to Hope Valley, Hope Valley to Woodfords	1600 acres in multiple locations throughout the watershed	USFS-HTNF West Carson River Habitat Improvement Project	HTNF/ Alpine County, CWSD, AWG, FOHV	2022-2024	~	CDFW Watershed Restoration Grant, SNC, HTNF, USFS Wildfire Crisis Strategy
Upper Carson River Watershed	~	Geomorphologic Model and Prioritization Project	AWG, CWSD	March 2024-March 2025	$250,000 $83,350	CWA 3199h), CWSD

[14] While this Vision Plan is an independent document, it is useful to note that information about ongoing projects/studies in the WFCR watershed was previously provided in the WFCR sections of CRASP Table 8.4, (CWSD, 2017; https://www.cwsd.org/wp-content/uploads/2017/12/Final-CRWASP-2017-Update-Plan-Part-1.pdf.

Waterbody Reach(es)	Location	Title	Lead Organization/Partners	Dates	Budget	Funding Source(s)
Carson River Watershed	~	Watershed-Literacy Action Plan	CRC, CWSD	2015- will be updated based on 2024 survey.		CWSD
Carson River Watershed	~	Watershed-Literacy Surveys of Carson River Watershed Residents	CWSD	2015 - present		NDEP, CWSD
Carson River Watershed	~	Marketing and Communications Plan for the Carson River Watershed	CWSD, CRC	2016		CWSD
Carson River Watershed	~	"I Am Carson River" Watershed Campaign	CWSD, CRC	2016		CWSD, CWA 319(h) grant
Carson River Watershed	~	Soil Health/Regenerative Agriculture Project: includes Agricultural Producers Working Group, Ag BMP Whitepaper, Case Studies.	CRC, CWSD	2021-2024	$40,000	CWA Section 208 CWSD
Carson River Watershed	~	Carson River Watershed Outreach and Education Programs	CWSD, CRC, AWG, FOHV	~	~	CWSD, CWA 319(h)
Alpine County	Multiple	Creek Day	AWG, CWSD	Ongoing	~	~
WFCR (all reaches)	Along routes 88 and 89	Culvert Inspection Program	Caltrans District 10	2023	~	Caltrans

Waterbody Reach(es)	Location	Title	Lead Organization/Partners	Dates	Budget	Funding Source(s)
WFCR (all reaches)	HTNF-Carson Ranger District	Additional Recreational Technician in the Carson Ranger District	HTNF	2024	$35,000	USFS-RAC
WFCR (all reaches)	Woodfords	Educational Kiosk	HTNF	2023-2024	$10,000	USFS-RAC
WFCR Headwaters to Hope Valley	Scotts Lake	Scotts Lake vault toilet installation	HTNF	2023-2024	$80,000	USFS-RAC
WFCR Watershed	~	Invasive species reduction/eradication	Alpine County, AWG, CWSD	ongoing		CWSD

Table 6-4. Proposed and Potential Future WFCR Watershed Projects and Actions[15]

Waterbody Reach(es)	Location	Title	Lead Organization/Partners	Dates	Budget	Potential Funding Sources
WFCR Hope Valley to Woodfords	private lands	OWTS effluent connection to STPUD C-Line	Alpine County, private landowners, possibly STPUD	TBD	TBD	TBD
WFCR Hope Valley to Woodfords, Woodfords to State Line	private lands	OWTS education, outreach, improvements	Alpine County, private landowners, possibly STPUD.	TBD	TBD	TBD
WFCR Woodfords to State Line	rangelands	Support for Development of Ranch Management Plans, Implementation of Agricultural BMPs	AWG, CWSD, CRC, LWB, NRCS	TBD	TBD	CWA section 319 Grants
WFCR watershed	forested areas	Fuels Reduction and Aspen Restoration Projects	USFS-HTNF, Alpine County, Washoe Tribe, AWG, CWSD, CRC, National Forests Foundation	TBD	TBD	TBD

[15] While this Vision Plan is an independent document, it is useful to note that information about proposed and potential future projects and studies in the WFCR watershed was previously provided in the WFCR sections of CRASP Tables 8.3 and 8.8 which include some projects not listed here. (CWSD, 2017; https://www.cwsd.org/wp-content/uploads/2017/12/Final-CRWASP-2017-Update-Plan-Part-1.pdf.

Waterbody Reach(es)	Location	Title	Lead Organization/Partners	Dates	Budget	Potential Funding Sources
WFCR Headwaters to Hope Valley	dispersed camping areas in Hope Valley, Faith Valley, and Scotts Lake	Recreation Management & Facilities Improvements	USFS – HTNF	2023-2033	TBD	CWA section 319 Grants
WFCR Headwaters to Hope Valley	along Blue Lakes and Burney Lake Rd.	Detailed Road Assessment	USFS, HTNF, AWG, CWSD	2026	$10,000	HTNF
WFCR (all reaches)	roads and culverts	Road/Culvert improvements	Caltrans, HTNF, Alpine county	TBD	TBD	Caltrans, HTNF, Alpine County
WFCR Headwaters to Hope Valley	Hope Valley, Faith Valley	Meadow/Channel Restoration	USFS – HTNF, AWG, CWSD, RB6	TBD	TBD	CWA section 319 Grants
WFCR (all reaches)	river channel	River Channel/Riparian Restoration	AWG, CWSD, CRC, LWB	TBD	TBD	CWA section 319 Grants
WFCR (all reaches)	riparian areas	Invasive species reduction/eradication	AWG, CWSD, Alpine County	TBD	CWSD	TBD
WFCR Hope Valley to Woodfords, Woodfords to State Line	private lands	Low impact development	Alpine County, private landowners	TBD	TBD	TBD

Waterbody Reach(es)	Location	Title	Lead Organization/Partners	Dates	Budget	Potential Funding Sources
WFCR Woodfords to State Line	riparian areas	Riparian/Floodplain preservation	Alpine County, private landowners, land trusts	TBD	TBD	CWSD, private/land trust funding
WFCR (all reaches)	In-channel	Removal/improvement of flow diversion structures	TBD	TBD	TBD	TBD
WFCR (all reaches)	reservoirs	Late season reservoir releases for instream flows	CWSD, CDFW, TBD	TBD	TBD	TBD
WFCR (all reaches)	~	Water rights purchases for instream flows and habitat	CWSD, TBD	TBD	TBD	TBD
Carson River Watershed	~	Watershed Signage	CWSD, AWG, Caltrans, Alpine County	TBD	TBD	TBD

6.1. Overall Approach to Implement the Vision Plan

The Plan builds on ongoing stakeholder actions to restore water quality, and the greater effort for restoring water quality in the Carson River watershed identified in the CRASP (CWSD, 2017). The Vision Plan relies on local stakeholders, property owners, and state, local and federal government agencies to implement necessary actions to reduce pollutant discharges to the WFCR. The Vision Plan also relies on existing Lahontan Water Board regulatory and non-regulatory programs, authorities and responsibilities under the California Water Code and Federal Clean Water Act to facilitate and support the implementation of those actions. Much of the overall approach focuses on reducing erosion, restoring hydrologic function, and connecting floodplains to the river, all of which can have benefits for soil health and water resource availability. Reducing erosion will greatly reduce its associated water quality impacts – primarily turbidity and phosphorus, and to a lesser extent nitrogen, iron, and sulfates.

The approach described was developed with the overall goal of the reasonable protection of beneficial uses included in California's Porter Cologne Water Quality Control Act and therefore recognizes environmental and other social benefits of activities and land uses which may be contributing to water quality impairments.

6.2. Lahontan Water Board Authorities, Means, and Role

The Lahontan Water Board has responsibility and authority for regional water quality control of point and nonpoint sources of pollution. The Lahontan Water Board uses its permitting authorities (waste discharge requirements and waivers of waste discharge requirements) to implement the requirements of applicable State policies and State and Regional Water Quality Control Plans. The Lahontan Water Board regulates point sources with National Pollutant Discharge Elimination System (NPDES) permits, which regulate pollutant discharges into waters of the United States, and Clean Water Act section 401 certifications for discharges of dredge or fill material to waters of the United States. The Lahontan Water Board's approach to nonpoint source regulation is guided by the State Water Resources Control Board's (State Water Board's) Policy for Implementation and Enforcement of the Nonpoint Source Program (SWRCB, 2004), which allows flexibility in regulation of nonpoint source discharges.

The Lahontan Water Board also coordinates for water quality protection with other state, federal, and local governments, tribes, and non-governmental organizations; implements grant and loan programs to fund water quality related projects; and conducts education and outreach to promote water quality protection.

The Lahontan Water Board may use one or more of the following regulatory tools, as needed, to achieve water quality objectives:

- Basin Plan Section 4.1 Regionwide Prohibitions and Carson River Hydrologic Unit Prohibitions.

- California Water Code section 13267, which authorizes the Lahontan Water Board to require technical or monitoring program reports from dischargers.
- California Water Code section 13263 and 13383, which authorize the Lahontan Water Board to issue individual Waste Discharge Requirements (WDRs) to regulate discharges of waste.
- California Water Code section 13304, which authorizes the Lahontan Water Board to require cleanup of unauthorized discharges to waters of the state.
- California Water Code section 13261, which allows the Lahontan Water Board to issue waivers of WDRs. These waivers must be renewed every five years.
- Development of a Total Maximum Daily Load (TMDL) for impairments in the WFCR watershed, including a program of implementation.

In addition to using regulatory tools as appropriate, the Lahontan Water Board will implement the following activities for water quality protection in the WFCR:

- Solicitation and management of Clean Water Act Section 319 Grants for nonpoint source pollution reduction projects, Clean Water Act Section 205(j) water quality planning grants, and grants from other funding sources which the Lahontan Water Board and State Water Resource Control Board manage.
- Providing notices of available funding for other funding sources, such as DWR, Alpine County, CDFW, CWSD, and others. In addition to other notifications, the Lahontan Water Board provides to appropriate groups, within the next few months, the Lahontan Water Board will create a region-wide funding opportunities email list to share funding opportunities with stakeholders in the Lahontan region.
- Providing letters of support for proposals for projects and actions which will benefit water quality.
- Coordination with State, Federal, and Local Agencies and Tribal governments including development and updates of Memorandums of Understanding (MOUs) and Management Agency Agreements (MAAs).
- Coordination with non-governmental organizations doing water quality related work, including providing technical and regulatory assistance, and assistance with grant proposals for other agencies.
- Education and outreach.

Table 6-5 provides an overview summary of the categories of sources and entities potentially contributing to the impairments in the WFCR, existing regulatory tools and means to achieve reductions from those sources, and the proposed Vision Plan approach for requiring/achieving control actions, and partner agencies and organizations. Table 6-5 also lists other potential mechanisms that could be used if necessary or appropriate for one or more source categories. The subsequent sections in Chapter 6 further describe the plan for addressing each source category and provide

a timeline for actions. Table 10 summarizes these actions and their target start and completion dates.

Other regulatory and non-regulatory mechanisms could be determined to be necessary if monitoring does not show progress in water quality improvement and/or if adequate progress at meeting implementation milestones is not achieved. They also could be implemented for other reasons, such as consistency with program priorities.

The regulatory mechanisms used could be implemented as individual orders/actions for a specific discharger, watershed, or category of dischargers. A Basin Plan Amendment, if necessary or appropriate, could establish a TMDL and/or other requirements in the Basin Plan which would provide a formal framework for addressing one or more sources or water quality impairments in the WFCR. The Lahontan Water Board's general plan for collecting data and information and evaluating progress, as well as considerations for adaptive management, are discussed in the Evaluation and Adaptive Management section below.

Table 6-5. Sources and Means to Achieve Reductions

Source Category	Entities	Existing Regulatory Tools & Means	WFCR Vision Plan Proposed Tools and Means	Partner Agencies and Organizations	Other Potential Mechanisms[16]
Historical impacts such as logging, grazing, road building, channel alteration;	NA	Some projects are regulated under the Restoration General Order or individual WDRs/401 Certifications	CWA 319 grants and grants from other sources	AWG, CWSD, HTNF, CDFW, NRCS, Multiple NGOs	CAOs, Waiver, WDR
Roads and road maintenance;	Caltrans	Caltrans Stormwater Permit	Caltrans Stormwater Permit		Permit revisions 13267/13383 Orders
Roads and road maintenance	Alpine County	NA	CWA 319 grants and grants from other sources	AWG, CWSD	MAA, Waiver, WDR
Roads and road maintenance	Private Landowners	NA	Education, Grants	AWG, CWSD, Alpine County, Caltrans	Waiver, WDR
Roads and road maintenance	USFS-HTNF	NA	Informal	AWG, CWSD	13267 Orders, MAA, MOU, Waiver, WDR
Camping and recreational use	USFS-HTNF	NA	Education, RAC grants, CWA 319(h)	AWG, CWSD, FOHV, American Rivers, Alpine County	13267 Orders, MAA, MOU, Waiver, WDR
OWTS	Desolation Hotel Hope Valley	WDRs	WDRs		Enforcement orders such as CDO, CAA

[16] These could be implemented as individual orders/actions or as under Basin Plan implementation program such as a TMDL.

Source Category	Entities	Existing Regulatory Tools & Means	WFCR Vision Plan Proposed Tools and Means	Partner Agencies and Organizations	Other Potential Mechanisms[16]
OWTS	Private Residences	OWTS Policy Waiver Alpine County LAMP	OWTS Policy Waiver Alpine County LAMP	Alpine County, AWG, CWSD	WDRs
Grazing	Private ranches	NA 6 Users of recycled STPUD water have water reclamation requirements	Education, Grants, NRCS EQIP, CWA 319	NRCS, CWSD, AWG	WDRs, waiver of WDRs or NPDES permit/WDRs
Grazing	HTNF	HTNF - Term Grazing Permit and Annual Operating Instructions	HTNF - Term Grazing Permit and Annual Operating Instructions	HTNF	WDRs, waiver of WDRs, MOU, MAA
Climate change, wildfire, invasive species	USFS-HTNF CalFire	NA	Grants, outreach, education, enforcement of noxious weed, fire control laws.	NRCS, CDFW, CDFA, Alpine County, Forest Health Community Working Group, CWSD, AWG, American Rivers	NA

6.3. Potential Funding Sources

There are numerous sources of funding for implementing the projects and activities identified in this Vision Plan. Stakeholders can be informed about funding opportunities from the Lahontan Water Board's upcoming funding opportunities email list, as well as the Sierra Nevada Conservancy Funding Opportunities Newsletter (a hub for environmentally-focused grants).

Some of these funding sources are available to individual landowners. Some funding sources are available to agencies and nonprofit organizations, such as resource conservation districts (RCDs), which then manage the grants for projects on private lands. There is currently not an RCD in Alpine County, so it could be beneficial for an Alpine RCD to be re-initiated to facilitate funding for projects on private lands; alternately, Amador RCD has been providing assistance in recent years to Alpine County landowners.

Sources of funding include:

- The State and Regional Water Boards' Nonpoint Source (NPS) Grant Program, which supports projects to reduce and mitigate the effects of nonpoint source pollutants to waters of the state. The funding for this grant program comes from a grant to the State Water Resources Control Board (State Water Board) from U.S. EPA under Clean Water Act (CWA) section 319 (CWA 319h grant). More information on CWA 319 grants can be found at the Lahontan Water Board's Nonpoint Source Program webpage, and the guidelines for applications can also be accessed online at the Lahontan Board's Clean Water Act Section 319 website: https://www.waterboards.ca.gov/lahontan/water_issues/programs/nps/cwa-319-grant-program.html

- The State and Regional Water Boards' Cleanup and Abatement Account, which provides grants for the cleanup or abatement of a condition of pollution when there are no viable responsible parties available to undertake the work. The Cleanup and Abatement Account is supported by court judgments and administrative civil liabilities assessed by the State Water Board and the Regional Water Quality Control Boards. More information is available at: https://www.waterboards.ca.gov/water_issues/programs/grants_loans/caa/cleanup_and_abatement.html

- Clean Water Act section 205(j) water quality planning grants – These funds are awarded to the State Water Board by USEPA. The State Water Board may choose to allocate the funds to Regional Water Boards as needed.
- Natural Resource Conservation Service (NRCS) Environmental Quality Incentives Program (EQIP), and the Conservation Stewardship Program (CSP), both of which

also serve as sources of technical assistance. Information about NRCS Financial Assistance Programs is available at: https://www.nrcs.usda.gov/getting-assistance

- USFS - Secure Rural Schools and Community Self Determine Act Funds – Under this act, a portion of USFS revenues are provided for projects in counties with USFS lands, such as Alpine County, to help fund schools and roads and create employment opportunities through projects that maintain current infrastructure and improve the health of watersheds and ecosystems on national forests. In Alpine County, the Alpine County Resource Advisory Committee (RAC) is responsible for reviewing projects and making recommendations for funding. Information about this committee is available at: https://www.fs.usda.gov/main/htnf/workingtogether/advisorycommittees

- Funding from other government agency funds such as the Department of Water Resources and CDFW.

- CWSD funds for Alpine Watershed Group, invasive species management, studies, floodplain management, and NDS outreach and pollution control projects.

- Funding from private entities, including individual dischargers, or private entities, which provide services to dischargers in the watershed.

6.4. Historical Impacts - Stream/Watershed Restoration

Restoration of the WFCR channel and its watershed to reduce impacts from historical activities has been ongoing for several years through multiple projects and is expected to continue in the future. Restoration reduces erosion and restores connection between the channel and its floodplains, improving hydrologic function by slowing flows during high runoff events and increasing flows later in the year. These changes in flow regime also improve water quality by decreasing erosion from high flows and increasing assimilative capacity during lower flow periods.

There are several techniques that can be used to restore the river channel and watershed function in the WFCR, mitigating the damage from historical impacts in the watershed. Techniques appropriate for the WFCR include streambank stabilization, biotechnical streambank protection, and bank strengthening by vegetation restoration. Appendix A contains a more complete description of these techniques, their costs, benefits, and other considerations.

Many of the projects on the WFCR also involve planting willows and encouraging the growth of aspen along the river channel and in other wet areas. This vegetation helps reduce erosion and provide habitat. Planting willows and encouraging aspen instead of more flammable conifers also helps reduce fire risk, which reduces the risk of fire

impacts on WFCR water quality. Additionally, beaver dams and beaver dam analogues (and other low-tech process-based restoration techniques) have been identified as potentially beneficial in the upper reaches of the WFCR as they provide check dams which slow the flow, aggrade the channel, and allow better connection to meadow floodplains both immediately and over the long term. Beaver can have positive impacts through raising the water table locally and aggrading the stream channel over time, thereby increasing connectivity with the meadow floodplain, as well as enhancing wet meadow vegetation and habitat. They can also have negative impacts through elimination of riparian trees and some increases in bank erosion, as discussed in the CRASP (CWSD 2017). An in-depth discussion of beaver dam analogs is provided by Pollock et al. (2023), available at: https://www.fws.gov/media/beaver-restoration-guidebook. Information about low-tech process-based restoration is provided by Wheaton et al. (2019), available at: https://lowtechpbr.restoration.usu.edu/manual/

6.4.1. Existing and Recent Projects/Efforts

There are multiple current and recent restoration projects in the watershed which are already improving water quality in the WFCR. They are described below. The science and art of channel and meadow restoration is continuously evolving, and the lessons learned from each project contributes to the design of subsequent projects.

The Upper Carson River Watershed Stream Corridor Assessment (MACTEC, et al., 2004), was developed with funding from CA Proposition 13, and support from AWG, and several other agencies, organizations, and individuals. The Assessment describes in detail the geomorphologic condition of specific reaches of the WFCR. The assessment of the Upper Carson River noted widespread incision with unstable, eroding banks, and some headcutting, as well as discontinuous riparian canopy in Hope and Faith Valleys. The project team developed a list of impacted reaches which would most benefit from restoration and developed specific recommendations for these reaches. For the WFCR these were, moving from downstream to upstream:

- “Reach WF8”, an incised meadow in Lower Hope Valley, immediately downstream of the Highway 88 bridge.
- “Reach WF10”, an incised meadow in Upper Hope Valley.
- “Reach WF14”, a meadow in Faith Valley.
- “Reach WF15”, a meadow in Faith Valley.

In between 2014 and 2017, American Rivers conducted an assessment of all accessible meadows in the upper Carson River watershed funded by the National Fish and Wildlife Foundation (NFWF) to guide investment and accelerate the pace of restoration (Fair et al., 2018). They identified six priority meadows, including three in the WFCR watershed (Forestdale Meadow, Faith Valley Meadow, and Highway 88 Meadow) and established a Carson meadows work group to pursue restoration of these six sites as an initial objective. The upper watershed assessment and the meadows assessment guided the

selection of restoration projects in the WFCR watershed. Restoration projects have been implemented on portions of reaches WF8, WF9, WF10, and WF 14. Figure 6-1 shows the location of these reaches as well as current and recent restoration projects.

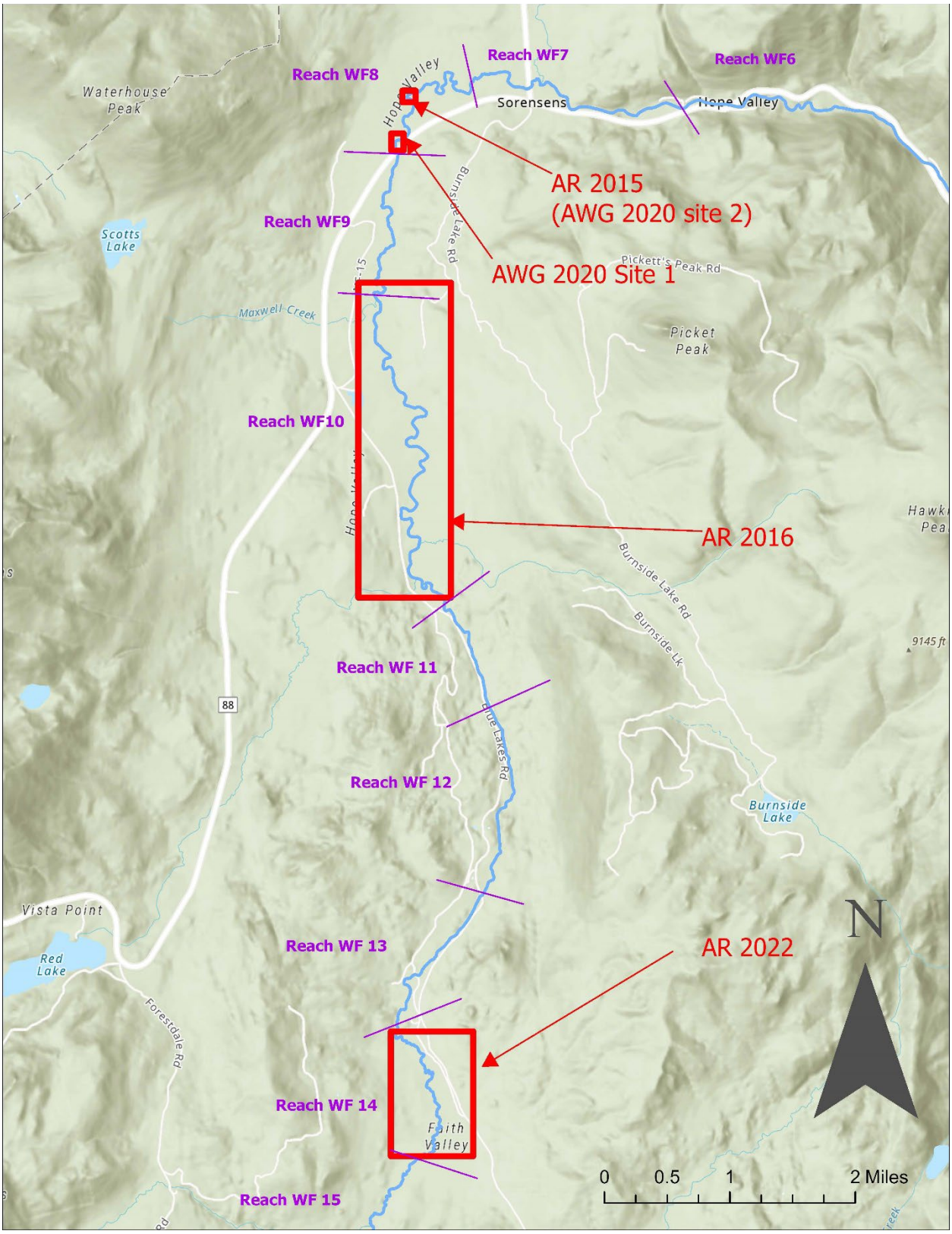

Figure 6-1 WFCR Restoration Sites

American River's Hope Valley Meadow Restoration

Staring in 2015, and finished in fall of 2017, the environmental organization American Rivers led the Hope Valley Meadow Restoration project, which restored about two miles of stream channel on the WFCR (in reaches WF8 and WF10) by stabilizing streambanks, planting willows, developing floodplain benches, protecting a meander bend that was threatening to cutoff, installing a log-crib structure, and protecting headcuts.

In 2015 a log-crib structure was installed to stabilize a particularly high, eroding bank and enhance fish habitat along a 130-foot section of stream channel in reach WF8 (AR 2015 in Figure 6-1) on CDFW land. In 2016 and 2017 American Rivers implemented restoration activities, meadow restoration approximately 3 miles upstream (AR 2016 in Figure 6-1) on HTNF land, on Reaches WF9 and WF10 to stabilize banks and reduce the amount of sediment entering the river. This included stabilizing streambanks, planting willows, developing floodplain benches, protecting a meander bend that was threatening to cutoff using rock and rootwads and protecting headcuts.

This project was a collaborative effort that involved American Rivers, USFS-HTNF, AWG, Friends of Hope Valley, CDFW, Institute for Bird Populations, Trout Unlimited, Great Basin Institute, Waterways Consulting, Habitat Restoration Sciences, and more. Funding came from the National Fish and Wildlife Foundation, Sierra Nevada Conservancy, CA Wildlife Conservation Board, CDWR, Wildlife Conservation Society and the Bella Vista Foundation.

> More information about this project is available at: https://www.americanrivers.org/2017/01/major-meadow-restoration-in-hope-valley-complete/

Alpine Watershed Group's Hope Valley Restoration and Aquatic Habitat Enhancement Project.

The AWG-led Hope Valley Restoration and Aquatic Habitat Enhancement Project was constructed in Fall 2020. The goals of this project were to reduce erosion, improve aquatic habitat, and create a more connected river channel and floodplain. The project took place at two sites which are both river meanders downstream of the highway 88 crossing of the WFCR in Hope Valley. The first site (AWG 2020 Site 1 in Figure 6.1) was immediately downstream of the highway and the second site (AWG 2020 Site 2 in Figure 6-1) was about half a mile farther downstream at the log crib structure from the 2015 American Rivers' project.

At the first site, restoration techniques were utilized to mimic an abandoned oxbow. A floodplain bench about 2.5 feet deep, 14 feet wide, and 300 feet long was excavated behind a failing bank on the outside of a river meander. This structure was filled with locally harvested sod blocks and willow stakes and live willow transplants. This design

allows vegetation to establish before coming in contact with the actual river channel. This vegetation will provide natural armor for the channel in high flows, and the lowered area will also make it easier for the river to access the floodplain during high flows if the stream erodes the riverbank back to the project site.

At the second site, anchored slash piles were placed upstream and downstream of the previously installed log crib structure to reduce erosion, and willows were planted throughout the site. Most of the work was done on the downstream end, where some minor excavation was performed to grade back the bank and allow for vegetation to be planted. Willow fascines, (dormant branch cuttings bound together into long cylindrical bundles) were also installed near the waterline, below installed sod and slash[17].

This project was funded by the Water Boards' Cleanup and Abatement Account (as part of a settlement of a State Water Board enforcement action), the National Fish and Wildlife Foundation, and the California Department of Fish and Wildlife.

More information about this project is available at https://www.alpinewatershedgroup.org/hope-valley-restoration-and-aquatic

HTNF's West Carson River Habitat Improvement Project

The HTNF is implementing a project to restore and improve aspen stands, reduce hazardous fuels, and improve meadow habitat along the WFCR. By thinning conifers both out of aspen stands as well as meadows, fire reduction is greatly reduced, and meadow function is improved while erosion potential is reduced. The project timeline is spring 2022 through fall 2024, and the work will incorporate 1,600 acres. Work is being completed by California Conservation Corps crews, American Conservation Experience crews, and private contractors. AWG will be completing monitoring of aspen groves. Funding for the project was provided by the CDFW Watershed Restoration Grant Program, the Sierra Nevada Conservancy, as well as USFS funding. In addition, this area is included in the USFS Wildfire Crisis Strategy. The HTNF will be completing additional NEPA analysis in the area to expand the project with funds from the Wildfire Crisis Strategy.

> More information about this project is available at https://www.nationalforests.org/who-we-are/press-news/west-fork-carson-fuels-reduction-aspen-and-meadow-restoration-project
>
> http://bondaccountability.resources.ca.gov/Project.aspx?ProjectPK=42027&PropositionPK=48

[17]These fascines were intended to help reduce erosion and sprout new willows, however less than a month after the project was complete a beaver repurposed the willow fascines into a dam, so they did not end up serving their intended purpose.

American River's Faith Valley Meadow Restoration

The Faith Valley Meadow Restoration Project (AR 2022 in Figure 6-1) aims to restore the hydrological and ecosystem processes at Faith Valley to enhance their ability to provide outstanding natural benefits, including groundwater storage, enhanced baseflows and downstream water quality, enhanced habitat for sensitive species, climate resilience and recreational values. The project aims to reestablish the hydrological connectivity between the WFCR and surrounding 120-acre Faith Valley meadow through the implementation of beaver dam analogs (BDAs), and a rocked grade control, which will raise the water table and aggrade sediment over time. The project also includes road improvement work on the dirt forest road adjacent to Faith Valley Meadow to reduce adverse impacts of recreation on the meadow while improving recreational access. The first phase of the project constructed the rocked grade control and 14 pilot BDAs in the summer of 2022. Those BDAs were monitored to track performance and impacts on stream flow to inform subsequent work. The project requires monitoring the beaver dams and BDAs when CWSD does its late season water release from Lost Lakes to ensure the water right is not impacted. Phase 2 was implemented in 2023 and included repairing existing BDAs, installing an additional 25 BDAs, and implementing dirt road repairs, including aggrading the road based and installing rocked fords.

The Faith Valley Meadow Restoration is a collaborative effort led by American Rivers alongside HTNF, AWG, Institute for Bird Populations, Friends of Hope Valley, Trout Unlimited, Waterways Consulting, Habitat Restoration Sciences, Symbiotic Restoration, and more. CWSD is also a partner due to their water rights at Lost Lakes. Funding came from the National Fish and Wildlife Foundation, CDFW California Climate Investments, CA Wildlife Conservation Board (Prop 68), and California State Parks Off-Highway Vehicle Recreation Program.

For more information, please contact Julie Fair at jfair@americanrivers.org or the Humboldt-Toiyabe National Forest, Carson District Office at 775-882-2766.

Alpine Watershed Group's Creek Day

Creek Day is a community-wide, volunteer-based watershed restoration event that AWG has been coordinating since 2001. This event involves numerous restoration activities on sites in Alpine County, some of which are in the WFCR watershed. Activities include installing willow stakes, removing trash, pulling invasive weeds, addressing erosion issues, and wrapping aspens. Creek Day involves dozens of volunteers working on a handful of projects. More information about this day is available at:

https://www.alpinewatershedgroup.org/creek-day

Friends of Hope Valley Annual Workday

The non-profit organization Friends of Hope Valley also hosts an annual volunteer workday during the summer. Projects include such activities as planting willows, general clean-up, Adopt-a-Highway litter pick-up, and replacing old fencing along the highway. Information about the annual workday can be found at:

http://www.friendsofhopevalley.org/events.html

6.4.2. Ongoing and Future Projects/Actions, Schedule and Resources Needed.

Ongoing restoration will continue through the efforts of key partners, such as CWSD, AWG, American Rivers, and Friends of Hope Valley, to obtain funds and implement restoration of the reaches identified in the 2004 Stream Channel Assessment and meadows along the WFCR identified in the 2014-2017 meadows assessment. Of the four reaches identified as priorities for restoration in the 2004 Upper Watershed Assessment, projects have been implemented on reaches WF8, WF9, WF10, and WF14, but additional projects could be applied in other parts of these reaches, as well as the reach WF15.

The Geomorphologic Model and Prioritization by AWG and CWSD will provide further insight into which reaches, or possibly which tributaries, would be the most beneficial to restore in terms of water quality improvements. This model will be developed over the next few years and be completed by the end of 2026.

As discussed in Appendix A, river restoration can reduce sediment concentrations significantly; up to 50% sediment reductions have been observed in past restoration projects. Similar reductions should be attainable in the WFCR when restoration is combined with efforts at reducing erosion from roadways and other uses in the watershed. For the Headwaters to Hope Valley Segment of the WFCR an approximately 44% reduction in phosphorus is needed to attain standards as discussed in Section 4. Historic impacts, roads, and recreation are the only pollution sources in this upstream reach. In addition to the activities to address road and recreation sources, it is likely that additional restoration will be needed to attain phosphorus WQOs in the WFCR by reducing in-channel sources and improving hydrologic function.

While an exact schedule cannot be proposed since funding is not definite, it is likely that a restoration project could be completed every 4 years, starting when modeling is concluded in 2026; with some potential overlap, 2-3 restoration projects could be completed over the lifespan of this Vision Plan. The completion of these projects would be contingent on funding availability and the ongoing voluntary efforts of AWG, CWSD, FOHV and others, to obtain project funding and implement these projects.

The cost of the geomorphological model for the Upper WFCR is approximately $333,350. River restoration projects for a river of this size can have costs in the $500,000 - $1M range. Therefore, the total cost of assistance needed for watershed and channel restoration to implement 3 additional restoration projects is estimated to be in the range of $2M.

All restoration projects which involve changes to a streambed require Clean Water Act section 401 permitting from the Lahontan Water Board. To streamline this process as much as possible, where possible, projects will be permitted under the State Water Board's Order for Clean Water Act Section 401 Water Quality Certification and Waste Discharge Requirements for Restoration Projects Statewide (Statewide Restoration General Order, Order No. WQ 2022-0048-DWQ). USFS-HTNF will also continue to be a partner in restoring the WFCR and its tributary watershed, most of which is on HTNF land.

6.5. Roads

The entities responsible for roads in the WFCR include Caltrans, Alpine County, USFS-HTNF, and private landowners. The Lahontan Water Board, as well as AWG and stakeholder groups, will continue working with these entities to reduce pollution from roads. Many existing activities and projects are underway and will continue. Additional projects and practices are also expected to be implemented, as well as studies to prioritize and target these practices for effectiveness.

The State Water Board regulates the California Department of Transportation's stormwater discharges under a statewide NPDES municipal stormwater permit (https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/Caltrans/Caltrans_Permit_Final_DIT.pdf). Like all NPDES permits, the Caltrans permit is renewed approximately every five years. The current Caltrans permit was adopted by the State Water Board on June 22, 2022. The Caltrans permit does not set numeric effluent limitations but requires Caltrans to implement BMPs to comply with the permit. Upon determination that Caltrans is causing or contributing to an exceedance of applicable water quality standards, Caltrans must engage in an iterative process of proposing and implementing additional control measures to prevent or reduce the pollutants causing or contributing to the exceedance. The Caltrans permit requires Caltrans to update, maintain, and implement as effective Storm Water Management Plan (SWMP) that describes how they will meet the requirements of this Order. The Caltrans permit requires Caltrans to submit an Annual Report each year to the State. The Annual Report serves the purpose of evaluating, assessing, and reporting on each relevant element of the storm water program, and revising activities, control measures, BMPs, and measurable objectives.

The stormwater discharges from the remainder of the roads and highways which are not managed by Caltrans are not currently regulated by the State Water Board or the

Lahontan Water Board through a permit or any other formal mechanism, and no new formal regulatory mechanism is proposed for these discharges at this time.

There are three basic types of management measures that can be implemented to reduce pollution from roads. Pollution prevention measures that reduce the generation of pollutants, transportation of polluted runoff away from where it may enter waterways, and treatment of polluted road runoff.

Since failing roads and culverts can be a source of sediment, pollution prevention practices include general road and culvert maintenance, as well as replacing undersized culverts and failing roads. Pollution prevention can also include reducing erosive potential resulting from concentrated flows from impervious surfaces. In some cases, removal of some failing roads may also be appropriate. More precise applications of salt, brine, and abrasives could help reduce the overall amounts applied. Improved roadway traction abrasive specifications, as are used in the Tahoe Basin, can reduce the load of fine sediment in stormwater runoff from roadways. Increased sweeping frequency and more efficient sweepers can also reduce abrasives and salts available to enter surface waters.

Transportation and treatment practices include low impact development measures where feasible that utilize features such as swales or infiltration basins to capture stormwater runoff and reduce discharge to surface waters.

The Handbook for Forest, Ranch and Rural Roads (Weaver et al., 2015) provides an extensive description of practices for reducing erosion from unpaved rural roads. It is available for free download at http://www.pacificwatershed.com/roadshandbook. A video summary of the handbook is available at: https://www.youtube.com/watch?v=7cbN6YvRTSo .

6.5.1. Existing and Recent Projects/Efforts

Existing road maintenance and improvement by the parties responsible for roads help prevent erosion from roads and culverts failures. Caltrans implements many practices to reduce pollution from its highways under the Caltrans permit. Caltrans has a culvert inspection program, created in 2005 to inventory and assess all the State's culverts. The program goal is to assess all culverts in the State by 2023. Culverts are assessed and rated and documented. Culverts assessed in poor or fair condition are put into a project for the needed repairs, replacement, or cleaning. The State Highway System Management Plan sets targets for the number of linear feet, based on the goal for 90% of culverts to be in good or fair condition.

HTNF and Alpine County also have programs for maintaining and improving their road systems.

The Road system in the Carson Ranger District of the HTNF is managed according to their Travel Analysis Process (TAP) report (HTNF, 2011). The TAP report provides

information related to travel analysis in conjunction with the identification and management of the minimum road system. It includes recommendations that the district can use to identify where both USFS roads and unauthorized routes could be decommissioned or added to improve recreation access, administration, and protection of the National Forest System lands on the district. The TAP also includes preliminary analysis of the effects of the Forest Transportation System on biophysical and human resources.

HTNF has a road maintenance crew, which has a budget of approximately $500,000 per year, which is all needed for regular maintenance. HTNF does not have a regular road evaluation and inspection program, but road staff crews regularly identify safety issues and roads or features with potential to cause resource damage. Decommissioning of USFS roads or illegally-created routes is done on an ad-hoc basis (Jorgensen, 2023). BMPs to protect water quality on USFS roads are installed following the USFS BMP Manual (USFS, 2012)

HTNF recently received additional funding as part of the USFS Wildfire Crisis Strategy, $6 million of which was dedicated for forest road improvements, shared between the Carson Ranger District of the HTNF and Elko area. The purpose of this funding is to improve access to high fuels areas for fire control, but improvements in these roads will also make them more stormproof, sustainable, and reduce their potential for erosion and resulting water quality impacts. BMPs to be applied to these roads include adding rolling dips, reconstructing sections or roads, adding cross slope, adding ditches, and grading and filling in ruts.

HTNF has agreements with Alpine County under which Alpine County maintains some paved roads in the HTNF, such as Blue Lakes Road.

The American Rivers and USFS-HTNF Faith Valley Restoration Project, described above, also includes forest road improvement work on the dirt road adjacent to Faith Valley Meadow, which will help reduce sediment going into the WFCR.

6.5.2. Ongoing and Future Projects/Actions, Schedule, and Resource Needs.

The Lahontan Water Board will work with Caltrans, HTNF, Alpine County, and local landowners to support improvements for roads with high erosion potential, including pursuing funding from grants or other sources.

Since there are many miles of roads and highways in the WFCR watershed, investigations should be performed to identify which areas are hydrologically connected with the WFCR or its tributaries, and if additional BMPs or other repairs are needed in those areas. An example of such a prioritization is the Natural Environment as Treatment (NEAT) study (Wood Rodgers, 2010) performed to develop a consensus-based approach for the prioritization and selection of water quality improvements for

Caltrans highways within the Lake Tahoe Basin. The NEAT study classified segments of highways into 3 distinct categories depending on hydrologic connectivity with waters: In some highway segments, the pollutants transported by storm water runoff would be adequately treated by the natural environment, other segments needed minor modifications to treat highway runoff, and in other segments storm water needed to be collected and treated prior to discharge.

The Lahontan Water Board will work with Caltrans, the HTNF, and Alpine County to ensure the development of investigations, identifying roads and road maintenance activities with the greatest potential for discharges to surface waters in the WFCR watershed. These investigations should be completed within the next three years. This will allow time for development and implementation of projects over the next several years, so they can be completed in the timeframe of the overall Vision Project.

Currently, Caltrans is the only party in the West Fork Carson River watershed whose stormwater discharges are covered under a State Water Board or Lahontan Water Board permit. USFS logging activities are regulated under the Lahontan Water Board's Timber Waiver, but the Lahontan Water Board does not currently have a permit covering other activities on USFS land. In the future, the Lahontan Water Board may issue orders requesting information or regulating discharges associated with road activities of the USFS, Alpine County, or other parties.

On an annual basis, the Lahontan Water Board will request information from Caltrans, Alpine County, and the USFS-HTNF about their progress in identifying and resolving culvert issues and other road erosion issues as well as let them know of any identified areas of greater potential water quality impact. The Lahontan Water Board will also work with them to request salt and sand use reporting on an annual basis and to investigate the potential use of materials with less impact to water quality. For Caltrans, this information can be included in their annual report submitted to the State Water Board.

Caltrans' program for addressing culvert issues for its highways, described above, should result in identification and resolution of highway culvert related erosion sources in the WFCR watershed.

The Lahontan Water Board will work with State Water Board staff to suggest findings and requirements in the Caltrans Permit when it is updated to address the potential for state highways to be a source of contributions to water quality impairments in the WFCR. The Caltrans permit is not likely to be updated until approximately 2027 due to the 5-year NPDES permit cycle. In the meantime, Lahontan Water Board staff will work with the State Water Board and Caltrans to include studies and BMPs for the WFCR in the Caltrans SWMP.

The Lahontan Water Board will also work with Alpine County to support improvements for roads and culverts with high erosion potential, including pursuing funding from grants or other sources. The Lahontan Water Board will work with Alpine County to provide

resources, data, and best management practices that may reduce discharges associated with road activities of Alpine County. Alpine County will share information with the Lahontan Water Board on the use of salt and sand use on roads and areas where the County has been able to make progress in identifying and improving culvert issues and other road erosion issues as well as let them know of any identified areas of greater potential water quality impact. The Lahontan Water Board will work with the USFS to support improvements for roads and culverts with high erosion potential and decommissioning of especially problematic roads.

State Water Board investigations identified twelve culvert features on Alpine County roads showing signs of failure and are therefore in need of repair (Hanks et. al, 2019). It is envisioned that these should be repaired within the next six years, by 2029, and should be a priority for grant or other funding. The Lahontan Water Board will also work with Alpine County, local landowners, and watershed groups to identify and address roads and culverts with high erosion potential on private lands.

For dirt roads in the HTNF, studies need to be performed to identify roads in need of repair and any dirt roads or ORV trails that should be removed. The Upper Carson River Watershed Stream Corridor Assessment (MACTEC, et al., 2004) recommended that a detailed assessment of road conditions be prepared that would identify potential sources of sediment along roadways in the vicinity of Blue Lakes and Burnside Lake Roads. These studies should be performed within the next 5 years, so that any projects identified can be implemented in a timely manner to meet the goal of attainment of water quality standards in the Vision Plan timeframe. Utilizing the cost estimate from the Upper Carson River Watershed Stream Corridor Assessment and adjusting for just the portion of the area in the WFCR watershed, as well as adjusting from 2004 to 2023 dollars, the cost of the road assessment is estimated at $10,000. Once this study is complete, it is likely that specific roads and road features will be identified for needing repairs/decommissioning, or improvements. Based on the SWRCB study (Hanks et. al, 2019), approximately 1/3 of crossings in the watershed are in need of some form of repair or replacement. Improvements on HTNF roads could be funded with a 319 grant, and/or USFS Secure Rural Schools and Community Self Determine Act Funds.

Education and outreach are also critical elements of addressing impacts from roads and vehicular use of HTNF lands. Education topics related to roads are included as a topic for outreach in the Information and Education section below. Watershed signage along roads is also discussed in the Information and Education section below.

6.6. Onsite Wastewater Treatment Systems (OWTS)

The Lahontan Water Board will continue to work with OWTS owners and Alpine County to reduce water quality impacts to the WFCR from OWTS. Residential OWTS in Alpine County are covered by the OWTS Policy Waiver and are regulated by the County under a Local Area Management Plan (LAMP) which was approved by Alpine County Board of Supervisors in May 2019, and the Lahontan Water Board in July 2019. The OWTS for

one resort facility near the river, Desolation Hotel Hope Valley used to be regulated under a WDR under its former owner. As described below, the Lahontan Water Board is working with the new owner to get this facility regulated under waste discharge requirements.

Under the California Water Code, the State and Regional Water Boards have full regulatory authority to regulate discharges to surface waters and groundwater, including those from OWTS, under Waste Discharge Requirements.

The State Water Resources Control Board's *Water Quality Control Policy for Siting, Design, Operation and Maintenance of Onsite Wastewater Treatment Systems* (OWTS Policy) (SWRCB, 2012) waived the requirement for OWTS owners to submit a report of waste discharge, obtain waste discharge requirements, and pay fees for discharges from OWTS covered by the Policy and that meet the conditions of the OWTs Policy Waiver. In July 2019, the Lahontan Water Board adopted Resolution R6T-2019-0254, approving the Alpine County Local Area Management Plan (LAMP). Eligible new and replacement OWTS must comply with the requirements of the LAMP to be covered under the OWTs Policy Waiver.

The LAMP is designed to protect groundwater and surface waters from contamination through the proper design, placement, installation, maintenance, and assessment of OWTS. The LAMP includes minimum standards for the treatment and ultimate disposal of sewage using OWTS in Alpine County. The Alpine County Environmental Health Department is responsible for permitting and inspecting the installation of residential septic systems. The County also follows up on septic systems which are failing or in need of repair. The implementation of the Alpine County LAMP by the County will continue to be an important means of protecting water quality in the WFCR. If water quality data or other information indicate that additional protections are needed to ensure water quality in the WFCR is protected from OWTS impacts, the Lahontan Water Board will work with the county to amend the LAMP and/or follow up on any failing OWTS, whose owners are required to implement corrective actions per Tier 4 of the OWTS Policy.

Additionally, education about potential impacts of OWTS on the WFCR will be a focus of outreach by the Lahontan Water Board, Alpine County, and others. OWTS owners and operators will be encouraged to upgrade their systems and operate them as efficiently as possible. Alpine County's Local Area Management Plan (LAMP) does not require notification or provision of educational materials to new property owners with existing septic systems. This notification should be a priority for improved outreach by Alpine County. Information about for homeowners and others about how to effective OWTS is available at via the USEPA's Septic Smart program https://www.epa.gov/septic. Where needed, grant funding could be pursued for upgrading OWTS. Potential sources include:

- Clean Water Act Section 319 grants.

- Clean Water State Revolving Fund (SRF):

  OWTS Policy Section 14.0 states that local agencies may apply to the State Water Board for funds from the Clean Water SRF for use in mini-loan programs. Local agencies are also responsible for administering SRF mini-loans.

- United States Department of Agriculture (USDA) Rural Development:

  The USDA Section 504 Home Repair Program provides loans to very-low-income homeowners to repair, improve, or modernize their homes or grants to elderly very-low-income homeowners to remove health and safety hazards. More information about this program is available at https://www.rd.usda.gov/programs-services/single-family-housing-programs/single-family-housing-repair-loans-grants

To help identify potential OWTS impacts, the Lahontan Water Board will conduct and/or support monitoring in the WFCR, downstream from OWTS areas. This monitoring, described in the monitoring section below, will include anthropogenic substances such as sucralose and caffeine which can provide an indication of OWTS impacts in receiving waters. Such monitoring should be completed before the Lahontan Water Board evaluation of progress in 2029, to inform timely actions and adaptive management.

Ultimately, if impacts to the WFCR from OWTS increase, due to population increases or other factors, other solutions for wastewater treatment, such as construction of a community wastewater treatment system, should be considered in long term planning for the area.

One resort facility along the river, Desolation Hotel Hope Valley, has had historical issues with its OWTS. The facility was formerly Sorensen's Resort and Cafe but changed ownership in 2018. This facility was under Waste Discharge Requirements (WDRs) and a cleanup and abatement order (CAO) to resolve issues with failure of its OWTS resulting in discharges of partially-treated wastewater to the river during wet years. The leach field was subject to high groundwater intrusion, and not allowing the treated wastewater to percolate and continue treatment. The wastewater/groundwater mix was surfacing at the low side of their property (parking lot) and traveling to WFCR via the roadside storm drainage ditch.

The WDRs for this facility were not transferred to the new owners during purchase. Lahontan Water Board will work with the new owner to finalize their application and get this facility under waste discharge requirements. A new package treatment plant has been installed at this facility after its purchase in 2018. The long-term solution for this facility's wastewater could be for it to meet the requirements that would allow it to discharge to the STPUD C-line, with onsite storage as a backup. This solution would eliminate all discharges to the WFCR. The Lahontan Water Board will continue to work with the owners of this facility to get it coverage under WDRs and ensure that the discharge from this facility is not impacting the WFCR or groundwater in the area.

6.7. Grazing

There are many practices, processes, and programs which help reduce the impacts of grazing to surface waters in the WFCR watershed. These are expected to continue to be utilized to effectively address the potential water quality impacts to the WFCR from grazing. While the Basin Plan generally describes potential control measures for Grazing in Section 4.9, currently the Lahontan Water Board has not issued waste discharge requirements or a waiver of waste discharger requirements to regulate grazing in the WFCR watershed. The one exception is that use of recycled STPUD water for irrigation on six ranches in the WFCR watershed is regulated under Wastewater Reclamation Requirements issued by the Lahontan Water Board (CRWQCB-LR, 1989a-1989f). These requirements specify the location of use of irrigation water, and prohibit discharge to surface waters, and require reporting of the adequacy of tailwater controls to prevent surface water runoff.

Practices to reduce NPS pollution include riparian fencing and buffers, rotational grazing, hardened stream crossing, salt block placements, and provision of alternative water sources. Appendix B contains a summary of potential grazing practices for the WFCR.

6.7.1. Existing and Recent Projects/efforts

There are current and recent efforts to reduce NPS pollution from grazing in the WFCR. The local NRCS office in Minden, Nevada, provides technical and financial assistance to growers in the area. Grants continue to be available to fund implementation of practices. Watershed groups such as CWSD and AWG provide a forum for education and collaboration on reducing NPS pollution through their projects and programs.

Carson River Coalition Agricultural Producers Working Group

The Carson River Coalition Agricultural Producers Working Group (CRC-APWG) was launched by CWSD in 2022. This working group performs direct outreach to the Carson River Watershed's farming and ranching community regarding soil health and water quality related best management practices. CWSD is also developing an agricultural BMPs white paper. The white paper will provide a user-friendly document that explains different types of agricultural BMPs suited to the local area, the benefits of these practices to water quality and soil health, and how they help sustain the producer and the environment. The document will include local case studies, look at barriers to implementation, and outline steps producers could take to seek funding and to implement BMPs. The Lahontan Water Board will track and participate in these efforts as they are relevant to ranchers in the WFCR watershed.

Rivers and Ranches Project

In 2016, the owner of Ace Hereford Ranch, a 914-acre ranch along the WFCR, in partnership with AWG and others, implemented a project to improve the ranch's management practices, pasture utilization, and infrastructure. The project received funding from a Proposition 84 grant.

The project included:

- Installation of exclusion fencing to improve pasture utilization, inhibit nutrient loading, and disperse grazing.
- Fencing out riparian areas and other sensitive habitats that disperse, filter, and capture nutrients.
- Repairing and improving irrigation infrastructure that allows the ranch to utilize pastures away from the river.
- Planting grasses, aspen, and evergreens to stabilize slopes and inhibit erosion while dispersing and capturing nutrients.
- Enhancing an existing wetland to trap sediment and filter nutrients before water returns to the Carson River
- Enhancing a bridge to allow cattle to safely cross the river without walking through the stream channel.

6.7.2. Ongoing and Future Projects/Actions

The Lahontan Water Board will continue to work with ranchers in the watershed, with priority on those immediately along the WFCR, to support and encourage the development and implementation of ranch water quality plans to reduce current and potential future impacts on water quality. The Lahontan Water Board will promote and facilitate voluntary implementation of BMPs focused on reducing NPS pollution to the WFCR. Voluntary implementation will be facilitated through *Ranch Water Quality Planning* in conjunction with the Natural Resources Conservation Service (NRCS) and potentially University of California Davis Cooperative Extension (UCCE).

Lahontan Water Board staff review of the grazing permit and annual operating instructions for grazing the Humboldt-Toiyabe National Forest indicated that adequate practices are required to keep these cattle from impacting water quality so no additional actions are currently proposed for cattle on the HTNF land.

A goal of this Vision Plan is for all grazing lands along the WFCR to be implementing ranch water quality plans (RWQPs) within the next two years, by October 2025. RWQPs should identify practices and areas which have the most potential to cause sediment, nutrients, or bacteria to be discharged to the WFCR or its tributaries, and relevant best management practices (BMPs), such as those described in Appendix B to prevent or mitigate the pollution potential from those practices and areas. Since the Lahontan

Water Board does not currently have an inventory of what practices are already being applied, the level of improvement needed is not known. Some ranches may need minimal improvement, and could document that in their RWQP, while others may need more significant changes. An important aspect of RWQPs is the control of the use of recycled water, which is high in nutrients.

For the RWQP process, NRCS and UCCE are likely to be able to provide technical assistance. Clean Water Act section 205(j) water quality planning grants could also potentially be used to help with the water quality planning process. For the implementation of projects and practices to reduce nonpoint source pollution, funding is potentially available from NRCS EQIP Grants and Clean Water Act section 319 grants. Additional EQUIP funding could become available if the West Fork Carson River watershed becomes recognized as a priority watershed under NRCS National Water Quality Initiative (NWQI). The Lahontan Water Board will work with NRCS and other stakeholders to investigate the potential for the WFCR watershed to be recognized as a NWQI priority watershed.

The Lahontan Water Board will need to collect information about management plans and practices being implemented. The Lahontan Water Board will request submittal of RWQPs by October 2025. Starting in 2026, an annual reporting of BMP installations will be crucial for measuring progress. This will enable the Lahontan Water Board to track the ranchers' installed or maintained BMP efforts to help reduce grazing-related water quality impacts in comparison to the water quality data results. This information could be collected and submitted to the Lahontan Water Board through a third party such as a ranchers' association or watershed group. The CWSD's web map-based tool for project tracking could be one way to report progress. The Lahontan Water Board may also request this information directly from the grazing landowners or operators if necessary and/or appropriate.

Lahontan Water Board staff will reach out to grazing landowners through direct communication by the end of 2023 to ensure that this expectation, and available resources and opportunities for collaboration, are clearly communicated. The Lahontan Water Board will continue to track progress, provide feedback to stakeholders, and report and discuss progress and opportunities for collaboration and funding at forums, watershed group meetings, and Lahontan Water Board meetings.

The long-term approach will also be influenced by the Lahontan Water Board's overall approach to regulating grazing lands in the region through the forthcoming Regional Grazing Strategy. If necessary or appropriate, the Lahontan Water Board may also modify the Waste Discharge Requirements for the users of recycled STPUD water. The Lahontan Water Board will also request that STPUD, by the end of 2025, provide an analysis of potential long-term impacts of the use of recycled water on the WFCR. The Lahontan Water Board may also request STPUD to help initiate the discussions of water quality planning and reporting for the users of recycled STPUD water along the WFCR.

6.8. Camping and Recreational Use

There are several ongoing and planned future efforts to mitigate the impacts of camping and recreational use in the WFCR watershed. These efforts include increased management of recreational use by land managers, improvements in sanitation facilities, and education and outreach to recreational users. These efforts will result in an increase in proper disposal of waste and reduced vehicular erosion. Additional potential future efforts could include addressing the need for a sanitary dump station for black and grey water as discussed below. Section 6.2 describes activities to reduce road impacts and is applicable to activities to reduce impacts which occur due to roads in these recreational areas. Section 6.11 includes a description of education efforts and topics applicable to reducing recreational impacts.

Discharges from recreational use in the watershed are currently not under a permit, waiver, or other order of the Lahontan Water Board. However, reducing these impacts is identified in this Vision Plan as a priority of the Lahontan Water Board's NPS Program. The NPS Program will work with the land managers and stakeholders in these areas to encourage and support their ongoing implementation of these measures, work with land managers, and watershed groups to support public education efforts, and continue to pursue funding for these measures.

6.8.1. Existing and Recent Projects/Efforts

The HTNF has several activities they perform to control and reduce impacts or recreational use in the HNTF watershed. There is a 14-day limit on camping in the HTNF and other regulations to reduce recreational impacts. However, there are currently limited resources to provide education and enforce the 14-day limit and other regulations. There is one recreational technician and one law enforcement officer to help educate visitors and enforce rules for the entire 600,000-acre Carson Ranger District.

CWSD had an ongoing campaign to outreach to recreational users in the watershed, which is one of its activities identified in the Carson River Watershed Adaptive Stewardship Plan (CWSD, 2017), and is further described in the Information and Education section, below.

6.8.2. Ongoing and Future Projects/Actions

HTNF staff are aware of the impacts of camping and recreational use on their lands in the WFCR watershed and have been implementing and pursuing funding for practices to address these impacts. The Lahontan Water Board, AWG, CWSD, and others will continue to support funding for these projects and practices.

Additional staffing to provide education and outreach on forest rules and assist enforcement could greatly reduce recreational impacts. HTNF has obtained Resource

Advisory Committee (RAC) funding for an additional seasonal (May-October) recreation tech in 2024 which will cost approximately $35,000 for the year.

For the Scotts Lake dispersed camping area, the USFS has obtained RAC funding (approximately $80,000) to install two restroom facilities by the end of 2024. HTNF is also working on obtaining funding to make this area into a fee site, due to its increasing usage.

For the dispersed camping areas along Blue Lakes Road, the USFS is increasing their presence in the area through an additional recreational technician, as described above, as well as a volunteer campground host for the area. The host would be present in the summer, provide outreach to campers, and work with USFS staff to address any issues observed in the area. The USFS has advertised for a host for the area on Volunteers.gov (Eddy, 2022).

For both the Scotts Lake area and the dispersed camping areas along Blue Lakes Road, the USFS has obtained RAC funding for educational kiosks to better inform forest visitors of forest rules and regulations, fire prevention, and the importance of proper dispersed camping to protect valuable resources. The kiosks will be constructed to be resistant to vandalism and the harsh weather conditions of the area and will cost approximately $10,000 to be created and installed. Lahontan Water Board and AWG were identified as partners on the project and will have input on the messaging regarding water quality. These are expected to be installed by the end of 2024.

Another potential improvement identified in these areas would be the installation of a sanitary dump station for human waste. Currently the nearest sanitary dump stations are either in South Lake Tahoe or Carson Valley. The Hope Valley Campground, currently managed by a concessionaire, could be a site for a sanitary dump station, which would likely reduce dumping of greywater and blackwater. There is also a dump station in Markleeville that could be re-vamped and re-opened. Another potential location in the area could be the reinstallation of the sanitary dump station at Indian Creek Reservoir which was lost in the Tamarack Fire. Lahontan Water Board staff will continue to discuss this and funding opportunities with HTNF and other stakeholders.

Lahontan Water Board staff will continue to check in with HTNF staff and stakeholders on at least an annual basis on the progress at reducing impacts from camping and recreational use, to assess effectiveness and identify other potential projects and funding sources that may be needed.

6.9. Hydrological Modification

Generally, increasing the flows in the WFCR during the summer and fall, when flows are typically low, would help reduce pollutant concentrations, lower temperature, increase dissolved oxygen and reduce potential for eutrophic conditions. Therefore, this Vision Plan recognizes that projects that improve hydrologic function and increase flow in the

WFCR will help meet the Vision Plan's goal of standards attainment in the WFCR. Regulation of diversions is outside of the authority of the Lahontan Water Board. Lahontan Water Board staff will support restoration projects which benefit flows in the WFCR and hydrologic function of the river and its watershed. These include restoration projects such as those described in historical impacts, above. Additionally, this Vision Plan recognizes that water resources management activities which increase late season flows in the WFCR, such as late season releases from Lost Lakes, and potential for future water rights purchases to provide instream flows and protect habitat, will also benefit water quality in the WFCR.

The Lahontan Water Board will continue to monitor for Harmful Algal Blooms (HABs) in Red Lake. The Lahontan Water Board will continue to prioritize funding support for AWG's efforts to monitor for nutrients and HABs, a valued partnership with the Lahontan Water Board. The Lahontan Water Board will also request that CDFW prepare a report which evaluates potential ways to manage Red Lake to reduce HABs.

6.10. Climate Change, Fire, and Other Factors

This Plan recognizes that other factors can contribute to the water quality impairments in the WFCR and supports efforts to reduce those potential impacts. Identified factors for potential impacts are climate change, fire, invasive species, and development in the WFCR watershed.

The Lahontan Water Board has a Climate Change Mitigation and Adaption Action Plan (Scribe, 2021) which provides a framework for how Lahontan Water Board staff will develop, implement, and report on actions to adapt to and mitigate impacts from climate change. This Vision Plan includes actions that implement two of the Policy Statements from the Climate Change Mitigation and Adaption Action Plan, namely Protection of Wetlands, Floodplains and Headwaters, and Protection of Headwater Forests and Promoting Fire Resiliency.

The increase in potential for erosion, hydrologic impacts, and flooding due to climate change further emphasizes the need for the erosion control actions proposed in this Vision Plan and the benefits of restoration projects which improve hydrologic function. Lahontan Water Board staff will continue to require and encourage erosion control and support external restoration efforts by facilitating necessary permitting and supporting restoration projects.

Given the potential devastating impacts of wildfire on water quality in the WFCR watershed, this Vision Plan recognizes the water quality benefits of projects that reduce fuels and otherwise decrease the potential for wildfires. An example of this is the HTNF's WFCR Fuels Reduction, Aspen and Meadow Restoration Project, discussed in the Historical Impacts – Stream and Watershed Restoration section above. Other recent and ongoing efforts to reduce fire fuels and create a more resilient forest include the activities of the Forest Health Community Working Group

(http://www.alpinecountyca.gov/699/Forest-Health-Community-Working-Group) , and the recent construction of a new sawmill near Carson City on Washoe Tribe land. The Vision Plan also recognizes the water quality benefits of reducing the presence of invasive species in the watershed since these can increase fire risk and erosion potential.

Consistent with the CRASP, this Vision Plan recognizes that local governments and stakeholders should consider, and where most needed work to remove floodplains from development and establish conservation easements or designated open spaces. This recognition should be considered in the Lahontan Water Board's approach to regulating grazing lands, since economic impacts of the regulatory approach could otherwise result in changes to land uses which have a more severe impact on floodplains, hydrologic function, and water quality.

6.11. Information and Education

Information sharing and education will be key to the success of this Vision Plan. There are a number of ongoing activities, forums, and campaigns which support education about the health of the Carson River, and waters in Alpine County.

AWG actively engages in Outreach and Education projects in the WFCR watershed. AWG has quarterly meetings which are open to the public and sometimes recorded and available online. AWG also leads educational watershed tours, visits to restoration project sites, and publishes a monthly email newsletter.

CWSD is another organization that engages in educational activities to promote understanding and awareness of watershed resources and issues. CWSD works with partners to coordinate, plan, and fund outreach and education actions and activities.

The CRC Education Working Group is a subcommittee of the overall CRC and works cooperatively with CWSD and multiple partners on educational programs and projects that seek to educate citizens through action oriented, hands-on activities that engage and connect us to the watershed.

CWSD and the CRC host an annual Carson River Watershed Management forum which focuses on actions to protect water quality and the health of the Carson River Watershed.

CWSD and CRC have ongoing Watershed-Literacy Programs. In 2015 CWSD and CRC sponsored a Watershed-Wide Literacy Survey of Carson River Residents to determine Carson River Watershed residents' knowledge of and attitudes toward watershed health, knowledge of basic watershed concepts, and activities or behaviors that may impact the watershed's environment. CWSD and CRC plan to resurvey watershed residents in 2024.

CWSD and CRC developed a Watershed Literacy Action Plan in 2015. The Watershed Literacy Action Plan provides an action framework to moving target audiences along the

change continuum from awareness to action with the goal of obtaining actual environmental benefits, including water quality improvements, in the long-term. This plan will be updated based on 2024 survey results.

CWSD and CRC sponsored the development of a Marketing and Communications Plan for the Carson River Watershed 2016. This marketing and communications plan is a survey analysis and planning strategy used by the CRC and CWSD to inform watershed literacy programs and develop more effective outreach.

CWSD and CRC have an ongoing “I am Carson River Watershed” Watershed Moments campaign, which includes short public service announcements which air on local television and online. Each public service announcement discusses key nonpoint source issues and asks residents to take actions to reduce nonpoint source pollution. The public service announcements are Recreate Responsibly, Bag It, Use a Car Wash, Recycle Your Motor Oil, Pitch In, Make Your Yard a Sponge, and Curb Your Chemical Use. More information about that campaign is available at https://iamcarsonriver.org/

CWSD and AWG both have expressed that a critical step in public awareness is working with Caltrans to have signs posted along highways when entering and leaving the Carson River watershed.

The Lahontan Water Board’s reports evaluating progress on implementation of the Vision Plan will help inform stakeholders and other parties about progress. This information will also be posted on the Lahontan Water Board’s and/or AWG’s WFCR Vision Plan website. A comprehensive 5-year review of the plan will occur in 2029 and 2034. This will be an opportunity where the Lahontan Water Board, agencies, and stakeholders can share monitoring and study results, progress implementation of the Vision Plan, and gather information and feedback to inform adaptive management of the implementation of the Vision Plan.

NRCS provides information to local agricultural producers about practices to improve water quality and funding opportunities.

The USFS provides education to users of the forest on how they can lessen their impacts. The HTNF also identified in its Travel Analysis Process (TAP) document several educational activities that could help reduce impacts from roads and vehicular use in the HTNF. These include increased signage educating users about USFS rules and potential impacts to water quality, as well as increased USFS field presence, as discussed in the Recreation and Camping section, above.

Lahontan Water Board staff will continue to participate and support these activities and forums and education projects to improve knowledge of potential impacts and how they can be reduced. Table 6-6 presents key educational topics and partners for those topics.

Table 6-6 Key Educational Topics

Sources	Key Educational Topics	Partners
All	Water quality and impacts of pollutants of concern on the WFCR	AWG CWSD
Recreation and Camping	How recreational activities, fire and management of human wastes can be done in a way that minimizes their potential to impact water quality. (including the location of the nearest locations for proper disposal).	HTNF AWG, CWSD, Friends of Hope Valley, Alpine Trails Association, Alpine County Chamber of Commerce
Roads	How vehicular impacts on water quality can be reduced. Signage on highways when entering and leaving the watershed	HTNF, Caltrans AWG, Alpine County, CWSD
OWTS	How septic tanks can be managed to minimize their potential to contribute to water quality degradation.	Alpine County, AWG, CWSD
Grazing	How soil health, off channel stock watering, reduction of river access and other management practices can improve land health, cattle health, and water quality.	NRCS, UCCE, AWG, CWSD
All	Volunteer Opportunities	AWG, CWSD, Friends of Hope Valley, Alpine Trails Association
All	The water quality, habitat, flood attenuation and groundwater recharge benefits of continuing to maintain and protect Agricultural and Open Space land uses in the floodplain.	CRC, CWSD, AWG
All	Potential sources of funding and technical assistance	NRCS, AWG, CWSD, Sierra Nevada Conservancy

7. Stakeholder Engagement

There has been considerable stakeholder engagement in the development of this Vision Plan. Alpine Watershed Group hosted, and Lahontan Water Board staff presented at, the following Vision Plan Stakeholder Forums:

- September 10, 2019: AWG Meeting with Lahontan Water Board Presentation on West Fork Carson River Vision Project
- September 8, 2020: Forum on Roads & Water Quality
- November 10, 2020: Forum on Restoration Projects in the West Fork Carson River Watershed
- March 9, 2021: Forum on Recreation: Trends, Impacts, and Solutions for the West Fork Carson Watershed
- March 8, 2022: Forum on Ranching for Improved Water Quality

Videos of the AWG forums are available at https://www.alpinewatershedgroup.org/west-fork-carson-river-vision-proje

In October 2022, Lahontan Water Board staff and AWG hosted a tour to discuss grazing best management practices at Ace Hereford Ranch, the site of the Rivers and Ranches project. Lahontan Water Board staff also met with staff from the HTNF, AWG, and CWSD in the development of this Vision Plan.

In August 2023, Lahontan Water Board staff gave a presentation on the draft Vision Plan to the Alpine County Board of Supervisors and discussed the Supervisors' concerns about the draft Plan.

Lahontan Water Board staff circulated a draft of the Vision Plan to stakeholders for a 40-day review in July 2023 and met with key stakeholders to discuss the Vision Plan. Staff made appropriate changes in response to the comments received and prepared written responses to the comments received.

Lahontan Water Board staff will look at opportunities to make this Vision Plan more of a living document to incorporate new information and adaptive management. This can be done through the utilization of electronic means to provide regular updates on the status of projects and water quality through tools such as the GIS web viewer and partner portal, currently being developed by CWSD.

Lahontan Water Board staff will continue to engage with stakeholders during implementation at forums and opportunities discussed in the Information and Education section. Stakeholders can always provide feedback to Board Staff, or at any Lahontan Water Board meeting. Stakeholders will also have an opportunity to discuss WFCR water quality issues during the comprehensive 5-year reviews of the Vision Plan in 2029 and 2034.

8. Monitoring

Ongoing monitoring and proposed water quality monitoring programs and studies in the WFCR are summarized in Table 8-1. This table can also be considered an update/addendum to Table 7.2.12-2 in the CRASP (CWSD, 2017).

A goal of monitoring in the WFCR should be to provide enough information to answer the following questions:

1) Are WQOs being met in the WFCR?
2) Are concentrations and pollutant loads in the WFCR increasing or decreasing?
3) Are the actions to improve water quality in the watershed effective?
4) What should be the focus of any future actions to improve water quality?

Table 8-1 WFCR Water Quality Projects/Studies Underway/Proposed

Title/Program	Locations	Timing and Frequency	Lead Organization & Partners	Description
Surface Water Ambient Monitoring Program (SWAMP)	Downstream of Willow Creek, Woodfords, Paynesville	Quarterly 2010-present	Lahontan Water Board	Routine water quality monitoring
Harmful Algal Bloom Studies	Red Lake, other waterbodies in the WFCR watershed as needed	Monthly June-Oct 2019 – present	Lahontan Water Board, AWG, CDFW	Routine water quality monitoring, nutrients, pigments, and cyanobacteria
NDEP Ambient Monitoring	Woodfords, Paynesville	Approx. quarterly 1966-present	Nevada Division of Environmental Protection (NDEP)	Routine water quality monitoring
AWG Upper Carson River Monitoring	Pickett's Junction, Woodfords, Paynesville, Blue Lakes Road	Approx. quarterly 2004-present	Alpine Watershed Group	Routine water quality monitoring
STPUD Alpine County Surface Water Monitoring	Downstream of Willow Creek, Woodfords, Paynesville	Monthly, 1980-present	South Tahoe Public Utility District	Routine water quality monitoring
OWTS Impacts	Multiple sites between Willow Creek and state line	Proposed weekly in summer of 2025 and 2026	Lahontan Water Board, Alpine County	

There is a significant amount of monitoring on the WFCR by the existing programs listed in Table 8-1 above. Also proposed is a study on potential OWTS impacts to the WFCR, discussed below. These monitoring programs should generate data adequate to answer the monitoring questions listed above. To better meet that goal, it would be beneficial to

coordinate these activities and resources, to the extent practicable, to get better temporal coverage and increase consistency. Therefore, coordinating water quality monitoring will be discussed with the individual monitoring entities on an annual basis.

Ongoing monitoring for all programs should include all the parameters associated with the impairments to the WFCR – turbidity, phosphorus, all nitrogen species, TSS, iron, sulfates, and indicator bacteria. Ongoing monitoring should also include both TSS and, if possible, Suspended Sediment Concentration (SSC). These parameters are currently not part of SWAMP monitoring in the WFCR but at least TSS will be added in the near future. TSS is useful for comparing to historic data and readily affordable to test at approximately $30 per sample. SSC is recommended by USGS as an improved measure of sediment concentrations and loads but is less affordable at approximately $300 per sample. Data for TSS (and if feasible SSC) can be used to refine the relationship of these measurements to turbidity, and for characterizing sediment loads and load reductions.

Ongoing monitoring should all be performed under an approved Quality Assurance Project Plan (QAPP) or equivalent so that data are of known and documented quality. All California data should be entered into the Environmental Data Exchange Network (CEDEN) database
CEDEN - California Environmental Data Exchange Network

The NDEP monitoring is done under a QAPP and entered into a readily-accessible database: https://ndep.nv.gov/water/rivers-streams-lakes/water-quality-monitoring/water-quality-data-warehouse-viewer

SWAMP, AWG, and harmful algal bloom monitoring are done under QAPPs and entered into CEDEN. The data from STPUD surface water monitoring, while a valuable data source, was available in multiple spreadsheet formats, with less quality assurance program documentation than would be available under a full QAPP. The compilation of data from disparate data sets was a significant task in the preparation of this Vision Plan. Having the data that is generated in the future from STPUD and any other sources integrated into CEDEN would make future evaluations of data to assess water quality improvements more feasible with limited resources. Having the data collected under an approved QAPP and in CEDEN will also improve understanding of data quality and allow it to be assessed in the Integrated Report, since having a QAPP or equivalent is required for its use as a primary line of evidence under the State's Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (SWRCB, 2015).

Preparing QAPPs and putting the data that is generated in the future into CEDEN will be a significant expense for programs like the STPUD Surface Water Monitoring. However, this will be worth an investment or redirection of monitoring resources, since these changes will make these valuable data and their quality more understandable and readily available to the public, the Lahontan Water Board, and others. Therefore, the Lahontan Water Board will work with STPUD so that data are collected under a QAPP,

that is reviewed and approved by the Lahontan Water Board and data generated under the approved QAPP is entered into CEDEN, starting within two years, or by October 2025. This should allow adequate time for the development of a QAPP and any needed changes to the current STPUD data infrastructure.

Also, if possible, to better characterize sediment loads, a turbidity meter should be added to the USGS flow monitoring site at Woodfords. This would allow continuous estimation of sediment and phosphorous loads and help better capture key runoff events. A flow gauge in the WFCR at state line would also be beneficial for determining pollutant loads entering Nevada and assessing progress reducing pollutant loads.

To help identify potential OWTS impacts, the Lahontan Water Board will conduct and/or support monitoring in the WFCR, downstream from OWTS areas. This monitoring will occur in times when the OWTS are most likely to impact the river – in the summer when cabins are occupied and flows in the river are lower, at least two times per month until fall. The monitoring should include anthropogenic substances such as sucralose and caffeine which can provide an indication of OWTS impacts in receiving waters, as well as nitrates, fecal indicator bacteria, and salt. This monitoring should occur in the summers of 2025 and 2026 – so results and follow-up monitoring can be concluded well before the 2028 renewal of the OWTS Policy. Lahontan Water Board staff will seek monitoring funds from the SWAMP and TMDL program as well as other sources to support this monitoring. Lahontan Water Board staff will coordinate with Alpine County on the draft monitoring design.

9. Evaluation and Adaptive Management

This section describes how the Lahontan Board will evaluate progress at meeting goals and objectives and junctures at which it will consider adaptation of the Vision Plan approaches.

Development and implementation of the Vision Plan does not eliminate the requirement to develop TMDLs. If water quality objectives for the constituents of concern are not attained within 10 years, the Water Board will consider prioritization of completion of TMDLs for the constituents causing the remaining impairments. At a minimum, the Lahontan Water Board will evaluate progress in 2029, after five years, which is halfway to the Vision Plan attainment date, and in 2034, after 10 years, which is the target date for WQO attainment. This timeline will allow the data and analysis used in the Vision Plan assessments to inform the subsequent 2032 and 2038 303(d) Lists/Integrated Reports.

The Lahontan Water Board will need to collect information about sources and actions being implemented from stakeholders in each source category. The collection of water quality and implementation information under this Vision Plan will help inform the Lahontan Water Board's assessment of progress, consideration of appropriate actions and regulatory mechanisms, and consideration of potential changes to the Basin Plan to

establish TMDLs or other requirements, or to revise water quality standards. CWSD is currently developing a web access system capable of viewing, editing, and tracking CRASP projects. It may be possible to utilize that system to help facilitate the Lahontan Water Board's collection of information and tracking of Vision Plan projects and to share that information with stakeholders and the public. Therefore, if needed, funding for the CWSD system is identified as a potential project to implement this Vision Plan.

The Lahontan Water Board will annually evaluate and report on progress of implementation of this Vision Plan. This annual progress can also be discussed at forums such as the CWSD's annual Carson River Watershed Forum, Alpine County Board of Supervisors meetings, and AWG meetings, where the Board can gather more information and feedback to inform adaptive management. Regularly evaluating the status of implementation actions alongside water quality data will determine the level of progress towards achieving the Vision Plan goals and help the Board determine if additional actions are needed to meet water quality objectives, as part of the adaptive management approach.

Key questions that for these evaluations are:

- Is water quality improving over time (with consideration of hydrologic and weather conditions)?
- Has progress been made to implement the necessary BMPs and other actions described in this Vision Plan?
- Are the current water quality objectives providing an appropriate level of protection or should they be revised to be more attainable or protective?

Criteria for identifying if pollutant reductions are being attained over time will be comparison of the monitoring data to the water quality objectives, and comparison of pollutant loads to the loading reductions listed in Section 4. Section 10 contains a summary of key milestones for implementation actions for the Vision Plan that can be used to determine if adequate progress is being made on implementation. Should implementation actions not occur and/or those actions not achieve the expected reductions in contaminant concentrations, the Lahontan Water Board can reevaluate the regulatory approach to one or more parties/sources as discussed in Section 6.1, potentially implementing alternative approaches listed in Table 6-5.

The Lahontan Water Board could, also as part of its evaluation of progress, decide to consider revising the water quality objectives for one or more constituents in the WFCR. The water quality objectives would still need to be protective of all beneficial uses, but could potentially be adjusted, via a Basin Plan Amendment, to reflect the consideration of updated information the Lahontan Water Board will have about what criteria are reasonably protective of beneficial uses in the WFCR. A decision on pursuing changing water quality objectives would be made after the 10-year target date for attainment, when there will be sufficiently more data and information collected on WFCR water quality. A decision on pursuing changing water quality objectives could also be made by

the Lahontan Water Board during one of its triennial reviews of Basin Plan water quality standards.

10. Summary of Implementation, Studies, and Adaptive Management Schedule

Table 10-1 Summarizes the schedule for implementation actions and key milestones. Not all potential future projects from Table 6-4 are included in Table 10-1 since they are not well defined and scheduled yet.

Table 10-1 Schedule for Implementation, Studies, and Adaptive Management

Source Category	Implementation Action	Vision Plan Section	Target Start Date	Implementing Party	Target Milestone Date
All	Annual evaluation of Vision Plan Implementation	9.	2024	Lahontan Water Board	Annually
All	Geomorphologic Model and Prioritization Plan	6.4.2	2024	AWG, CWSD	2025 – completion of modeling and prioritization
Historic Impacts	Stream Restoration on the WFCR	6.4.2 also Appendix A	2025	AWG, CWSD, American Rivers, Friends of Hope Valley	2033 – completion of 2-3 additional restoration projects identified as priority
Roads	Road erosion source survey	6.5.2	2023	Caltrans	2026 complete study
Roads	Salt/abrasives alternatives/BMP investigation	6.5.2	2023	Caltrans	2026 complete investigation
Roads	Road source survey	6.5.2	2023	Alpine County	2026 complete study

Source Category	Implementation Action	Vision Plan Section	Target Start Date	Implementing Party	Target Milestone Date
Roads	Road source survey	6.5.2	2023	HTNF	2026 complete study
Roads	Road/Culvert Restoration	6.5.2	2023	Caltrans Alpine County USFS-HTNF	2036 projects completed
Roads	Caltrans Permit – Add WFCR actions/studies	6.5.2	2025	SWRCB LWB Caltrans	2027 Caltrans Permit Update
Grazing/agriculture	Development of ranch water quality management plans	6.7.2 also Appendix B	2023	Ranchers, UCCE, NRCS STPUD	End of 2025
Grazing/ agriculture	CRC-APWG meetings and BMP white paper	6.11	2021	CRC, CWSD	2024 Agricultural BMPs white paper, outreach to ranchers
Grazing/ agriculture	Analysis of potential effects of recycled wastewater on the WFCR	6.7.2	2023	STPUD	End of 2025
OWTS	OWTS targeted WFCR monitoring	6.6	2025	LWB	2029 – completed monitoring and evaluation
OWTS	WDRs for Desolation Hotel Hope Valley	6.6	2026	LWB	2028

Source Category	Implementation Action	Vision Plan Section	Target Start Date	Implementing Party	Target Milestone Date
Recreation and camping	Seasonal volunteer at Hope Valley Campground	6.8.2	2023	HTNF	2023 and annually
Recreation and camping	Seasonal Recreation Technician	6.8.2	2024	HTNF	Annually May-Oct Starting in 2024
Recreation and camping	Scotts Lake restroom installation	6.8.2	2023	HTNF	End of 2024
Recreation and camping	Kiosk installations in Scotts Lake and Faith Valley	6.8.2	2023	HTNF	End of 2024
Recreation and camping	Development of fee area at Scotts Lake	6.8.2	TBD	HTNF	TBD
All (Monitoring)	STPUD Surface Water Monitoring QAPP approved, new data generated under the QAPP entered into CEDEN	8	2023	STPUD, LWB	October 2025
All (Education)	Educational Programs	6.11	Ongoing	AWG, CWSD, HTNF, Caltrans	Ongoing
All	LWB review of progress	9	2029	Lahontan Water Board	2028 Board meeting workshop. Consideration of adaptive management of approach(es).

Source Category	Implementation Action	Vision Plan Section	Target Start Date	Implementing Party	Target Milestone Date
All	LWB Review – targeted WQO attainment	9	2034	Lahontan Water Board	2033 Lahontan Water Board meeting – assessment of WQOs attainment. Consideration of adaptive management of approach(es).

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Appendix A: River and Channel Restoration and Costs

River restoration is the process of modifying or rehabilitating the rivers. There are many techniques that can be used that support ecosystem function and improve water quality.

Streambank Stabilization

Streambank stabilization is a strategy used to protect or restore riverbanks. It can be defined as “a vegetative, structural or combination treatment of streams designed to stabilize the stream and reduce erosion” (Department of Public Works, 2008).

Biotechnical Streambank Restoration

One type of streambank restoration that has been recommended for West Fork Carson area is biotechnical streambank protection (MACTEC et al., 2004). The USDA defines biotechnical streambank restoration as infrastructure that “utilizes living plant materials to reinforce soil and stabilize slopes” (Wells, 2002). Some components that have specifically been recommended are “willow wattling, brush mattressing, brush layering or revetment, placement of fascines, and brush packing” (MACTEC et al., 2004). Benefits of biotechnical streambank restoration include stabilized streambanks, reduced bank erosion, improved water quality, improved terrestrial and aquatic habitat, improved soil quality, and colder water temperature (Wells, 2002).

Bank Strengthening by Vegetation Restoration

One type of biotechnical streambank restoration is bank strengthening by vegetation restoration. Bank strengthening by restoration of wet meadow vegetation has been shown to decrease stream migration by 84% and decrease failure numbers and erodibility by 90% (Micheli and Kirchner 2002, as cited in Lake Tahoe TMDL, 2008). In addition, BSTEM modeling has estimated this method to reduce sediment load by 52.7% (Lake Tahoe TMDL, 2008). Bank strengthening by restoration of woody riparian vegetation showed a reduction in sediment load of 44 to 60% when compared to agricultural land (Micheli et al. 2004, as cited in Lake Tahoe TMDL, 2008). This strategy also includes ecological benefits, such as providing terrestrial and aquatic habitat (Wells, 2002). On average, the 20-year cost per meter of bank strengthening is $336 per meter (Lake Tahoe TMDL, 2008).

Selected Placement of Woody Debris

Selected placement of woody debris jams has been recommended as a strategy for the West Fork Carson area (MACTEC et al., 2004). Large woody debris can be defined as “fallen trees, logs and branches that are at least four inches wide and six feet long” (Rhea, 2021). Large woody debris may have many benefits including increased floodplain connectivity, slower water flow, decreased erosion and sediment, and habitat

creation (Rhea, 2021). They can also promote bank stabilization (MACTEC et al., 2004). Salvage logging can be used and costs about $300 per log (2004 dollars) (MACTEC et al., 2004).

Channel Reconstruction

Channel Reconstruction can be defined as “restoring the natural geomorphic characteristics of streambank through construction” (Lake Tahoe TMDL, 2008). It has been shown to be 20 to 34% effective at reducing sediment in the waterway (Stubblefield et. Al 2005, as cited in Lake Tahoe TMDL, 2008). On average, for small to moderate streams, the 20-year cost of channel reconstruction is $2,718 per meter. For larger streams, the cost can be more. For example, in the Upper Truckee River, the 20-year cost of channel reconstruction is $11,882 per meter.

Bank Lowering

Bank lowering by either floodplain excavation or angle reduction can be effective at reducing sediment load to waterways (Lake Tahoe TMDL, 2008). Bank lowering and floodplain excavation has been shown to reduce sediment load by 23-93% (Phillips 1989, as cited in Lake Tahoe TMDL, 2008). Bank lowering and angle reduction has been shown to reduce the sediment load by 8-93% (Van der Lee et al. 2004, as cited in Lake Tahoe TMDL, 2008). Bank lowering and floodplain excavation costs about $1,601 per meter for 20 years. For a large stream the 20-year cost can be about $6,997 per meter. The 20-year cost of bank lowering and angle reduction, for small to moderate streams, is about $268 per meter. For a larger stream, the 20-year cost is about $1,170 (2008 dollars) (Lake Tahoe TMDL, 2008).

Stone Toe Bank Protection

Structural streambank stabilization uses permanent structures to stabilize streambanks (“Structural Streambank”, 1992). One example is stone toe bank protection. In this strategy, stone is placed at the toe of the streambank, and overtime, the streambank stabilizes (“Stone Toe”, n.d.) Bank protection by stone toe can reduce sediment load by up to 100% (Lake Tahoe TMDL, 2008). The 20-year cost of bank toe protection with stone is $700 per meter (Lake Tahoe TMDL, 2008).

Culvert Removal or Replacement

Replacing or removing outdated or undersized culverts can improve water quality (Moore, 2017). Badly designed culverts can cause erosion and bank slumping. This can cause increased sediment in waterways (Moore, 2017). The 20-year cost per meter of a culvert removal or replacement is $476 per meter (2008 dollars) (Lake Tahoe TMDL, 2008). For a bigger stream, such as the Upper Truckee, the 20-year cost is $2,079 (Lake Tahoe TMDL, 2008).

Beaver Dams and Beaver Dam Analogues

An additional set of practices is the encouragement of beaver dams and/or the construction of beaver dam analogues. These structures can impound water and retain sediment, raising water tables, reconnecting channels to expanded floodplains, increasing summer, expanding wetlands and thus improving water quality (Pollock et al., 2023). An in-depth discussion of beaver dams and beaver dam analogs is provided by Pollock et al. (2023), available at: https://www.fws.gov/media/beaver-restoration-guidebook.

Effects of Combined Approaches

It is common for multiple strategies to be used when restoring river channels. Here are some and the effects of using these strategies. In the Tahoe TMDL, BSTEM modeling was used to calculate sediment and phosphorus reductions for Blackwood Creek, Upper Truckee River, Ward Creek, General Creek, and Third Creek. From there cost per pollutant reduction was also calculated. The load reduction and average cost reduction is an average of all 6 streams. Both pollutant reduction times and costs were assumed over a 20-year period.

Channel Restoration

For channel restoration, a river channel was restored by “modifying the existing unstable stream’s planform, increasing its length and sinuosity, and decreased slope” (Lake Tahoe TMDL, 2008). This reduced sediment by 44.1%. The cost to reduce 1 metric ton of sediment was $97,528. It also reduced phosphorus by 44.2%. The cost per metric ton of phosphorus reduced was $641,633,554 (Lake Tahoe TMDL, 2008). This also has been shown to increase plant and animal biodiversity, including in the land that surrounds the stream (Oehrli et al., 2013).

Bank Protection

For bank protection, an unstable streambank was modified “without changes to the channel planform, length, sinuosity, or slope” ... “reaches might also have had grade control installed along with bank treatments” (Lake Tahoe TMDL, 2008). This reduced fine sediment by 82.3%. The cost per metric ton of fine sediment reduced was $5,050. Phosphorus was also reduced by 82.3%. The cost per metric ton of phosphorus reduced was $110,364,583 (Lake Tahoe TMDL, 2008).

Mixed-Treatment

In the mixed treatment method, some areas of a river use channel restoration, others use bank protection, and some used both (Lake Tahoe TMDL, 2008). This reduced fine sediment by 68.1%. The cost per metric ton of fine sediment reduced was $5,140. It

also reduced the phosphorus load by 68.1%. The cost per metric ton of total phosphorus reduced was $33,816,010 (Lake Tahoe TMDL, 2008).

Potential Sources of Funding

There are many potential sources of funding that can help finance river restoration in the West Fork Carson River (The Environmental Protection Agency, 2022). These include the Bella Vista Ecosystem Restoration Grants, WaterSMART: Basin Studies, California Landowner, Incentive Program (LIP), Proposition Funds allocated by the California Wildlife Conservation Board, California Integrated Regional Water Management Implementation Grant Program, California Proposition 1 Water Quality, Supply, and Infrastructure Improvement, Act of 2014, California Floodway Corridor Program (FCP) (Prop 1E), California Clean Water Act (CWA) Section 319 Nonpoint Source Management Grant, California Forest Conservation Program, California Riparian Habitat Conservation Program, California Habitat Enhancement and Restoration Program, Fish and Wildlife Coordination Act Program, Mary A. Crocker Trust Environment Grants, The California Wellness Foundation Grants, and the WaterSMART Cooperative Watershed Management Program for Implementation of Watershed Management Projects (Phase II) (The Environmental Protection Agency, 2022).

Conclusion

In conclusion, there are many river restoration strategies that improve water quality and have other ecological benefits. Also, there are many resources to fund these strategies.

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Appendix B: Grazing and Ranching Management Practices and Costs

There are several practices that can be used to reduce nonpoint source pollution to the WFCR from grazing, including fencing off riparian areas, streambank restoration, alternative water sources, heavy use protection areas, manure management, rotational grazing, and other sources of shade. These also improve water and soil retention, soil health, and forage quality in pasturelands.

Stream Bank Fencing

Table B-1 Streambank Fencing Benefits and Costs

Environmental Benefits	Livestock Benefits	Potential Challenges	Estimated Costs
-decreased fecal matter in waterways -decreased nitrogen and phosphorus in waterways -less erosion of banks and decreased sediment deposition in waterways -less erosion and decreased loss of topsoil, organic matter in pastureland -increased vegetation cover and standing litter -decreased bare soil and soil bulk density -increased biodiversity in fenced areas	-decreased risk of injury -decreased risk of disease -healthier pastureland for livestock	-materials and labor cost -general maintenance - need for an alternate water source -potential initial loss of forage -potential entanglement	-Barbed or Smooth Wire: $5.94/ft -Barbed or Smooth Wire (Difficult Installation): $8.20/ft -Woven Wire: $7.43/ft -Electric: $3.31/ft -Safety or Heavy Use: $10.33/ft -Organic Fence: $6.48/ft

Stream bank fencing is a technique used to reduce the effects of grazing and ranching on waterways. Fences are built along the stream as far away from the stream as possible to promote a buffer between the grazed land and waterways (Davis et al., 2022). Streambank fencing is a commonly used strategy in grazing and ranching management, and its effectiveness has been researched.

Benefits:

Water Quality and Riparian Health:

Fencing off riparian areas on grazing and ranching lands is one of the most effective ways to improve and maintain water quality (Davis et al., 2022). One of the ways that this strategy can improve water quality is to prevent livestock from depositing feces in the waterways (Muirhead, 2019). In fact, riparian fencing was found to be on average 62% effective in reducing fecal indicator bacteria (Muirhead, 2019). It was also found to be effective at reducing the nutrient load of the waterways (Galeone et al., 2016). In a study by United States Geological Survey, areas in which stream bank fencing was installed, had an annual nitrogen decrease of 27% and an annual phosphorus decrease of 33% (Galeone et al., 2016). Another effect of fencing off the riparian zone is the prevention of streambed erosion and sediment deposition (Galeone, 2000). In one study, after streambank fencing was installed, suspended sediment was found to decrease as much as 26% during low flow periods and as much as 54% during storm flow periods.

This reduction in erosion was also shown in land beyond the riparian buffer (Galeone, 2000). This is important because erosion in the pastureland can lead to loss of organic topsoil, organic material, and nitrogen (Brackenrich & Duiker, 2018). All of this is important for healthy forage which will keep livestock fed and their environment healthy. In addition, erosion in the pastureland can also make its way downstream to pollute the water (Brackenrich & Duiker, 2018). In other words, maintaining a healthy riparian buffer prevents erosion and sediment deposition into the stream from the streambed and from the pastureland. Another study, Miller et al. (2010), found that “Rangeland health was improved (health score increase from 55 to 72%); vegetation cover (13-21%) and standing litter (38-742%) were increased; and bare soil (72-93%) and soil bulk density (6-8%) were decreased under cattle exclusion, indicating an improvement in environmental quality from streambank fencing.” A health score is defined as how similar five variables (ecological status, community structure, litter, site stability, and noxious weeds) are to the reference community (Miller et al., 2010). The evidence shows how streambank fencing can make the entire pasture healthier.

Streambank fencing is important to the animal biodiversity of the area. Fenced areas have 88% more species than unfenced areas do (Giuliano, 2006). For streambank fencing specifically, a study by the United States Geological Survey found an increase of 30% in benthic-macroinvertebrate taxa in the streams (Galeone, 2000). Additionally, good riparian fencing helps exclude cattle from most of the waterways, while still allowing for wildlife crossing (Paige, 2012). Overall, stream bank fencing is an effective choice to mitigate the environmental impacts of grazing and ranching and to promote healthy habitat for conservation.

Livestock Health:

Apart from benefiting ecosystem health, streambank fencing also keeps livestock safe and healthy. Stream bank fencing helps prevent some cattle diseases, such as leptospirosis, by limiting access to waterborne bacteria (Davis et al., 2022). In addition, riparian fencing reduces the risk of livestock injury. This is because of the risk livestock have of getting stuck in streams. That risk increases when livestock are around unstable streambanks. The more time livestock spend around streams, the more unstable the banks tend to become due to increased erosion (Davis et al., 2022). The more unstable banks become, the greater risk of livestock injury is presented. In terms of livestock well-being, streambank fencing is an effective prevention measure.

Associated Costs:

There is the risk of livestock or other animal entanglement (Paige, 2012). This means that fences may need to be designed with visibility in mind and checked regularly. This could add to the time and resources needed, making the initial cost higher than expected (Paige, 2012). In addition, loss of forage will have to be compensated for (Zeckoski et al., 2007). Distributing waterers is one way to do this that could add to the initial cost (Zeckoski et al., 2007). Another potential cost is the need to replace the water sources for the livestock multiple ways to do this (Dressing, 2003). One example is to install troughs. Replacing and maintaining the alternate water source adds to the initial cost (Dressing, 2003). If a stream needs to be crossed, then a stream crossing must be implemented as well.

A barbed or smooth wire fence costs about $5.94/foot (“California Practice”, 2023). Barbed or smooth wire fence with difficult installation costs about $8.20/foot. Electric fencing costs about $3.31/foot. Woven Wire is about $7.43/foot. Safety or Heavy Use fencing costs about $10.33/foot. Organic Fencing Costs about $6.48/foot. All these estimates include cost of materials and labor (“California Practice”, 2023).

Alternate Water Sources

Table B-2 Alternative Water Sources Benefits and Cost

Environmental Benefits	Livestock Benefits	Potential Challenges	Estimated Costs
-less erosion in any one area especially close to waterways -less direct fecal matter deposition in waterways	-cleaner water for livestock -livestock gain weight faster -less risk than drinking directly from stream	-costs of alternate water sources -water transportation -labor	-tire trough: $3.00/gal -frost free trough: $40.57/gal -above ground storage tank: $2.36/gal -below ground storage tank: $3.21/gal -stock trough: $8.52/gal -livestock pipeline (PVC): $3.96/ft -livestock pipeline (PVC, difficult to install): $6.47/ft -livestock pipeline (HDPE): $4.30/ft -Barbed or Smooth Wire: $5.94/ft

Another management practice which can be implemented is providing alternate water sources, so cattle do not need to access the river to drink. Alternative water sources must be properly planned for the wellbeing of the livestock and environment. There are many alternative ways to give livestock water, and it is common for a combination of methods to be implemented.

Troughs

A trough is one example of a way for animals to access alternative water. They allow livestock to have water away from streams, in which the quality can be controlled. Willms et. al (2002) found that cattle would choose clean water in a trough over manure contaminated water in a pond or trough. In addition, cows that had access to clean water gained 23% more weight (Willms et. al, 2002). Water from the West Fork Carson River is relatively clean. Troughs can be placed in strategic locations, cleaned, and some can be moved. West Fork Carson River water is a relatively clean water source that can be used for livestock.

Controlled Direct Access to Stream

Controlled direct access is another way to limit livestock access to riparian areas. Livestock can either drink at a stream access point or a stream crossing (Davis et. al, 2022). This can be done in a couple of ways. One way is to have a gate somewhere along streambank fencing. Another way is to have a floating fence and maybe a ramp at the access point. The floating fence can be three walls creating an indent in the water way or it be a two-wall stream crossing. Although limiting livestock access to certain points is a good way to reduce the negative environmental impacts, there is still erosion and pollutant deposition happening at these points. Therefore, it is important to stabilize these areas to reduce the damage (Davis et. al, 2022).

Other Watering Alternatives

Other watering alternatives for livestock include: a pipeline, a pond, or a well. A combination of these practices may be and are often used. Having different sources of water on a pasture, especially ones that move around, can help any one area from being overgrazed (Gould, 2012). This decreases erosion which can cause excessive sediment and nutrients from entering the waterways. In addition, this strategy helps spread urine and manure out, decreasing mud and mudholes. This helps limit livestock contact with harmful pathogens (Gould, 2012). Overall, alternative water sources are a beneficial management practice for the environment and the livestock.

Associated Costs

There will be costs to implement alternative watering structures (“California Practice”, 2023). Since water must be transported from either a well or another source, such as the stream, there will also be the cost of water transportation. This might be from a pipeline. One example of a pipeline that may be used is one made of PVC, which would cost about $3.96/ foot. If difficult to install, PVC pipe could cost about $6.47/ foot. Water containers may be necessary. A tire trough costs about $3.00/ gallon. A frost-free trough costs about $40.57/ gallon. An above ground storage tank costs about $2.36/ gallon. A below ground storage tank costs about $3.21/ gallon. A stock trough costs about $8.52/ gallon. Fence costs for stream access vary, but barbed or smooth wire can be used and costs about $5.94/ foot. All these estimates include cost of materials and labor (“California Practice”, 2023).

Heavy Use Protection Areas

Table B-3 Heavy Use Protection Areas Benefits and Costs

Environmental Benefits	Livestock Benefits	Potential Challenges	Estimated Costs
-reduce erosion -decrease sediment deposition in waterways -decreased nutrients to waterways	-livestock exposed to less pathogen heavy mud -livestock tend to be more comfortable meaning they gain more weight -dairy cattle are also more comfortable and produce more milk	-materials -labor -maintenance cost	-reinforced concrete: $11.22/ sq ft -non-reinforced concrete with sand or gravel foundation: $6.49/ sq ft -rock/gravel: $1.81/ sq ft -rock/ gravel on geotextile: $1.98/ sq ft -rock/ gravel-geocell on geotextile: $4.89/ sq ft -sand-topped rock/ gravel on geotextile: $2.58/ sq ft

The NRCS defines heavy use protection areas as infrastructure, such as concrete, that is “used to stabilize a ground surface that is frequently and intensively used by people, animals, or vehicles” (United States, 2014). Areas frequently used by livestock tend to have very high levels of erosion that can make its way down into the waterway (United States, 2014). Heavy Use Protection areas reduce that erosion, thereby adding to the improvement of overall water quality. Also, urine and manure can make its way to pollute waterways (Briggs & Lemenager, 2020). A study, using heavy use protection pad in heavy use areas of poultry farms, found that heavy use protection pads prevented most nutrients from entering the waterways (Ozbay et al., 2021). Heavy use protection areas are a good way of protecting water quality.

In addition to protecting waterways, heavy use protection areas help keep livestock healthy. Areas frequented by livestock tend to turn into mud or “a combination of soil, manure, and urine” (Briggs & Lemenager, 2020). This mud has a higher concentration of pathogens, which can make livestock sick. This uncomfortable, potentially dangerous environment can lead to lower productivity in livestock. For example, cows tend to have lower body weight and produce less milk when exposed to a muddy environment (Briggs & Lemenager, 2020).

Potential Costs

There are extra initial costs that go into constructing heavy use protection areas. In addition, their efficacy was found to decrease with age (Ozbay et al., 2021). This means maintenance is necessary and could add to the cost. A reinforced concrete heavy use protection area costs about $11.22/square foot (“California Practice”, 2023). Non-

reinforced concrete with sand or gravel foundation costs about $6.49/ square foot. Rock and gravel costs about $1.81/square foot. Rock and gravel on geotextile cost about $4.89/square foot. Sand-topped rock/gravel on geotextile costs about $2.58/square foot ("California Practice", 2023). Although there could be large initial costs with heavy use protection areas, farmers found that they spent less time cleaning livestock after heavy use protection areas were implemented (VanDevender & Pennington, n.d.). All these estimates include cost of materials and labor ("California Practice", 2023).

Manure Management

Table B-4 Manure Management Benefits and Costs

Environmental Benefits	Livestock Benefits	Potential Challenges	Estimated Costs
-less fecal matter in waterways -less nutrient pollution in waterways -manure applied in appropriate matter can be beneficial pasture	-minimizes livestock exposure to mud and harmful pathogens -improved forage from manure that has been appropriately used as compost	-materials and labor of containers -labor of storing and applying manure at appropriate times -potential cost for collection of excess manure	-earthen facility: $0.30/ cu ft -above ground concrete tank: $1.49/ cu ft -composted bedding pack, concrete floor, concrete walls: $19.30/ sq ft -concrete tank with lid: $16.55/ cu ft

Although animal waste can be beneficial to crops and pasture, it can also harm waterways and the animals themselves. Often, the level of manure is higher than what the land itself can absorb. This includes an increased concentration of nitrogen and harmful pathogens that can make their way into waterways and harm animal health (Briggs & Lemenager, 2020). Good livestock waste management is essential to protecting waterways.

Manure storage facilities can help prevent runoff of the manure, that can harm animals and waterways. Waste storage allows farms to wait until an appropriate time to apply manure to land (Bollwahn, 2014). Manure may be stored in containers below or above ground that prevent nitrates from leaching into the soil and making their way into waterways. In addition, this also limits livestock exposure to harmful pathogens that can make them sick. If there is more manure than can be used, the manure can be taken away easier when it has been stored. If the manure is to be used, it can be applied at the appropriate time to avoid excess runoff (Bollwahn, 2014). Overall, manure storage is an effective addition to a best management practice plan.

Associated Costs

The cost of a waste storage facility can vary depending on the materials used ("California Practice", 2023). For example, an earthen facility costs about $0.30/cubic foot. Above the ground concrete tank costs about $1.49/cubic foot. A composted bedding pack, concrete floor, and concrete walls costs about $19.30/square foot. A concrete tank with lid costs about $16.55/cubic foot. All these estimates include cost of materials and labor ("California Practice", 2023).

Rotational Grazing

Table B-5 Rotational Grazing Benefits and Costs

Environmental Benefits	Livestock Benefits	Potential Challenges	Estimated Costs
-improved forage production and soil health - increased soil infiltration -decreased erosion -decreased nutrient runoff	-more forage mass available -more of the forage species that livestock prefer available	-fencing -watering systems -added labor of moving livestock	-Barbed or Smooth Wire: $5.94/ft -Barbed or Smooth Wire (Difficult Installation): $8.20/ft -Woven Wire: $7.43/ft -Electric: $3.31/ft -Safety or Heavy Use: $10.33/ft -Organic Fence: $6.48/ft

Rotational grazing is another strategy that benefits both livestock and the environment. Rotational Grazing is defined as "a system where a large pasture is divided into smaller paddocks allowing livestock to be moved from one paddock to the other easily" (Smith et al., n.d.). This allows areas of the pasture to recover, thereby improving forage production and soil health. Rotational Grazing can increase forage production by up to 70% (Morgan, 2018). This includes plants growing larger roots which can lead to decreased erosion and nutrient runoff. In addition, rotationally-grazed areas need less water which is important to drought prone areas (Morgan, 2018). Another environmental benefit is the potential to direct grazing animals to control invasive species. Overall, rotational grazing provides many environmental benefits.

Besides environmental benefits, rotational grazing can also be beneficial to livestock health and farm productivity. Plants that livestock like to consume can be planted and will last longer than if livestock were continuously grazed (Beck, 2021). In one study, alfalfa that had been planted 3 years ago for livestock remained at 25% compared to the 10% in continuous pastures. This helps increase grazing efficiency. In fact,

rotationally grazed pastures were found to be 65% more efficient than continuously grazed pastures and stocking rate increased by as much as double (Beck, 2021). Overall, it's clear that rotational grazing is beneficial to the environment and livestock farms.

Potential Costs

There are potential costs associated with rotational grazing. These include fencing and watering systems (Beck, 2021). A barbed or smooth wire fence costs about $5.94/foot ("California Practice", 2023). Barbed or smooth wire fence with difficult installation costs about $8.20/foot. Electric fencing costs about $3.31/foot. Woven Wire is about $7.43/foot. Safety or Heavy Use fencing costs about $10.33/foot. Organic Fencing Costs about $6.48/foot. All these estimates include cost of materials and labor ("California Practice", 2023).

Other Sources of Shade

Table B-6 Other Sources of Shade Benefits and Costs

Environmental Benefits	Livestock Benefits	Potential Challenges	Estimated Costs
-less erosion near waterways or in one area -less fecal matter deposition near waterways or in one area	-less heat-related stress and illness -more forage with appropriate amounts of shade	-materials -labor -loss of forage if too much shade is used	-portable shade structure: $5.74/sq ft -prefabricated portable shade structure: $7.66/sq ft -tree/shrub establishment (Native Seed, Hand Plant): $784.98/ acre -Silvopasture establishment: $89.46/ acre

Because there is more shade in riparian areas, livestock tends to congregate in these areas when they are hot (Clary et al., 2016). Where livestock tend to congregate, erosion increases. Congregation near riparian areas tend to increase erosion and other negative effects. Alternate shade, either natural or manmade, seeks to lure livestock away from riparian areas or prevent them from spending too much time in any one area. In one study, alternate shade reduced the time livestock spent in riparian areas by 30% (Clary et al., 2016).

Along with mitigating negative environmental effects, providing sources of shade is beneficial to the health of livestock as well. Shade sources have been documented to reduce heat stress in cattle (Edwards-Callaway et al., 2020). In one study, during a heat wave, heat-related cattle deaths came in at 0.2% in shaded areas compared to 4.8% in

non-shaded areas (Busby & Loy, 1997). Providing sources of shade to livestock is a worthwhile strategy to mitigate environmental impact on waterways and improve livestock health.

Associated Costs

Whether planting natural shade or installing manmade shade, there will be some initial costs. A portable shade structure costs about $5.74/ square foot (“California Practice”, 2023). A prefabricated portable shade structure costs about $7.66/ square foot. Tree and shrub establishment by native seed that is hand planted costs about $784.98/ acre. Silvopasture establishment costs about $89.46/ acre. All these estimates include cost of materials and labor (“California Practice”, 2023).

Another potential cost could be the loss of forage if too much shade is utilized. However, moderate amounts of shade were found to increase forage (“What am I giving”, 2021).

Sources of Funding

There are many existing funds that cover a partial or the full cost of best management practices implementation. The Natural Resources Conservation Service of the United States Department of Agricultural employs regional specialists to help ranchers find funds applicable to them (United States, 2022). Through programs such as the Environmental Quality Incentives Program and the Conservation Stewardship Program, both technical and financial support services are provided (United States, 2022). The California Department of Food and Agriculture also has financial assistance for ranchers implementing best management practices, through programs like the Healthy Soils Grant (California State, n.d.). The Food Animal Concern Trust is a nonprofit that supplies the Fund-A-Farmer Grant (Food Animal, n.d.). This grant potentially supplies applicants up to $3,000 for independent livestock farmers in the United States (Food Animal, n.d.). The Sustainable Agriculture Research and Education Program offers grants to a variety of people, including ranchers, that use their farm for research or educational purposes (Sustainable Agriculture, 2021). There may be other existing funds out there depending on what the goal of the farm is. Employees at the Natural Resources Conservation Service can help with the research, application, and implementation process.

Conclusion

There are many best management practices that are specifically designed for ranchers that help keep the environment, especially the waterways, healthy. Most of these strategies also help keep livestock healthy, improve soil infiltration/moisture retention, and forage quality. These strategies do have costs associated with them. However, there are many funds out there to help tackle these costs. Furthermore, the profits that

come from having healthy livestock and a healthy pastureland can help mitigate, and in some cases even outweigh, the cost of these best management strategies. The right strategies can differ depending on the farm's unique situation, so asking for free assistance at the Natural Resources Conservation Service may be worth considering.

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ENCLOSURE 3

General Manager
Paul Hughes

Directors
Nick Haven
Shane Romsos
David Peterson
Kelly Sheehan
Nick Exline

South Tahoe Public Utility District

1275 Meadow Crest Drive • South Lake Tahoe • CA 96150-7401
Phone 530 544-6474 • Fax 530 541-0614 • www.stpud.us

August 23, 2023

Lahontan Regional Water Quality Control Board
2501 Lake Tahoe Boulevard
South Lake Tahoe, CA 96150
Attn: Danny McClure

Re: Comment Letter – West Fork Carson River Vision Plan

Dear Mr. McClure,

South Tahoe Public Utility District (District) appreciates the opportunity to provide comments on the Lahontan Regional Water Quality Control Board (Lahontan) West Fork Carson River Vision Plan (Vision Plan). After reviewing the draft document, the District has several concerns with the Vision Plan as it is currently drafted.

As required by the Porter-Cologne Act, the District exports recycled water out of the Tahoe Basin to Alpine County and stores it in Harvey Place Reservoir during the winter months. Recycled water is released during irrigation season for use on the District's alfalfa fields as well as for delivery to six ranches in Alpine County for irrigation of pasture lands. Both Harvey Place Reservoir and the District's alfalfa fields are located in the East Fork Carson watershed, while the six ranches that receive recycled water are located in the West Fork Carson watershed.

The Vision Plan discusses the water quality impairments occurring in the West Fork Carson River and provides the background necessary to understand the level of impairment and potential sources. With regard to the potential sources, the District is mentioned once in Section 5.4 in the context that some of the grazing lands along the West Fork Carson receive "treated effluent" that is "much higher in nutrients…and is thus a potential source of nutrients," however no data is cited to substantiate this claim. The District requests that the Vision Plan note that there is currently no data indicating that nutrients from recycled water have impacted the West Fork Carson River.

The Vision Plan states in Section 6.7.2 that the District will be requested to complete an analysis of long-term impacts from the use of recycled water to the West Fork Carson River by the end of 2025. The District currently maintains an extensive monitoring well network for monitoring

groundwater for any impacts from our recycled water operations. Several of these wells are located within the West Fork Carson watershed and are sampled quarterly and the results submitted to Lahontan. To date, the District is unaware of any notification that our operations are causing an impact to water quality. The lack of impact in the groundwater wells demonstrated through the District's current monitoring, coupled with the prohibition for surface water discharge in the ranchers' Wastewater Reclamation Requirements (WRRs) demonstrates that there is no impact to the West Fork Carson from the District's recycled water and any additional analysis is not needed. The District requests that this additional study to be conducted by the District be removed from the Vision Plan. If additional studies are needed, the District believes these studies should be conducted by the regulatory agency, not a Special District with no operations in the watershed.

Each of the ranches that receive recycled water from the District has their own WRRs with Lahontan. The Vision Plan notes in Section 6.7 that these agreements specify the location of use of irrigation water, prohibit discharge to surface water, and require reporting of the adequacy of tailwater controls to prevent surface water runoff. The District is not party to these agreements, however we recognize that we have a vested interest in the ranches being able to accept recycled water. To the District's knowledge, Lahontan has not noted that these WRRs are ineffective or need to be modified in any way. If Lahontan believes that these operations are causing an impairment in the West Fork Carson, the District feels this should be investigated prior to requiring any modifications to the existing WRRs.

The Vision Plan notes in Section 6.7.2 that ranches will need to submit Ranch Water Quality Plans by October 2025 and that the District may be asked to help facilitate water quality planning and reporting for the users of our recycled water. This request is of concern to the District from a resource standpoint. With the addition of water quality planning and reporting for 6 ranches to the District's existing workload, this represents a significant increase to the District and the District does not have the resources to take this on. However, based on the District's conversations with Lahontan, the intent of this request is for the District to facilitate the relationships between the ranchers and Lahontan, not to prepare the plans and/or conduct the monitoring. The District requests that the following modification be made to the last sentence of Section 6.7.2:

> "The Lahontan Water Board may also request STPUD to help facilitate *the initiation of discussions of* water quality planning and reporting for the users of recycled STPUD water along the WFCR."

The Vision Plan calls for the District to prepare a QAPP and enter all of our data into CEDEN. The District would like to clarify that this request only applies to data collected after the QAPP has been approved by Lahontan and that there is no expectation that the District enter existing data into CEDEN.

The District recognizes the importance of the West Fork Carson River and supports the efforts to improve its water quality. The District appreciates the opportunity to comment on the Draft Vision Plan and is available to discuss any or all concerns with Lahontan staff prior to finalization of the Vision Plan. Please do not hesitate to reach out to the District at any time.

Sincerely,

Stephen M. Caswell

Stephen Caswell, P.E.
Principal Engineer

CARSON WATER SUBCONSERVANCY DISTRICT
777 E. William Street, #209, Carson City, NV 89701
775/887-7450
cwsd.org

A healthy watershed that meets the water needs of all users

August 23, 2023

Daniel McClure
Water Resource Control Engineer P.E.
California Regional Water Quality Control Board – Lahontan Region

South Lake Tahoe, CA

Dear Daniel,

The Carson Water Subconservancy District (CWSD) is submitting formal comments on the July 2023 Draft West Fork Carson River Vision Plan. This submittal is directly from CWSD staff familiar with the Plan. Due to timing considerations and the deadline for comments required by August 23, 2023, this letter has yet to be approved by our Board of Directors. However, at our August 16, 2023, Board meeting, the Directors were informed staff would be submitting a formal comment letter. CWSD staff will seek formal approval of the letter at our September 20, 2023, Board meeting.

Overall, CWSD staff is pleased with the direction of the plan and applauds Lahontan staff for all their efforts to bring this to fruition. As a stakeholder, CWSD is keen to continue to work with Lahontan staff and all the stakeholders to implement this plan. We appreciate the ability to comment during the public comment process. We realize these comments are very detailed in nature. We wish there had been the opportunity to see the draft prior to public comment, as many of these issues would have been easily resolved. Many of our comments relate to information that we feel is missing from the plan, or areas that may need additional explanation, clarification or reorganization. There are several typos, incorrect dates, missed acronyms, etc. that are easily corrected. To make this as easy as possible, CWSD staff provides our comments to the draft in a linear progression per page below. Critical questions and comments are highlighted in green:

Executive Summary:
Page 2: First Paragraph
Mention California….Alpine County, CA.

Page 3: Final Paragraph

Correction: Carson ~~River~~ Water Subconservancy District

Page 7: List of Acronyms needs to be updated and put in alphabetical order to include:

CALTRANS – California Department of Transportation
CAO-?
CDO-?
CEDEN –
FOHV – Friends of Hope Valley
FTS-?
MAA-?
NTU - Nephelometric Turbidity Units
ORV – Off Road Vehicle
RWQP – Ranch Water Quality Plan
STPUD – South Tahoe Public Utility District
SWAMP –
TMDL – Total Maximum Daily Load
UCCE – University of California Cooperative Extension

Page 12: Paragraph 1:
Figure 2 should be Figure 2-1. Include links to CRASP 2007, 2017

Paragraph 3: Include Faith Valley and Hope Valley into list of dispersed camping areas. Is Paradise a mistake?

Pages 12-13:
May want to mention Pacific Crest Trail. More information on Lost Lakes: CWSD owns water rights, releases water for late season flows, Red Lake – Alternative site to Hennan for Fish Hatchery, owned by Cal Fish and Game. Any additional info on Scotts and Crater Lake water rights, etc.

Page 13 Final Paragraph:
Date Error: CWSD, 2006, 2015~~5~~7

Page 14:
Consider including Friends of Hope Valley in this list more specifically. They are a critical partner that helped protect Hope Valley from development and have implemented many willow plantings along the West Fork over the past 20+ years.

Final Paragraph:
Add American Rivers. Add links to the list of stakeholders. Projects and suggested actions are also listed in CRASP 2017. Please link.

Page 16: Figure 2-2. Where is this referenced in the text? Please include an explanation relating to the lands that are in Alpine County and are under the jurisdiction of Lahontan, yet don't flow into the WF in CA, but do flow into the WF in NV. This area appears to be a no man's land regarding WQ planning coverage and will need to be addressed in the future between Lahontan and CWSD.

Page 17
Paragraph 3:

Op should be of
Basin Plan link takes you here. Perhaps this?

Final Paragraph: Weblink takes you to a pdf of the webpage.
Page 18:
Table 3-3-1: Spell out NTU

Page 19:
Table 3-5 label acronym error WRFC should be WFCR.

Page 20:
Paragraph 2:
Remove 2nd ~~magnitude~~. Also, add 'must' in last sentence….It also be noted….

Page 22:
Paragraph 2:
Question: Would fecal indicator bacteria be associated with other beneficial uses such as Water Contact Recreation and Agricultural Supply?

Page 24/25:
Table 4-3: Links to the plans would be beneficial here. Last plan, Alternative Restoration Plan…was completed in 2022, not ~~2002~~. (NDEP, ~~2002a~~, 2022)

Page 29/31:
Tables 4-5and 4-6:
Please add a note to these tables stating something like 'for the purposes of this report, water quality data up to 2021 was used. Lahontan continues to collect WQ data beyond 2021'.

Page 38:
Question: Figure 4.6: When were the samples taken? Do seasonal water variations correlate with reductions?

Pages 41-44:
TDS appears to be higher in winter. Does this suggest deicing of roads is the main issue? Also appears higher in the upper watershed, what is accounting for the higher amounts in the upper watershed? Could a comparison of the Hope Valley to Woodfords to the Headwaters to Hope Valley during the same periods be helpful to determine if there are seasonal or hydrological events that would account for the exceedances?

Page 44: Paragraph 1:
Typo: Tables 4-16 and 4-17, not ~~4017~~.

Page 46:
Paragraph 2: Typo: Table ~~4-15~~ should be 4-18 right?

Page 47:
Question: Is there enough data collected to determine delisting of iron in the upper watershed? Only two years of data according to Table 4-18.

Page 57 – 58:
Section 5.5:
Comment:
Dispersed camping discussion needs to include the lack of usable sanitary dump stations. Hope Valley Campground removed their dump station? Why? Their camp host has a sewer hookup, but the public dump station no longer exists. Not sure if it was a holding tank that needed to be pumped. This being no longer available may be a contributing factor. Additionally, in the implementation section it is important to let campers know where a sanitary dump station is located and the issues with dumping black and grey water on water quality.

Page 58:
Paragraph 5: ~~Blue,~~ insert Lost
Comment: Either here, or more likely in the Background section, more discussion of Lost Lakes, the Dams, CWSD water rights, late season flow release, and the beaver dam analogs (BDAs) in Faith Valley would add value to the plan.

Page 59:
Section 5.7:
Comment: Climate, Wildfire, Invasive Species and Stormwater all deserve their own sections in this plan. Given all the work that is currently being undertaken by the Forest Health Community Working Group, this section appears to be very limited in scope. Additional information should be added to address these "other factors". Partner stakeholders can help fill in additional information if desired.

Page 61 - 64:
Table 6-1:
Comment: Table needs headers to go from page to page. Also, Page 63 Potential Sources should be spread out to be consistent with the rest of the table.
Questions:
Are tributaries such as Red Lake Creek included in each segment and be subject to these management measures?
There are several in-holdings located in these areas. Are there concerns or information regarding management measures in relation to these private properties?
Are there other sources to consider such as sediment transport during spring runoff?
Could Conservation Easements for floodplain protection be added as a management measure in relevant sections where there is private property in the floodplain or adjacent to the WF?
In the performance indicators, miles of channel restored seems a large scale. Could linear feet be considered which would be consistent with the CRASP?
Could some of these management measures here be SMART goals? Specific, measurable, achievable, relevant, and time-bound?
Can off channel stock watering as a management measure and performance indicator be added?
Can weed/invasive species management/planning be added as a measure and performance indicator?

Page 66:
Table 6-3:
Comments:
Add Watershed-Literacy Programs as Alpine County residents were surveyed and have been a part of this campaign planning and implementation. Specifically it seems important to include: Watershed-Literacy Survey of Carson River Watershed Residents 2015. This study was conducted for the Carson

Water Subconservancy District (CWSD) to determine Carson River Watershed residents' knowledge of and attitudes toward watershed health, knowledge of basic watershed concepts, and activities or behaviors that may impact the watershed's environment. The study entailed a telephone survey of residents of the Carson River Watershed area in Nevada and Alpine County, CA, ages 18 and older. The CRC and CWSD plan to resurvey watershed residents, including Alpine County in 2024. This will be compared to information collected from a resident survey conducted in 2015. See Page 67 comments.

Marketing and Communications Plan for the CRW 2016. This marketing and communications plan is a survey analysis and planning strategy used by the CRC and CWSD to inform the campaigns and develop more effective outreach.

Watershed-Literacy Action Plan 2015. The WLAP provides an action framework to achieve the Carson River Coalition's Education Working Group (EWG) vision by moving our target audiences along the change continuum from awareness to action with the goal of obtaining actual environmental benefits including water quality improvements in the long-term. This plan will be updated based on 2024 survey results.

Also, the Low Impact Development (LID) in the Carson River Watershed white paper 2015, provides recommendations on implementing LID projects in the watershed.

Page 67-68:
Table 6.3:
Comments:
Add BDAs into Faith Valley project. Ask American Rivers, Julie Fair, for specifics on Budget and funding sources. Perhaps spell out the multiple locations projects that are happening throughout the watershed. Add CWSD to funding source for Geomorphologic Model and Prioritization Plan and Ag project. Retitle the last project Soil Health/Regenerative Agriculture Project: includes Agricultural Producers Working Group, Ag BMP Whitepaper, Case Studies. Also add Clean Water Act (CWA) 319(h) instead of just 319. Add CWSD's Watershed-Literacy "I Am Carson River Watershed" Watershed Moments campaign. CWSD and the CRC are currently revising 6 films to fit into the 30 second Public Service Announcements (PSAs). Each film discusses key NPS issues and asks residents to take actions to limit their impacts on WQ and reduce NPS pollution. The six, maybe seven, films will be Recreate Responsibly, Bag It, Use a Car Wash, Recycle Your Motor Oil, Pitch In, Make Your Yard a Sponge, and possibly Curb Your Chemical Use. Although there is limited development in the WF, these NPS issues are still a concern and could resonate with residents and visitors alike.

Page 68:
Comments:
Add CWSD and CWA Section 319(h)NDEP to funding sources for the CRW Outreach. These are broad watershed-wide outreach campaigns providing people with actions to limit the impacts of NPS pollution as described above.

Pages 69-70:
Table 6-4
Comments:
Some of the proposed projects in the CRASP are not included here. Perhaps either include or reference the CRASP here.
Add Watershed Signage – CWSD, AWG, Caltrans, Alpine Cty.
Add Aspen Restoration/fuel reduction?

Add Creek Day
Add Invasive Species reduction/eradication along WF? El Dorado Cty is contracted by Alpine to do their weed removal, AWG, CWSD helps fund efforts…
Faith Valley Projects?

Page 71-73:
Comments:
This section appears to need an action timeline or reference the one in Section 10.
Funding matrix with dates, amounts, eligibility requirements? Or in Section 6.3?
The funding email list and letters of support are a positive step.
What kind of Education/Outreach is Lahontan planning to do and what partners do you plan to coordinate with? CWSD, AWG, FOHV, Alpine Cty., USFWS, Cal Fish and Wildlife, USFS -HTNF, Washoe Tribe of Nevada and California?

Page 74-75:
Table 6-5:
Questions/Comments:
Is Lahontan an assumed partner on all of these projects? Lahontan should be added to the lists.
Add NRCS to Historical Impacts category.
Potentially add Federal Hwy. Administration (FHA) as partner under Roads and Maintenance. Do they have any grants?
Add Education/Outreach to Camping and recreational use with additional partners being HTNF, USFWS, FOHV, American Rivers (road restoration to limit NPS in Faith Valley) and Alpine County.
Add Placement of a Sanitary Waste Dump site in WF or adjacent area as a tool to limit sources in dispersed camping areas. Funding through RAC, CWA 319(h)???
Should the Rural Development folks be included as partners under Camping and Rec (potential for sanitary dump station placement) and the OWTS category for funding, etc.? ~~Wilder~~ is Wylder.
The final category deserves more information and specificity. Noxious weed laws are regulatory tools/means. CWSD should be listed as a grantor and partner organization. AWG, American Rivers, Alpine County and FOHV should be listed as partners.
Add Caltrans in relation to future project for Education and Outreach: Watershed Signage.

Page 76 Section 6.3:
Comments:
Add CWSD as funding source for AWG, Invasive Species management, Geomorphological Study and Prioritization Plan, floodplain management and general NPS outreach efforts.

Page 76 Section 6.4:
Not sure if the discussion on Lost Lakes should be here or in the Background section. Additional background on the Lost Lakes Dam, water releases, water rights, dam safety fees, PCT, and other specifics relating to the WF source. Beavers and their impacts both positive and negative, finding the balance, should be discussed. Tribal use of the land in the WF has not been discussed.

Page 78 Section 6.4.1
Comment:
Is this the location to discuss the American Rivers Meadow Assessment as background to the series of projects?

Page 80:

Comments:
Would it be helpful to address some of the things that didn't work and the problem solving that needed to occur post high water in 2017?

Page 81 First line:
Typo: Floodplain is one word.

Page 82:
Comments:
Potentially add to American River's Faith Valley project description that CWSD is also a partner due to our water rights at Lost Lakes. The project also requires monitoring the Beaver Dams and BDAs when CWSD does its late season water release to ensure the water right is not impacted.

Change ~~Markleeville~~ Creek Day to just Creek Day. Often volunteers are sent to various work sites on both the East and West Forks. AWG could add examples of past projects to the plan. There have been head cut BMPS completed in Hope Valley and willow plantings.

Please identify the contact link for FOHV and the approximate time for their workday.

Page 83-85 Section 6.5:
Comment/Question:
Not sure if should be in Roads but noticed that trails are not discussed including the Pacific Crest Trail anywhere in relation to them possibly being a source of NPS pollution. Do trails warrant discussion?

Please add a GIS map with the different levels of roads or a link to such a map.

Page 85 Section 6.5.1:
Comment/Questions:
Is there a map or planning document relating to the 2023 Caltrans culvert study and next steps?
HTNF is a large area with a small staff and likely a small budget. What percentage of the road maintenance budget is expended in the WF Carson annually, and are expenditures on a maintenance schedule, or are they complaint driven? This could impact when WQ work could realistically be completed. Is there an MOU or other agreement between Lahontan and HTNF – USFS?

Can a map be created of the road improvements to be undertaken for fire protection in the WF area?

Page 86-88 Section 6.5.2:
Comments/Questions:
Perhaps referencing Section 10 would be good in the sections where Lahontan is proposing to act with stakeholders annually.
Does the Caltrans NEAT study have maps, and how many of the study recommendations have been implemented in the WF?
Does Lahontan plan to commission the $10,000 study of HTNF dirt roads and ORV trails or will this be HTNF or other grant funding?
Does Lahontan plan to produce a more detailed plan of action to work with each stakeholder?

Page 88 Paragraph 1:
Typo: ~~Scholls~~ to Schools
Could Watershed Signage be an added outreach project?

Page 88 Section 6.6:
Comments/Questions:
CWSD is not familiar with Alpine County's LAMP, so do new owners of properties with existing septic systems get notified and provided educational materials from the County and Lahontan?

Page 90-91 Section 6.7.1:
Questions/Comments:
Is there any hay or crop production in the WFCR that requires chemical use that warrants discussion?
Another program that may be worth noting is the NRCS's National Water Quality Initiative. This program may be worth pursuing as it can provide additional funding for projects in specific areas (mainly to private property areas through additional EQIP funding). The Carson Valley Vision Plan is also a new NWQI area that receives special funding annually through NRCS and could be a good example of how to go about receiving this funding.

Page 91-92 Section 6.7.2:
Comments/Questions: Is there a link to the RWQPs program and has Lahontan coordinated with NRCS and UCCE to date? How will ranchers obtain funding to accomplish their RWQPs by October 2025? Is this supported by NRCS and Lahontan? NRCS often has landowner privacy concerns and consideration when asking to share data associated with such endeavors. There may be constraints on how these actions are taken and tracked, which may impact actions and deadlines. Has Lahontan discussed their requests with STPUD to ensure they know what is being asked of them?

Page 93-94 Section 6.8:
Comments/Questions:
The need for a sanitary dump station and discussion on possible location and funding source should also be added to this section. Outreach regarding why dumping of black and grey water is impactful to the water quality, and mapped links and fees associated with sanitary dump stations nearest to each dispersed camping location should also be considered as a future project/action. It may be worth Lahontan first pursuing the reinstallation of the sanitary dump station at Indian Creek Reservoir with BLM that was lost in the Tamarack Fire.

Page 94- 95 Section 6.9:
Comments/Questions: Discussion on Lost Lakes late season releases. The potential for future water rights purchases to provide instream flows to protect habitat and water quality has not been considered. Perhaps a place holder for future additions/revisions?

Section 6.10:
Comment: This Section deserves more details and projects/actions.
Actions should be added to the Table relating to Climate Change, Wildfire restoration, Invasive Species reduction, Stormwater and Floodplain Management. Continuing to provide Agricultural and Open Space land uses in the floodplain and protecting these areas from future development is a main message of the CRC and benefits water quality, habitat, flood attenuation and groundwater recharge.

Page 97 Table 6-6:
Comment: It may be better to rephrase the Grazing Key Educational Topic to a more positive, motivational phrase, over a regulatory approach. For instance, stating how soil health, off channel stock watering, reduction of river access, etc. can improve land health, cattle health and water quality. All the educational messages could have a more positive bend.

Page 98 Section 7:
Paragraph 5, last sentence:
Add …viewer and partner portal, currently being developed by CWSD.

Page 100 Table 8-1:
Consider adding American Rivers Faith Valley Monitoring to the table.

Page 101:
Paragraph 2:
Comment/Question:
What type of funding would be available for WQ sampling to help pay the $300 per sample?

Page 102:
Paragraph 2:
Question: In relation to the proposed additions for flow monitoring and additional gauges, would Lahontan be including this in their budget or does a funding source need to be identified?

Page 103:
Paragraph 1:
Comment:
CWSD foresees on-going fees to run, manage and maintain the web access viewer, partner portal and queryable database system. ESRI GIS fees and staff funding to manage the QAQC of partner data, and upkeep of the system. We are hoping this system will become the CRASP tracking and monitoring hub and we welcome additional funding from Lahontan to share this critical tracking/monitoring/mapping resource.

Pages 104-106 Table 10-1
Comments/Additions to the table:
Add CWSD to the Implementing Party for the WFCR Geomorphological Study.
Add UCCE and NRCS to the Development of RWQPs.
Add the placement of a sanitary dump station and educational program as actions into the timeline.
Add Lahontan as a coordinating body to work with other stakeholders to implement the WF Vision Plan and include the methods to undertake this action.

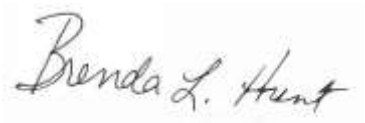
Appendices: The appendices could be referenced more throughout the document and added to the action plans more specifically. There should be an Appendix for OWTS, Wildfire Restoration, Climate Change, Invasive Species, LID and Floodplain Management. Perhaps placeholders, referencing other documents, or beginning attempts can be included and be added to during subsequent document revisions. CWSD will be updating its Watershed-Literacy Action Plan in the next couple of years. We plan to work with Alpine County stakeholders to ensure actions addressing outreach and education needs discussed in this plan are included.

Appendix A:
Comments:
The plan may want to include a more in-depth discussion, or reference American Rivers Meadow study and their use of BMP including BDAs (reduce sediment/turbidity, aggrade streams to reduce incision, etc.). Perhaps there is a better way to present Appendix A as a matrix so one could garner the most

effective measure per source? Maybe in a future version?

CWSD hopes these comments and questions will add value to the final West Fork Carson River Vision Plan. Thank you for the opportunity to comment. If there are any questions, please contact me brenda@cwsd.org or call 775.887.9005.

Sincerely,



Brenda Hunt
CWSD Watershed Program Manager

Daniel McClure, P.E. -Water Resource Control Engineer
Planning and Assessment Unit
California Regional Water Quality Control Board – Lahontan Region
South Lake Tahoe, CA
Daniel.McClure@waterboards.ca.gov

Re: Draft West Fork Carson River Vision Plan

Dear Daniel McClure, P.E.

Alpine County has some concerns with the California Regional Water Quality Control Board – Lahontan Region's (Lahontan) draft West Fork Carson River Vision Plan. Our basic concern is that implementation of the plan as written would place an unreasonable financial burden on property owners for a minimal improvement in water quality..

While it is true that the West Fork Carson River (WFCR) does occasionally exceed the Water Quality Objectives (WQO), it doesn't happen often and when it does it is not by much. The draft plan acknowledges this as follows:

> "... the magnitude and frequency of WQO exceedances causing the impairments in the WFCR are not extreme in magnitude or very frequent. Additionally, data show that WQOs related to multiple other constituents (such as dissolved oxygen, toxicity, pesticides and other organic pollutants) are attained in the WFCR (SWRCB, 2021). It also be noted that the watershed is recovering from the impacts of the historical activities discussed in Section 5.1, which were much greater than the impacts of any current activities ...". (Plan draft, 4. WFCR Water Quality, 2nd para., page 20)

It seems unreasonable to us that this plan, if adopted as proposed, could require actions that require significant expenditures by property owners when the watershed is recovering on its own and the exceedances of WQO is infrequent and not by much. For example, Onsite Wastewater Treatment Systems (OWTS) improvements up to and including a community wastewater treatment facility would be a hugely unfair imposition on property owners for only a marginal gain in water quality. Similarly, ranchers who receive treated wastewater from the South Tahoe Public Utility District (STPUD) shouldn't need to incur the expense of developing and implementing ranch water quality plans (RWQP) for only a marginal gain in water quality. In addition requiring Alpine County to improve road maintenance is an added cost to a County that has struggled to maintain its roads.

While the draft plan does list numerous potential sources for grants to pay for these additional costs, it leaves the burden of identifying and applying for grants on the property owners. Our objection to the draft plan would be mitigated if Lahontan would include a commitment to fund the identification of and application for grants that would pay for any required corrective actions.

We appreciate the opportunity to comment and would be happy to answer any questions.

Irvin Jim, Chair

Cc Assemblymember Megan Dahle
Senator Marie Alvarado-Gil
Carson Water Subconservancy District (Ed James)
Alpine Watershed Group (Kimra McAfee)

RE: Draft West Fork Carson River Vision Plan available for review and comment

Sam Booth <sbooth@alpinecountyca.gov>

Tue 8/22/2023 3:23 PM

To:McClure, Daniel@Waterboards <Daniel.McClure@waterboards.ca.gov>

Cc:Sussman, Daniel@Waterboards <daniel.sussman@waterboards.ca.gov>;Kimra McAfee <awg.kimra@gmail.com>;Brenda Hunt <brenda@cwsd.org>

EXTERNAL:

Hi Danny,

I've done a review of the WFCRVP and appreciate you pointing me to the sections on Roads and on-site septic systems. I do have some concerns with the language at the bottom of page 86 in Section 6.5 on Roads and the top of page 87. My concern would be with the highlighted language below from those paragraphs:

> *Currently, Caltrans is the only party in the West Fork Carson River watershed whose stormwater discharges are covered under a State Water Board or Lahontan Water Board permit. USFS logging activities are regulated under the Lahontan Water Board's Timber Waiver, but the Lahontan Water Board does not currently have a permit covering other activities on USFS land. In the future, the Lahontan Water Board may issue orders requesting information or regulating discharges associated with road activities of the USFS, Alpine County, or other parties. On an annual basis, the Lahontan Water Board will request information from Caltrans, Alpine County, and the USFS-HTNF about their progress in identifying and resolving culvert issues and other road erosion issues as well as let them know of any identified areas of greater potential water quality impact. The Lahontan Water Board will also work with them to request salt and sand use reporting on an annual basis and to investigate the potential use of materials with less impact to water quality. For Caltrans, this information can be included in their annual report submitted to the State Water Board.*

Similar to the comments the Alpine Board of Supervisors made last week, I would be concerned with the language here suggesting that Lahontan would take regulatory measures with Alpine County for potential discharges associated with road activities when responses to these orders or regulatory measures would require the County to expend limited budget funds or potentially prevent regular road maintenance activities which promote safe transit of vehicles in our harsh weather. The statement that Lahontan will "request information from Caltrans, Alpine County, and the USFS about their progress in identifying and resolving culvert issues and other road erosion issues" is also a concern to me. If Alpine County is unable to make progress due to lack of funding, will there be repercussions in the form of an order issued from Lahontan? I think that the language earlier in the plan which states: *"The stormwater discharges from the remainder of the roads and highways which are not managed by Caltrans are not currently regulated by the State Water Board or the Lahontan Water Board through a permit or any other formal mechanism"* should indicate that Alpine County would not be treated with the same regulatory actions as Caltrans.

As we've spoken about before, Alpine County is willing and eager to review data about possible improvements in practices and locations where BMPs could be implemented to improve the stream environment. It's our thought that the information could be a useful tool to invest in training, experiment with new practices and to seek funding from outside sources. However, we would be concerned about orders or regulatory mandates requiring these changes before additional funding is provided and the potential for that to impact vehicular travel of the roadways. Instead, I would like to see if its possible to include a discussion more similar to the last sentence highlighted above, which mentions working with the partners and investigating the use of materials with less impact to water quality.

Some possible language for consideration might be:

In the future, the Lahontan Water Board will work with Alpine County to provide resources, data, and best management practices that may reduce discharges associated with road activities of Alpine County. Alpine County will share information with Lahontan on the use of salt and sand use on roads and areas where the County has been able to make

progress in identifying and improving culvert issues and other road erosion issues as well as let them know of any identified areas of greater potential water quality impact.

As a general comment, I think the Vision Plan should look towards using education, resources and the pursuit of funding as a mechanism to make improvements to the watershed, in order to avoid regulatory orders for compliance with requirements to provide data and monitoring.

I appreciate the chance to comment and look forward to the final plan and partnering on some of these measures in the future.

Thank you,
-Sam

Samuel R. Booth, AICP
Director
Alpine County Community Development
50 Diamond Valley Rd
Markleeville, CA 96120
Office: 530-694-2140 x425

Alpine Watershed Group Staff Comments on West Fork Carson River Draft Vision Plan

See WFCR_Vision_Plan_Draft_July2023-AWG markup.doc for mark-up with changes tracked and many comments. Here are some additional comments, more high level.

1) There is an extreme lack of content on the Washoe Tribe of Nevada and California, and no mention of the Washoe Environmental Protection Department (WEPD) or traditional ecological knowledge. This needs to be rectified. Here are just a few ideas:
    a. Bottom of p. 3 – If you didn't develop the Vision Plan with assistance and collaboration of the Tribe and WEPD then you can't list them here, but it feels like a glaring omission.
    b. Top of p. 14 – The Washoe Tribe and WEPD should be listed before AWG and CWSD as far as stewardship of the watershed. It should be clearly stated that this is the Washoe ancestral home.

2) The plan could use more maps:
    a. Map of various water quality sampling sites – We think one exists with at least Regional Board and AWG sites.
    b. Map for roads section – It isn't a great map, but sending you map from USFS from Roads Forum.
    c. Mike Hanks' Final Project has many maps to consider to complement the text (e.g., Paved and Unpaved Roads, Roads and Stream Crossings).

3) The flora and fauna should have a larger section. As commented on in AWG's mark-up, invasive species are only given a couple sentences, but there are noxious weeds and impacts to waterways that should be expanded on.

4) The ten-year goals sound reasonable, but what work and support will be provided? What outreach has been done with landowners and project managers to establish these ten-year goals? AWG is in the plan for two to three projects, but AWG staff were not aware ahead of time, so we are wondering with the other goals if folks are aware of what they are requested to do according to the Vision Plan.

5) The timeframes listed for Water Board should have more details on when and what will happen at the deadline given.

6) The resources included in Appendix A and B are a really great format for informing project managers of options. Please do one for Onsite Wastewater Treatment Systems.

7) Send document to USFS to confirm what is included in the document. USFS Forester Annabelle Monti should review the substance in Section 6 (i.e., aspens are not being planted as part of *HTNF-WFCR Fuels Reduction, Aspen, and Meadow Restoration Project* listed on page 81).

Re: West Fork Carson River Draft Vision Plan ~ Comments due 8.23.2023

Rachel Kieffer <awg.rachel@gmail.com>

Tue 8/22/2023 3:06 PM

To:Ewing, Ben@Wildlife <Ben.Ewing@wildlife.ca.gov>

Cc:McClure, Daniel@Waterboards <Daniel.McClure@waterboards.ca.gov>

EXTERNAL:

Hi Ben,

Thank you for taking the time to review the document. I am cc'ing Danny McClure with the Water Board so that he can see your comments.

Best fishes,
Rachel

Rachel Kieffer
Pronouns: she/her
Headwaters Coordinator

www.alpinewatershedgroup.org

awg.rachel@gmail.com

(530) 694-2327 office

(818) 923-3748 cell

On Tue, Aug 22, 2023 at 1:17 PM Ewing, Ben@Wildlife <Ben.Ewing@wildlife.ca.gov> wrote:

> Rachel, My comments are as follows:
>
> Page 17, Section 3- I would add hunting and fishing to designated beneficial uses.
>
> Page 58, Section 5.5- CDFW does not maintain the bathroom at Picketts Junction.
>
> Page 58, Section 5.6- Blue Lakes are not in W. Carson headwaters.
>
> Thanks for the opportunity to comment and take care, Ben

California Department of Transportation

OFFICE OF THE DISTRICT 10 PLANNING
P.O. BOX 2048 | STOCKTON, CA 95201
(209) 948-7325 | FAX (209) 948-7164 TTY 711
www.dot.ca.gov

August 14, 2023

Mr. Daniel McClure
Water Resource Control Engineer
Regional Water Quality Control Board
1685 E Street
Fresno, CA 93706

ALP-88-PM 10.911
Draft West Fork Carson River (WFCR) Vision Plan

Dear Mr. McClure,

The California Department of Transportation (Caltrans) appreciates the opportunity to review and comment on the California Regional Water Quality Control Board (RWQCB), Lahontan Region, West Fork Carson River (WFCR) Vision Plan. The Plan is a water quality improvement plan to address multiple pollutants in the WFCR in Alpine County.. The Plan describes present and future actions that will be taken to restore and protect water quality in the WFCR, which flows northeast from its headwaters high in the Sierra, through Alpine County to the Nevada State line. The WFCR combines with the East Fork Carson River near Genoa, Nevada to form the Carson River which flows northeast into its eventual terminus at the Carson Sink. This Vision Plan focuses on the WFCR and its watershed in California, which is all located in Alpine County. RWQCB especially requested Caltrans to review Sections 5.2, 6.5 and the Summary Table Section 10.

Caltrans at this time has the following comments:

Environmental
If any construction related activities will encroach into Caltrans Right of Way (ROW), the project proponent must apply for an Encroachment Permit to the Caltrans District 10 Encroachment Permit Office. All California Environmental Quality Act (CEQA) documentation, with supporting technical studies, must be submitted with the Encroachment Permit Application. These studies will include an analysis of potential impacts to any cultural sites, historic properties, biological resources, hazardous waste locations, scenic highways, and/or other environmental resources within Caltrans ROW, at the project site(s).

Hydrology
The WFCR Vision Plan sets out a 10-year timetable for implementation, with a goal of attainment for water quality objectives by October 2033. However, there is no change at this time in hydrology.

Any increase in runoff generated by the proposed Vision Plan should be stored/mitigated onsite. Caltrans would not allow additional runoff draining into the State ROW nor significantly impacting the existing drainage patterns. Additional review will be required when the Vision Plan has developed if the hydrology and flow pattern change has occurred within State Route (SR) 88 and 89 limits.

All future development for the project location will require further review by Caltrans. If you have any questions or would like to discuss these comments, please contact Lloyd Clark at (209) 986-9802 (Email: Lloyd.Clark@dot.ca.gov) or me at (209) 483-7234 (email: Gregoria.Ponce@dot.ca.gov).

Sincerely,

Gregoria Ponce'

Gregoria Ponce'
Chief, Office of Rural Planning

bc: Environmental – Elizabeth Hummel
Traffic Ops – Eric Ladiao
Hydraulics - Brandon Yu

ENCLOSURE 4

This document constitutes responses to written comments submitted regarding the West Fork Carson River Vision Plan (Vision Plan) draft circulated for review in July 2023. In some cases, comments are summarized for brevity. Comments or portions of comments that are summarized from the original are in brackets.

Comments were received from the following people:

Stephen Caswell, P.E., Principal Engineer, South Tahoe Public Utilities District (STPUD)
Brenda Hunt, Watershed Program Manager, Carson Water Subconservancy District (CWSD)
Jim Irvin, Chair, Alpine County Board of Supervisors
Sam Booth, AICP, Director, Alpine County Community Development
Kimra McAfee, Executive Director, Alpine Watershed Group
Ben Ewing, District Fisheries Biologist, California Department of Fish and Wildlife, North Central Region
Gregoria Ponce' Chief, Office of Rural Planning, California Department of Transportation (Caltrans)

Comment Letter 1. Stephen Caswell, P.E., Principal Engineer, South Tahoe Public Utilities District (STPUD)

Comment	Response
1. The Vision Plan discusses the water quality impairments occurring in the West Fork Carson River and provides the background necessary to understand the level of impairment and potential sources. With regard to the potential sources, the District is mentioned once in Section 5.4 in the context that some of the grazing lands along the West Fork Carson receive "treated effluent" that is "much higher in nutrients…and is thus a potential source of nutrients," however no data is cited to substantiate this claim. The District requests that the Vision Plan note that there is currently no data indicating that nutrients from recycled water have impacted the West Fork Carson River.	Staff acknowledge that the Vision Plan did not include detailed data about the quality of the recycled water that is used for irrigation on grazing lands in the West Fork Carson River Watershed. This treated wastewater effluent is a potential source of nutrients to the watershed, and it is a reasonable assertion that it is a potential source of nutrients to the River. Therefore, the requested change in the Vision Plan was not made. Staff did add language indicating that an impact has not yet been shown.

2. The Vision Plan states in Section 6.7.2 that the District will be requested to complete an analysis of long-term impacts from the use of recycled water to the West Fork Carson River by the end of 2025. The District currently maintains an extensive monitoring well network for monitoring groundwater for any impacts from our recycled water operations. Several of these wells are located within the West Fork Carson watershed and are sampled quarterly and the results submitted to Lahontan. To date, the District is unaware of any notification that our operations are causing an impact to water quality. The lack of impact in the groundwater wells demonstrated through the District's current monitoring, coupled with the prohibition for surface water discharge in the ranchers' Wastewater Reclamation Requirements (WRRs) demonstrates that there is no impact to the West Fork Carson from the District's recycled water and any additional analysis is not needed. The District requests that this additional study to be conducted by the District be removed from the Vision Plan. If additional studies are needed, the District believes these studies should be conducted by the regulatory agency, not a Special District with no operations in the watershed.	The lack of a notification to the District from the Board does not demonstrate a "lack of impact". The groundwater in the vicinity where South Tahoe Public Utility District's recycled water is used must be at a level to protect beneficial uses. There may be some impact on the groundwater quality, but the groundwater has not been shown to exceed water quality objectives. The water quality objectives for groundwater are different than the surface water quality objective for the West Fork Carson River. Some analysis of the data and information is necessary to demonstrate that these operations are not causing an impact to the West Fork Carson River. Until that analysis is conducted, we cannot dismiss the potential source. Therefore, the request for the District to conduct such an analysis was not removed from the Vision Plan.
3. Each of the ranches that receive recycled water from the District has their own WRRs [wastewater reclamation requirements] with Lahontan. The Vision Plan notes in Section 6.7 that these agreements specify the location of use of irrigation water, prohibit discharge to surface water, and require reporting of the adequacy of tailwater controls to prevent surface water runoff. The District is not party to these agreements; however, we recognize that we have a vested interest in the ranches being able to accept recycled water. To the District's knowledge, Lahontan has not noted that these WRRs are ineffective or need to be modified in any way. If Lahontan believes that these operations are causing an impairment in the West Fork Carson, the District feels this	Staff agree that, to this date, the Lahontan Water Board has not noted that these WRRs are ineffective or need to be modified in any way. Staff are not proposing any changes to WRRs at this time. However, the Board may determine that modifications are needed in the future for the protection of beneficial uses. Additionally, the WRRs may need to be changed to be consistent with the State's Recycled Water Policy (Resolution No. 2018-0057) (SWRCB, 2018). An investigation of impacts should be conducted, as proposed in the Vision Plan, but completion of that investigation is not a requirement for modifying the WRRs as

should be investigated prior to requiring any modifications to the existing WRRs.	the WRRs may be modified for the reasons stated above.
4. The Vision Plan notes in Section 6.7.2 that ranches will need to submit Ranch Water Quality Plans by October 2025 and that the District may be asked to help facilitate water quality planning and reporting for the users of our recycled water. This request is of concern to the District from a resource standpoint. With the addition of water quality planning and reporting for 6 ranches to the District's existing workload, this represents a significant increase to the District and the District does not have the resources to take this on. However, based on the District's conversations with Lahontan, the intent of this request is for the District to facilitate the relationships between the ranchers and Lahontan, not to prepare the plans and/or conduct the monitoring. The District requests that the following modification be made to the last sentence of Section 6.7.2: *"The Lahontan Water Board may also request STPUD to help facilitate the initiation of discussions of water qual ty planning and reporting for the users of recycled STPUD water along the WFCR."*	Staff agree that the proposed language better reflects the intent of what should be requested of the District. The requested change in language has been made to the Vision Plan.
5. The Vision Plan calls for the District to prepare a QAPP and enter all of our data into CEDEN. The District would like to clarify that this request only applies to data collected after the QAPP has been approved by Lahontan and that there is no expectation that the District enter existing data into CEDEN.	The intention of this portion of the Vision Plan was for new data, collected under an approved QAPP to be put into CEDEN, not past data. This has been clarified in the Vision Plan in Section 8 and in Table 10 by refereeing explicitly to data generated after QAPP approval being entered into CEDEN.
6. The District recognizes the importance of the West Fork Carson River and supports the efforts to improve its water quality.	Comment acknowledged. Lahontan Water Board staff appreciate the District's support of efforts to improve water quality in the West Fork Carson River.

Comment Letter 1. Brenda Hunt, Watershed Program Manager, Carson Water Subconservancy District (CWSD)

1. Overall, CWSD staff is pleased with the direction of the plan and applauds Lahontan staff for all their efforts to bring this to fruition. As a stakeholder, CWSD is keen to continue to work with Lahontan staff and all the stakeholders to implement this plan.	Comment acknowledged. Lahontan Water Board staff appreciate the support of CWSD and other stakeholders in implementing the Vision Plan.
2. [Commenter provided detailed comments on typographical errors, missing acronyms, incorrect dates, and other minor corrections]	Lahontan Water Board staff appreciate these corrections and comments and have made the suggested changes.
3. Pages 12-13: May want to mention Pacific Crest Trail. More information on Lost Lakes: CWSD owns water rights, releases water for late season flows, Red Lake – Alternative site to Hennan for Fish Hatchery, owned by Cal Fish and Game. Any additional info on Scotts and Crater Lake water rights, etc.	Information about Lost Lakes water rights and late season reservoir releases was added to the Vision Plan. Additional information about the Pacific Crest Trail, Red Lake being an alternative site to Hennan Reservoir as a hatchery, and more detail on reservoir water rights for Scotts and Crater Lake was not added to the Vision Plan due to resource limitations and this information not being critical to the Vision Plan's goals and objectives.
4. Page 16: Figure 2-2. Where is this referenced in the text? Please include an explanation relating to the lands that are in Alpine County and are under the jurisdiction of Lahontan, yet don't flow into the WF in CA, but do flow into the WF in NV. This area appears to be a no man's land regarding WQ planning coverage and will need to be addressed in the future between Lahontan and CWSD.	A reference to Figure 2-2 was added, and an explanation about these lands was added as a footnote. While outside the scope of the current Vision Plan, these lands may be addressed in future water quality planning efforts by the Lahontan Water Board, CWSD and others.
5. Page 38: Question: Figure 4.6: When were the samples taken? Do seasonal water variations correlate with reductions?	Nitrogen samples were typically taken at monthly intervals, but some years they were collected every other month. No correlation between seasonal water reductions and variations was observed.

6. Pages 41-44: TDS appears to be higher in winter. Does this suggest deicing of roads is the main issue? Also appears higher in the upper watershed, what is accounting for the higher amounts in the upper watershed? Could a comparison of the Hope Valley to Woodfords to the Headwaters to Hope Valley during the same periods be helpful to determine if there are seasonal or hydrological events that would account for the exceedances?	The higher TDS in winter could be an indication that deicing of roads is a significant source. The higher concentrations higher in the watershed also could be due to higher applications in the upper watershed. A more detailed comparison such as the one suggested could be helpful to determine if seasonal or hydrological events correlated with exceedances. Such an analysis is beyond the scope of the current Vision Plan but could be conducted in future investigations, or if suggested water quality improvement efforts are implemented but do not result in expected improvement.
7. Page 47: Question: Is there enough data collected to determine delisting of iron in the upper watershed? Only two years of data according to Table 4-18.	Only the lower segment, Woodfords to state line, is listed for iron. There is minimal iron data for the other two upstream reaches. CWA section 303(d) requires states to identify waters that do not meet, or are not expected to meet by the next listing cycle, applicable water quality standards after the application of certain technology-based controls and schedule such waters for development of Total Maximum Daily Loads (TMDLs). The states are required to assemble and evaluate all existing and readily available water quality-related data and information to develop the list and to provide documentation for listing or not listing a state's waters. The methodology to be used to develop the section 303(d) list is established by the State Board's Policy for Developing California's Clean Water Act Section 303(d) List. Determinations regarding whether a given stream qualifies for delisting are outside of the scope of this project and would be addressed through a separate process when assessing waters for 303(d) listing or delisting.
8. Page 57 – 58: Section 5.5:	Lack of sanitary dump stations was added to Section 5.5. Staff are not aware of why the dump station was removed from Hope Valley Campground. Staff agree the lack of a

Comment: Dispersed camping discussion needs to include the lack of usable sanitary dump stations. Hope Valley Campground removed their dump station? Why? Their camp host has a sewer hookup, but the public dump station no longer exists. Not sure if it was a holding tank that needed to be pumped. This being no longer available may be a contributing factor. Additionally, in the implementation section it is important to let campers know where a sanitary dump station is located and the issues with dumping black and grey water on water quality.	dump station could be a contributing factor to water quality impairments. Letting campers know the location of dump stations, and about the issues with dumping black and grey water on water quality, are educational themes in the education and outreach section which are expected to be included in education and outreach efforts by the HTNF and others.
9. Page 58: Comment: Either here, or more likely in the Background section, more discussion of Lost Lakes, the Dams, CWSD water rights, late season flow release, and the beaver dam analogs (BDAs) in Faith Valley would add value to the plan.	Additional information about these topics has been added to the Vision Plan.
10. Page 59: Section 5.7: Comment: Climate, Wildfire, Invasive Species and Stormwater all deserve their own sections in this plan. Given all the work that is currently being undertaken by the Forest Health Community Working Group, this section appears to be very limited in scope. Additional information should be added to address these “other factors”. Partner stakeholders can help fill in additional information if desired.	The Vision Plan is intentionally focused on water quality improvement. Staff agree that climate, wildfire, forest health and invasive species are important factors, but additional discussion of these topics is beyond the scope of the Vision Plan and available resources. Stormwater is not included as a specific topic because the discussion of specific sources such as roads, implicitly includes stormwater-mobilized discharges from these sources.
11. Page 61 - 64: Table 6-1: Are tributaries such as Red Lake Creek included in each segment and be subject to these management measures?	The tributaries are not included in each segment. However, if discharges to the tributaries are affecting water quality in the WFCR then management measures in the watershed to reduce those pollutant discharges are within the scope of the Vision Plan.
12. Page 61 - 64: Table 6-1:	At this time there are no specific concerns or management measures related to these in-holdings adjacent to HTNF

There are several in-holdings located in these areas. Are there concerns or information regarding management measures in relation to these private properties?	lands. However, road improvements and septic tank improvements in these properties would be beneficial to WFCR water quality and would be within the scope of the Vision Plan.
13. Page 61 - 64: Table 6-1: Could Conservation Easements for floodplain protection be added as a management measure in relevant sections where there is private property in the floodplain or adjacent to the WF?	Yes, this conservation easements have been added to Table 6-1.
14. Page 61 - 64: Table 6-1: In the performance indicators, miles of channel restored seems a large scale. Could linear feet be considered which would be consistent with the CRASP?	Yes, linear feet of channel restored has been added to the performance measures for consistency with the CRASP.
15. Page 61 - 64: Table 6-1: Could some of these management measures here be SMART goals? Specific, measurable, achievable, relevant, and time-bound?	Yes, many of these management measures could be SMART goals. That level of detail is beyond the scope of the current Vision Plan but could be included during implementation/assessments of progress if resources allow.
16. Page 61 - 64: Table 6-1: Can off channel stock watering as a management measure and performance indicator be added?	Yes, off channel stock watering was added to Table 6-1 as a management measure and performance indicator.
17. Page 61 - 64: Table 6-1: Can weed/invasive species management/planning be added as a measure and performance indicator?	Yes, weed/invasive species management and planning were added to Table 6-1 as management measures and performance indicators.
18. Page 66: Table 6-3: Comments: Add Watershed-Literacy Programs as Alpine County residents were surveyed and have been a part of this campaign planning and implementation. Specifically, it seems important to include: Watershed- Literacy Survey of Carson River Watershed Residents 2015. This study was conducted for the	Staff agree these watershed-literacy programs are valuable and important to include in the Vision Plan. The Marketing and Communications Plan for the Carson River Watershed, and Watershed Literacy Action Plan were added to Table 6-3.

Carson Water Subconservancy District (CWSD) to determine Carson River Watershed residents' knowledge of and attitudes toward watershed health, knowledge of basic watershed concepts, and activities or behaviors that may impact the watershed's environment. The study entailed a telephone survey of residents of the Carson River Watershed area in Nevada and Alpine County, CA, ages 18 and older. The CRC and CWSD plan to resurvey watershed residents, including Alpine County in 2024. This will be compared to information collected from a resident survey conducted in 2015. See Page 67 comments. Marketing and Communications Plan for the CRW 2016. This marketing and communications plan is a survey analysis and planning strategy used by the CRC and CWSD to inform the campaigns and develop more effective outreach. Watershed-Literacy Action Plan 2015. The WLAP provides an action framework to achieve the Carson River Coalition's Education Working Group (EWG) vision by moving our target audiences along the change continuum from awareness to action with the goal of obtaining actual environmental benefits including water quality improvements in the long-term. This plan will be updated based on 2024 survey results. Also, the Low Impact Development (LID) in the Carson River Watershed white paper 2015, provides recommendations on implementing LID projects in the watershed.	The Low Impact Development in the Carson River Watershed white paper was added to Table 6-2 as a completed project.
19. Page 67-68: Table 6.3: Add CWSD's Watershed-Literacy "I Am Carson River Watershed" Watershed Moments campaign. CWSD and the CRC are currently revising 6 films to fit into the 30 second Public Service Announcements (PSAs). Each film discusses key NPS issues and asks residents to take actions to limit their impacts on WQ and reduce NPS pollution. The six, maybe seven, films will be Recreate Responsibly, Bag It, Use a Car Wash, Recycle Your Motor Oil, Pitch In, Make Your Yard a Sponge, and possibly Curb Your Chemical Use. Although there is limited development in the	The "I Am Carson River Watershed" was added to table 6.3. Staff agree these NPS issues are a concern in the WFCR watershed, and these films are a valuable educational tool for addressing that concern.

WF, these NPS issues are still a concern and could resonate with residents and visitors alike.	
20. Page 71-73: Comments: This section appears to need an action timeline or reference the one in Section 10. Funding matrix with dates, amounts, eligibility requirements? Or in Section 6.3?	A reference to Section 10 was added to section 6.2, as was a reference to the timetables for specific source categories in subsequent chapter 6 subsections.
21. Page 71-73: Funding matrix with dates, amounts, eligibility requirements? Or in Section 6.3?	Staff agree a funding matrix would be useful. While outside of the scope and resources for completion of the Vision Plan. Resources allowing, we will look to produce such a matrix in the future. Staff have committed to creating region-wide funding opportunities email list to share funding opportunities with stakeholders in the Lahontan region.
22. Page 71-73: Comments: The funding email list and letters of support are a positive step.	Comment acknowledged.
23. Page 71-73: What kind of Education/Outreach is Lahontan planning to do and what partners do you plan to coordinate with? CWSD, AWG, FOHV, Alpine City., USFWS, Cal Fish and Wildlife, USFS -HTNF, Washoe Tribe of Nevada and California?	Generally, the Lahontan Water Board relies on other entities to take the lead role for education efforts. Staff's current plans are to support ongoing educations efforts of stakeholders active in the WFCR watershed as available resources allow. We plan to maintain our WFCR and website which will provide links to water board and external resources and fact sheets. Section 6.11 and Table 6-6 summarize key educational efforts and topics for support.
24. Page 74-75: Table 6-5: Potentially add Federal Hwy. Administration (FHA) as partner under Roads and Maintenance. Do they have any grants?	Lahontan Water Bord staff are not aware of any FHA applicable FHA grants at this time. Therefore, FHA was not added to the Table 6-5.
25. Page 76 Section 6.4: Additional background on the Lost Lakes Dam, water releases, water rights, dam safety fees, PCT, and other specifics relating to the WF source. Beavers and their impacts both positive and negative, finding the balance, should be discussed. Tribal use of the land in the WF has not been discussed.	The focus of the Vision Plan is on the information most relevant to the overall goal of water quality standards attainment. Staff are attempting to make the Vision Plan streamlined and focused on that purpose and refer to external information sources for conciseness & usability of the plan for water quality improvements. The Vision Plan

	refers to the CRASP for more detail on the watershed, water rights and other specifics and positive and negative impacts of. Additional information about beaver impacts, and a reference to the discussion in the CRASP was added to section 6.4. Additional information about Tribal use of the land in the WFCR watershed has been added to the Background chapter (2).
26. Page 83-85 Section 6.5: Comment/Question: Not sure if should be in Roads but noticed that trails are not discussed including the Pacific Crest Trail anywhere in relation to them possibly being a source of NPS pollution. Do trails warrant discussion?	Staff are not aware of trails being a significant source of NPS pollution. Trails are implicitly included in the recreational use section, since they are not known to be a significant source, they are not explicitly mentioned.
27. Page 83-85 Section 6.5: Comment/Question: Please add a GIS map with the different levels of roads or a link to such a map.	While additional maps would be useful, the production of a detailed roads map is beyond the resources available for completing the Vision Plan. Resources available, such maps may be prepared in the future and included as an addendum.
28. Page 85 Section 6.5.1: Comment/Questions: Is there a map or planning document relating to the 2023 Caltrans culvert study and next steps? HTNF is a large area with a small staff and likely a small budget. What percentage of the road maintenance budget is expended in the WF Carson annually, and are expenditures on a maintenance schedule, or are they complaint driven? This could impact when WQ work could realistically be completed.	There is not a fixed percentage of the HTNF road budget for a particular watershed or a maintenance schedule for HTNF roads, maintenance is done on an ad hoc basis as identified by HTNF staff.
29. Page 85 Section 6.5.1: Is there an MOU or other agreement between Lahontan and HTNF – USFS	There is not currently a Memorandum of Understanding (MOU) or other agreement between the Lahontan Water Board and HTNF. The Lahontan Water Board does have a liaison with the HTNF who meets with them on a regular basis. There is a Management Agency Agreement (MAA) between the State Water Board and the USFS, but it has not been updated since 1981.

30. Page 85 Section 6.5.1: Can a map be created of the road improvements to be undertaken for fire protection in the WF area?	These road improvements have not yet been fully planned, so a map is not available at this time. Such a map could be useful and, could be produced or obtained in future HTNF mapping efforts.
31. Page 86-88 Section 6.5.2: Does the Caltrans NEAT study have maps, and how many of the study recommendations have been implemented in the WF?	The existing Caltrans NEAT study was for the Lake Tahoe Basin and does not include the WFCR watershed.
32. Page 86-88 Section 6.5.2: Does Lahontan plan to commission the $10,000 study of HTNF dirt roads and ORV trails or will this be HTNF or other grant funding?	The source of funding for this has not yet been determined. The Lahontan Water Board does not plan to commission the funds as such a study would typically be the responsibility of the discharger.
33. Page 86-88 Section 6.5.2: Does Lahontan plan to produce a more detailed plan of action to work with each stakeholder?	Stakeholder engagement will be planned out by the implementing Lahontan Water Board programs from year to year in response to available resources and priorities. A single detailed plan of action is not currently planned.
34. Page 88 Section 6.6: Comments/Questions: CWSD is not familiar with Alpine County's LAMP, so do new owners of properties with existing septic systems get notified and provided educational materials from the County and Lahontan?	Alpine County's Local Area Management Plan (LAMP) does not require notification or provision of educational materials to new property owners with existing septic systems. This notification should be a priority for improved outreach by Alpine County. This has been added to the Vision Plan as a recommended action for Alpine County.
35. Page 90-91 Section 6.7.1: Questions/Comments: Is there any hay or crop production in the WFCR that requires chemical use that warrants discussion?	Staff are not aware of any hay or crop production in the WFCR watershed.
36. Page 90-91 Section 6.7.1: Another program that may be worth noting is the NRCS's National Water Quality Initiative. This program may be worth pursuing as it can provide additional funding for projects in specific areas (mainly to private property areas through additional EQIP funding). The Carson Valley Vision Plan is also a new NWQI area that receives special funding	The NWQI program has been added to section 6.7.1.

annually through NRCS and could be a good example of how to go about receiving this funding.	
37. Page 91-92 Section 6.7.2: Comments/Questions: Is there a link to the RWQPs program and has Lahontan coordinated with NRCS and UCCE to date? How will ranchers obtain funding to accomplish their RWQPs by October 2025? Is this supported by NRCS and Lahontan? NRCS often has landowner privacy concerns and consideration when asking to share data associated with such endeavors. There may be constraints on how these actions are taken and tracked, which may impact actions and deadlines.	There is not currently an active grazing program of the Lahontan Water Board to link to in this section. The development and implementation of ranch water quality plans is primarily the responsibility of the ranchers. Lahontan staff will provide technical support and notification of funding opportunities. Staff are aware of NCCS landowner privacy protections, and do not intend to utilize NRCS for tracking or reporting on implementation.
38. Page 91-92 Section 6.7.2: Has Lahontan discussed their requests with STPUD to ensure they know what is being asked of them?	Yes, Lahontan Water Board has discussed the Vision Plan with STPUD.
39. Page 93-94 Section 6.8: Comments/Questions: The need for a sanitary dump station and discussion on possible location and funding source should also be added to this section. Outreach regarding why dumping of black and grey water is impactful to the water quality, and mapped links and fees associated with sanitary dump stations nearest to each dispersed camping location should also be considered as a future project/action. It may be worth Lahontan first pursuing the reinstallation of the sanitary dump station at Indian Creek Reservoir with BLM that was lost in the Tamarack Fire.	More information about the need for a sanitary dump station and possible locations and pursuing funding has been added to this section and section 6.8.2. A reference to the relevant educational efforts in section 6.11 was also added to section 6.8. The potential reinstallation of the sanitary dump station at Indian Creek Reservoir was also added to the Vision Plan.
40. Page 94- 95 Section 6.9: Comments/Questions: Discussion on Lost Lakes late season releases. The potential for future water rights purchases to provide instream flows to protect habitat and water quality has not been considered. Perhaps a place holder for future additions/revisions?	Language recognizing the potential water quality benefits of late season reservoir releases and potential future water rights purchases was added to section 6.9.

41. Section 6.10: Comment: This Section deserves more details and projects/actions. Actions should be added to the Table relating to Climate Change, Wildfire restoration, Invasive Species reduction, Stormwater and Floodplain Management.	While such detail could be useful for informing future actions, the level of detail currently included is adequate, in consideration of available resources and the benefits of having the Vision Plan more streamlined and focused on water quality improvements.
42. Section 6.10: Continuing to provide Agricultural and Open Space land uses in the floodplain and protecting these areas from future development is a main message of the CRC and benefits water quality, habitat, flood attenuation and groundwater recharge.	The water quality, habitat, flood attenuation and groundwater recharge benefits of continuing to maintain and protect Agricultural and Open Space land uses in the floodplain was added to the key educational themes in Table 6-6.
43. Page 97 Table 6-6: Comment: It may be better to rephrase the Grazing Key Educational Topic to a more positive, motivational phrase, over a regulatory approach. For instance, stating how soil health, off channel stock watering, reduction of river access, etc. can improve land health, cattle health, and water quality. All the educational messages could have a more positive bend.	The suggested changes were made to Table 6-6 to make the educational messages more positive.
44. Page 101: Paragraph 2: Comment/Question: What type of funding would be available for WQ sampling to help pay the $300 per sample?	Water quality monitoring is funded through the Water Board's SWAMP program, as well as the STPUD and NDEP funds.
45. Page 102: Paragraph 2: Question: In relation to the proposed additions for flow monitoring and additional gauges, would Lahontan be including this in their budget or does a funding source need to be identified?	A funding source is yet to be identified for these gauges. It is possible that USGS or Water Board funds could be used.
46. Page 103: Paragraph 1: Comment: CWSD foresees on-going fees to run, manage and maintain the web access viewer, partner portal and queryable database system. ESRI GIS fees and staff funding to manage the QAQC of partner data, and upkeep of the system. We are hoping this system will become the CRASP tracking and monitoring hub and we welcome additional funding from Lahontan to share this critical tracking/monitoring/mapping resource.	Staff see the value of the web access server, portal and database for tracking and monitoring CRASP/Vision Plan projects and will support funding as we learn of potential funding sources.

47. Appendices: The appendices could be referenced more throughout the document and added to the action plans more specifically.	Additional references to the Appendices were added to the document and action plans.
48. Pages 104-106 Table 10-1 There should be an Appendix for OWTS, Wildfire Restoration, Climate Change, Invasive Species, LID and Floodplain Management. Perhaps placeholders, referencing other documents, or beginning attempts can be included and be added to during subsequent document revisions. CWSD	Creation of the additional appendices requested is beyond the available resources but could be created during implementation efforts or document updates.
49. Pages 104-106 Table 10-1 CWSD will be updating its Watershed-Literacy Action Plan in the next couple of years. We plan to work with Alpine County stakeholders to ensure actions addressing outreach and education needs discussed in this plan are included.	Comment acknowledged. Inclusion of these messages in the Watershed Literacy Action Plan will be extremely beneficial to the education efforts for the WFCR watershed.
50. Appendix A: Comments: The plan may want to include a more in-depth discussion, or reference American Rivers Meadow study and their use of BMP including BDAs (reduce sediment/turbidity, aggrade streams to reduce incision, etc.). Perhaps there is a better way to present Appendix A as a matrix so one could garner the most effective measure per source? Maybe in a future version?	A reference to a discussion of beavers and beaver dam analogues was added to Appendix A. A revision of Appendix A into a matrix could be useful in a future version but is outside of the resources available for finalizing the Vision Plan.

Comment Letter 1. Jim Irvin, Chair, Alpine County Board of Supervisors

1. Our basic concern is that implementation of the plan as written would place an unreasonable financial burden on property owners for a minimal improvement in water quality.	The Vision Plan as written places no additional financial burden on property owners. The Lahontan Water Board's responsibility for regulation of discharges with potential to impact water quality exists with or without the development of the Vision Plan. While individual discharges might each only have a marginal impact, the collective impacts of many of these impacts can result in impairments to water quality, which the Lahontan Water Board is required to address. The

	approach proposed in the Vision Plan seeks to resolve the water quality impairments in the WFCR initially using collaborative efforts without the establishment of more potentially costly formal regulations, such as Total Maximum Daily Loads (TMDLs), on dischargers.
2. While it is true that the West Fork Carson River (WFCR) does occasionally exceed the Water Quality Objectives (WQO), it doesn't happen often and when it does it is not by much. The draft plan acknowledges this as follows: *"… the magnitude and frequency of WQO exceedances causing the impairments in the WFCR are not extreme in magnitude or very frequent. Additionally, data show that WQOs related to multiple other constituents (such as dissolved oxygen, toxicity, pesticides, and other organic pollutants) are attained in the WFCR (SWRCB, 2021). It also be noted that the watershed is recovering from the impacts of the historical activities discussed in Section 5.1, which were much greater than the impacts of any current activities* …". (Plan draft, 4. WFCR Water Quality, 2nd para., page 20)	Comment acknowledged.
3. For example, Onsite Wastewater Treatment Systems (OWTS) improvements up to and including a community wastewater treatment facility would be a hugely unfair imposition on property owners for only a marginal gain in water quality.	See response to comment #1. Specific OWTS improvements are not required under the Vision Plan. The Vision Plan does not require the development of a community wastewater treatment facility.
4. Similarly, ranchers who receive treated wastewater from the South Tahoe Public Utility District (STPUD) shouldn't need to incur the expense of developing and implementing ranch water quality plans (RWQP) for only a marginal gain in water quality.	See response to comment #1. Under state law it is the responsibility of all dischargers to ensure their discharges do not adversely impact water quality. The approach proposed in the Vision Plan was chosen to have the least regulatory burden on grazing dischargers while still providing the means to ensure their discharges are adequately controlled.
5. In addition, requiring Alpine County to improve road maintenance is an added cost to a County that has struggled to maintain its roads.	See response to comment #1. Costs to the county will be a consideration in requests to the county, and staff intend to

	help identify grant funding opportunities for the County if needed to help with these costs.
6. While the draft plan does list numerous potential sources for grants to pay for these additional costs, it leaves the burden of identifying and applying for grants on the property owners. Our objection to the draft plan would be mitigated if Lahontan would include a commitment to fund the identification of and application for grants that would pay for any required corrective actions.	With available resources, Lahontan Water Board staff will provide guidance, technical assistance, and support of educational efforts, and inform stakeholders of opportunities for funding through such efforts as our email list for funding opportunities. The County can also seek to identify funding opportunities by contacting the Water Board's Department of Financial Assistance. Ultimately it is the responsibility of the dischargers to ensure their discharges do not adversely impact water quality.

Comment Letter 4. Sam Booth, AICP, Director, Alpine County Community Development

1. I've done a review of the WFCRVP and appreciate you pointing me to the sections on Roads and on-site septic systems. I do have some concerns with the language at the bottom of page 86 in Section 6.5 on Roads and the top of page 87. My concern would be with the highlighted language below from those paragraphs: "*Currently, Caltrans is the only party in the West Fork Carson River watershed whose stormwater discharges are covered under a State Water Board or Lahontan Water Board permit. USFS logging activities are regulated under the Lahontan Water Board's Timber Waiver, but the Lahontan Water Board does not currently have a permit covering other activities on USFS land. In the future, the Lahontan Water Board may issue orders requesting information or regulating discharges associated with road activities of the USFS, Alpine County, or other parties. On an annual basis, the Lahontan Water Board will request information from Ca/trans, Alpine County, and the USFS-HTNF about their progress in identifying and resolving culvert issues and other road erosion issues as well as let them know of any identified areas of greater potential water quality impact. The Lahontan Water Board will also work with them to request salt and sand use reporting on an annual basis and to investigate the potential use of materials with less impact to water quality. For Caltrans, this information can be included in their annual report submitted to the State Water Board."* Similar to the comments the Alpine Board of Supervisors made last week, I would be concerned with the language here suggesting that Lahontan would take regulatory measures with Alpine County for potential discharges associated with road activities when responses to these orders or regulatory measures would require the County to expend limited budget funds or	The Vision Plan does not propose a new regulatory mechanism for the regulation of discharges from Alpine County Roads, nor does it propose regulating these discharges under a permit similar to that used to regulate Caltrans storm water discharges. The approach proposed in the Vision Plan for these discharges is initially a collaborative and voluntary approach. The Vision plan does not change the regulatory measures available to the Lahontan Water Board for the regulation of discharges from Alpine County roads. The Board could, at some point, choose to regulate these discharges under orders while considering progress made, available funding and other factors, but no such action is proposed in the Vision Plan. Additional language clarifying the regulatory approach for Alpine County was added to the language of concern to the commenter as shown below in underline. "*The stormwater discharges from the remainder of the roads and highways which are not managed by Caltrans are not currently regulated by the State Water Board or the Lahontan Water Board through a permit or any other formal mechanism, and <u>no new formal regulatory mechanism is proposed for these discharges</u>."*

potentially prevent regular road maintenance activities which promote safe transit of vehicles in our harsh weather. The statement that Lahontan will "request information from Caltrans, Alpine County, and the USFS about their progress in identifying and resolving culvert issues and other road erosion issues" is also a concern to me. If Alpine County is unable to make progress due to lack of funding, will there be repercussions in the form of an order issued from Lahontan? I think that the language earlier in the plan which states: "The stormwater discharges from the remainder of the roads and highways which are not managed by Ca/trans are not currently regulated by the State Water Board or the Lahontan Water Board through a permit or any other formal mechanism" should indicate that Alpine County would not be treated with the same regulatory actions as Caltrans.	
2. As we've spoken about before, Alpine County is willing and eager to review data about possible improvements in practices and locations where BMPs could be implemented to improve the stream environment. It's our thought that the information could be a useful tool to invest in training, experiment with new practices and to seek funding from outside sources. However, we would be concerned about orders or regulatory mandates requiring these changes before additional funding is provided and the potential for that to impact vehicular travel of the roadways. Instead, I would like to see if its possible to include a discussion more similar to the last sentence highlighted above, which mentions working with the partners and investigating the use of materials with less impact to water quality. Some possible language for consideration might be: *"In the future, the Lahontan Water Board will work with Alpine County to provide resources, data, and best management practices that may reduce discharges associated with road activities of Alpine County. Alpine County will share information with Lahontan on the use of salt and sand use on roads and areas*	Staff appreciate the County's willingness and eagerness to review data about possible improvements in practices and locations where BMPs could be implemented to improve the stream environment. See response to comment #1 regarding regulatory mechanisms. The commenter's proposed language was added, with minor modifications, to the Vision Plan in section 6.5.2.

where the County has been able to make progress in identifying and improving culvert issues and other road erosion issues as well as let them know of any identified areas of greater potential water quality impact."	
3. As a general comment, I think the Vision Plan should look towards using education, resources, and the pursuit of funding as a mechanism to make improvements to the watershed, in order to avoid regulatory orders for compliance with requirements to provide data and monitoring.	Staff agree. The Vision Plan includes education, resources and the pursuit of funding and seeks to resolve the water quality impairments in the WFCR without the establishment of new regulatory requirements.

Comment Letter 5. Kimra McAfee, Executive Director, Alpine Watershed Group (AWG)

1. There is an extreme lack of content on the Washoe Tribe of Nevada and California, and no mention of the Washoe Environmental Protection Department (WEPD) or traditional ecological knowledge. This needs to be rectified. Here are just a few ideas: a. Bottom of p. 3 – If you didn't develop the Vision Plan with assistance and collaboration of the Tribe and WEPD then you can't list them here, but it feels like a glaring omission. b. Top of p. 14 – The Washoe Tribe and WEPD should be listed before AWG and CWSD as far as stewardship of the watershed. It should be clearly stated that this is the Washoe ancestral home.	Additional information about the Washoe Tribe and their ancestral homeland in the watershed has been added to the Vision Plan. Staff intends to continue to reach out to the Washoe Tribe and offer to work with them on implementation of the Vision Plan. The Washoe Tribe is not listed as a collaborator in the development of the Vision Plan on page 3. The Washoe Tribe was put before AWG and CWSD in the section on the top of page 14.
2. The plan could use more maps: a. Map of various water quality sampling sites – We think one exists with at least Regional Board and AWG sites. b. Map for roads section – It isn't a great map, but sending you	While additional maps would be useful, the production or inclusion of these additional maps is beyond the resources available for completing the Vision Plan. As resources become available, such maps may be prepared in the future.

map from USFS from Roads Forum. c. Mike Hanks' Final Project has many maps to consider to complement the text (e.g., Paved and Unpaved Roads, Roads and Stream Crossings).	
3. The flora and fauna should have a larger section. As commented on in AWG's mark-up, invasive species are only given a couple sentences, but there are noxious weeds and impacts to waterways that should be expanded on.	To maximize its effectiveness, the Vision Plan is focused on information most relevant to its primary objective of resolving and preventing water quality impairments. More lengthy descriptions of the flora and fauna would be ancillary to the focus of the Vision Plan. Information on flora and fauna could be informative for some readers, so a reference to the flora and fauna descriptions in the Carson River Adaptive Stewardship Plan was added the Vision Plan.
4. The ten-year goals sound reasonable, but what work and support will be provided? What outreach has been done with landowners and project managers to establish these ten-year goals? AWG is in the plan for two to three projects, but AWG staff were not aware ahead of time, so we are wondering with the other goals if folks are aware of what they are requested to do according to the Vision Plan.	With available resources, Lahontan Water Board staff will provide outreach to stakeholders as described for each source category. In addition, Lahontan Water Board staff will provide guidance, technical assistance, and support of educational efforts, and inform stakeholders of opportunities for funding through such efforts as our email list for funding opportunities. The outreach to stakeholders is summarized in section 7 of the Vision Plan. In addition to the outreach described there, in July 2023, drafts of the plan, with highlighted areas of relevance, were directly sent to AWG, CWSD, STPUD, Caltrans, the Humboldt-Toiyabe National Forest, and the California Department of Fish and Wildlife. While there has been some outreach to stakeholders, not all landowners may yet be aware of the 10-year goals or other timelines. Information about the timeframes for completion of certain elements will be related to stakeholders during implementation.

5. The timeframes listed for Water Board should have more details on when and what will happen at the deadline given.	Adding additional detail on exact Lahontan Water Board actions and timelines is not possible at this time. The Vision Plan cannot presuppose how the Lahontan Water Board will choose to follow up during adaptive management.
6. The resources included in Appendix A and B are a really great format for informing project managers of options. Please do one for Onsite Wastewater Treatment Systems.	Providing an additional appendix for Onsite Wastewater Treatment Systems (OWTS) is beyond the resources available. However, a link to existing OWTS resources available via the EPA Septic Smart program has been added to the Vision Plan.
7. Send document to USFS to confirm what is included in the document. USFS Forester Annabelle Monti should review the substance in Section 6 (i.e., aspens are not being planted as part of HTNF-WFCR Fuels Reduction, Aspen, and Meadow Restoration Project listed on page 81).	A draft of the Vision Plan was sent to the USFS for their review in July of 2023. A draft was also sent to Annabelle Monti in September 2023. The Vision Plan no longer says that aspen planting is part of the Humboldt-Toiyabe -WFCR Fuels Reduction, Aspen, and Meadow Restoration Project.
8. [Commenter provided detailed comments on typographical errors, missing acronyms, incorrect dates, and other minor corrections]	Lahontan Water Board staff appreciate these corrections and comments and have made the suggested changes.

Comment Letter 6. Ben Ewing, District Fisheries Biologist, California Department of Fish and Wildlife, North Central Region.

1. Page 17, Section 3- I would add hunting and fishing to designated beneficial uses.	The beneficial uses of Noncontact Water Recreation (REC-2), which includes hunting, and Commercial and Sportfishing (COMM), were added to the list of beneficial uses in section 3.
2. Page 58, Section 5.5- CDFW does not maintain the bathroom at Pickett's Junction.	This has been corrected to note that CDFW contracts out the maintenance of the facilities at Pickett's Junction.
3. Page 58, Section 5.6- Blue Lakes are not in W. Carson headwaters.	This error has been corrected.

Comment Letter 7. Gregoria Ponce', Chief, Office of Rural Planning, California Department of Transportation (Caltrans)

Comment	Response
1. Environmental If any construction related activities will encroach into Caltrans Right of Way (ROW), the project proponent must apply for an Encroachment Permit to the Caltrans District 10 Encroachment Permit Office. All California Environmental Quality Act (CEQA) documentation, with supporting technical studies, must be submitted with the Encroachment Permit Application. These studies will include an analysis of potential impacts to any cultural sites, historic properties, biological resources, hazardous waste locations, scenic highways, and/or other environmental resources within Caltrans ROW, at the project site(s).	Comment acknowledged. The Vision Plan identifies and discusses ongoing and expected actions to remedy the impairment in the WFCR but does not mandate compliance activities. If a project which is identified in the Vision Plan is implemented, that project's proponents will need to obtain all necessary permits and comply with any environmental analysis that may be required to obtain those permits. .
2. Hydrology The WFCR Vision Plan sets out a 10-year timetable for implementation, with a goal of attainment for water quality objectives by October 2033. However, there is no change at this time in hydrology. Any increase in runoff generated by the proposed Vision Plan should be stored/mitigated onsite. Caltrans would not allow additional runoff draining into the State ROW nor significantly impacting the existing drainage patterns. Additional review will be required when the Vision Plan has developed if the hydrology and flow pattern change has occurred within State Route (SR) 88 and 89 limits.	Comment acknowledged. See response to comment #1.

References

State Water Resources Control Board, 2018. Water Quality Control Policy for Recycled Water. https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2018/121118_7_final_amendment_oal.pdf