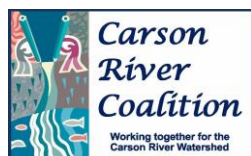


CARSON RIVER WATERSHED ADAPTIVE STEWARDSHIP PLAN



NEVADA DIVISION OF
**ENVIRONMENTAL
PROTECTION**



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How to Use this Document:

This document is a supplement to the original Carson River Adaptive Stewardship Plan 2007 and should be used in conjunction with that document. The actual 2007 document will not be modified. Instead the update will be consistent in order and form, and split into the sections as provided in the 2007 document. The update can simply be added into the 2007 document binder behind the appropriate sections, or must be added as a supplement to the original plan.

The original maps can still be used. New floodplain maps are being created and will be a part of a Carson River Regional Floodplain Management Plan Update in 2017/2018. The project level maps are being updated as an ongoing process. We have begun to map the new projects; however, are in the process of obtaining detailed project locations from our partners to finalize that effort.

Purpose of Update

The 2007 plan recommends that an update be conducted on an as needed basis, not to exceed a three-year time frame. We have exceeded that time frame so this document will serve as the 2017 update. The purpose of this update is to provide current information on projects and programs listed in the 2007 plan, add information acquired since 2007, and add projected and potential project and program information. Project implementation since 2007 has achieved the protection, revegetation or stabilization of approximately 29% of the river corridor between CA Stateline and Weeks Bridge upstream of Lahontan Reservoir in NV. In addition, analysis of the water quality data collected between 1993 and 2012 indicates a decreasing trend in total phosphorus concentration at three sampling sites along the river. The update for Chapter 6 provides a detailed summary of water quality and load reductions. The 2017 update will be distributed via email to stakeholders and is available at www.cwsd.org.

Acknowledgements:

Thank you to CWSO for patiently awaiting this update. Thank you to all those that participated in this process and provided data, information and hard work to assist in finalizing this document. CWSO is especially thankful to the NDEP Bureau of Water Quality Planning for helping to partially fund this update through the Clean Water Act Section 319(h) funding. This document would not be feasible without their guidance and funding assistance.

1.0 Introduction Supplemental Update

In June 2007, the Carson River Watershed Adaptive Stewardship Plan (plan) was completed. The main purposes of the Plan are to: a) provide an overview of the watershed and its challenges; b) identify potential sources of nonpoint source pollution; c) discuss short and long-term strategies and actions to address these potential sources; d) provide tracking mechanisms for projects and programs; e) identify future project and program opportunities; and, f) address the nine criteria elements of the Clean Water Act (CWA) Section 319 Program. These criteria elements are provided on page II, Section 1.1 of the 2007 plan.

Many organizations throughout the Carson River Watershed (watershed) rely upon CWA 319 funding for projects and programs. It is the desire of the Environmental Protection Agency (EPA) and the Nevada Division of Environmental Protection (NDEP) that all watershed based plans meet the criteria elements listed above. EPA and NDEP determined that the 2007 plan does meet the EPA criteria. All projects and programs implemented within the watershed utilizing CWA 319 funds are expected to be consistent with this plan.

For organizational purposes, the 2007 plan focuses on seven project categories. One of the goals of the plan is to present a comprehensive list of projects that fall within these categories to illustrate how the projects and programs are moving in a purposeful and solution-based direction. The seven major project categories as listed in the 2007 plan are:

1. Monitoring and Assessment
2. River Rehabilitation/Stabilization
3. Floodplain Conservation
4. Water Quantity
5. Outreach and Education
6. Noxious Weed Abatement
7. Recreation Use and Management

The original detailed descriptions of these categories are provided on page III of the 2007 plan, which is available at www.cwsd.org.

CWSD has updated these categories as follows:

1. Floodplain Management
2. Water Quality
3. Regional Water Supply
4. River Rehabilitation/Stabilization/Habitat Enhancement
5. Invasive Species
6. Outreach and Education
7. Recreation

An updated Figure ES-1: Carson River Integrated Watershed Management Project Categories (originally on page II of the CRASP Executive Summary describes the updated categories.)

Figure ES-1: Carson River Integrated Watershed Management Project Categories



Floodplain Management
Create regional level planning solutions focused on conserving and restoring our existing floodplain lands and raising public awareness of flooding hazards.



Regional Water Supply
Balance regional water supply demands among municipal, environmental, and agricultural users through cooperative action



Water Quality
Implement projects that monitor, evaluate, and will collectively or cumulatively improve water quality over time.



Outreach and Education
Promote action oriented, hands-on educational programs and projects that engage and connect the community to our watershed.



River Rehabilitation/Stabilization/Habitat Enhancement
Enhance riparian habitat, mitigate severe erosion, restore river bank form and function to improve the overall health of the river.



Recreation
Support public recreational access to natural areas, while maintaining natural resources and respecting private property rights.



Invasive Species
Map, monitor, and treat invasive animals and plants to prevent and mitigate their spread. Collaborate with stakeholders to inform and educate the public.

1.1 319 Elements of a Watershed-Based Plan

To ensure that projects that are conducted on the Carson River and are funded with Section 319 funds progress towards improvement of water quality, the following required elements will be addressed in this plan:

- a. An identification of the causes and sources or groups of similar sources that will need to be controlled to achieve the load reductions estimated in watershed plan. (*Section 5.11*)
- b. An estimate of the load reductions expected for the management measures described under paragraph (c) below. (*Section 6.2.5*)
- c. A description of the non-point source (NPS) management measures that will need to be implemented to achieve the load reductions estimated under paragraph (b) above and an identification (using a map or a description) of the critical areas in which those measures will be needed to implement this plan. (*Section 8.0, Tables 8.1 and 8.2*)
- d. An estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon, to implement this plan. (*Section 8.0, Tables 8.1-8.8, Section 9*)
- e. An information/education component that will be used to enhance public understanding of the project and encourage their early and continued participation in selecting, designing, and implementing the NPS management measures that will be implemented. (*Section 8.4*)
- f. A schedule for implementing the NPS management measures identified in this plan that is reasonably expeditious. (*Section 8.0, Tables 8.1-8.8*)
- g. A description of interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented. (*Section 8.0, Tables 8.1-8.2*)
- h. A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made toward attaining water quality standards and, if not, the criteria for determining whether this watershed-based plan needs to be revised, or, if a NPS TMDL has been established, whether the NPS TMDL needs to be revised. (*Sections 6.2.5.1.1 and 6.2.5.2.1*)
- i. A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under item (h) above. (*Section 8.7, Original Chapter 9*)

1.2 Abbreviations Updated

CEQA	California Environmental Quality Act
NEPA	National Environmental Policy Act
NAPCP	Nevada Air Pollution Control Program

2.0 Integrated Watershed Management

2.1.1 Update – Local Stakeholder Groups

The Lahontan Valley Environmental Alliance is now defunct due to lack of funding. The 319(h) Clean Water Act contract between NDEP and CWSD which funded the Clear Creek Watershed Coordinator expired in December 2013. CWSD staff will coordinate with the Clear Creek Watershed Council when issues need to be addressed.

2.2 Update – Western Nevada Resources Conservation and Development

This office was closed by the United States Department of Agriculture (USDA) during their required downsizing as a part of the US financial crisis. Since the loss of this office, the Carson River Workdays have been coordinated by River Wranglers, a non-profit organization whose mission is to explore, conserve and celebrate our rivers through community programs, projects, and hands-on education. The organization is focused on the Carson River at this time.

2.3 Update - Expansion of Carson Water Subconservancy District

The CWSD Board of Directors consists of thirteen members and one advisory member from Storey County, added in 2009. Each member is appointed by their respective counties as follows:

- Two representatives of Alpine County
- Five representatives of Douglas County
- Two representatives of Carson City
- Two representatives of Lyon County
- One representative of Storey County*
- Two representatives of Churchill County

* Currently serves in an advisory capacity only

2.4 Update - Reassessment of Watershed Goals and Objectives

In May 2009, the CRC held a 10-year anniversary celebration meeting. Goals for the meeting were to celebrate the work that has been accomplished, look at the original vision and purpose statements, and reassess watershed goals and objectives.

Measurable goals suggested at this meeting included the following:

1. Participation
 - a. Maintain current participation and expand to include greater number of general public, ranchers and public officials
 - b. More “on the river” activities
 - c. Maintain central facilitator/coordinator
 - d. Increase public awareness of CRC and activities
 - e. Develop a virtual bulletin board

2. Data Sharing

- a. Organize watershed conference for 2011
- b. Develop central data hub

Many of these suggestions are incorporated into the current Watershed/CRC Coordinator's 319 (h) contract tasks. Progress is documented in the 319 (h) contract final reports.

3.0 Overview of the Carson River Watershed

Additions to this section include the following:

3.1.1 Update - Reservoirs and Lakes

Indian Creek Reservoir is now a very popular fishing and camping area, and is no longer used to store treated wastewater from Lake Tahoe.

3.3 Update – Climate

The Carson Water Subconservancy District recently funded a study entitled *Streamflow Changes in the Carson River System* by Dr. Alexandra Lutz with the Desert Research Institute.

Particularly important results indicate that the spring runoff is occurring earlier in the year and less runoff in the earlier summer. This is likely a climate change signal. This aligns with the results that average minimum temperatures from January to May show a statistically significant increasing trend. Rising temperatures over the winter and spring indicate spring runoff will begin and end earlier (Lutz 2012). This has implications for seasonal water quantity given there is very limited upstream storage in the upper watershed. It also impacts agricultural users and the environment as the water is coming through the system prior to the start of the normal growing season.

3.5 Update – Habitat and Vegetation

3.5.1 Wetlands

The Nevada Natural Heritage Program completed the Nevada Priority Wetlands Inventory in 2007 as an addendum to Nevada’s 2003 Statewide Comprehensive Outdoor Recreation Plan. The Inventory ranks 234 wetland areas as priority areas for conservation initiatives. There are 26 wetland areas designated as the “highest” conservation priorities. The introductory document states that, “Wetland area ranks were determined by the qualitative rating of factors representative of the wetland area’s capacity to provide ecological functions and values, the intensity of stress induced by human activities, and an estimate of the proportionate area of wetlands historically impacted. The Carson River contains two priority areas in the top 26: The Lahontan Reservoir, Carson river– open water, riparian woodland ranked 6th and the Carson River/Carson Valley - river open water, Calif. border to Carson Valley exit ranked 7, as well as several others on the list of 234 (Nevada Natural Heritage Program 2008). Follow this link for further information <http://www.dcnr.nv.gov/wetinv2007.pdf>.

Also see Fallon Paiute Shoshone Tribal Wetland Section 3.8.2 below.

3.6 Update – Fish and Wildlife

A literature review of current data and information on aquatic life (fisheries and macro-invertebrate populations) of the Carson River was conducted in 2007. This report’s information better defines the impacts to aquatic life due to nonpoint source pollution and hydrogeomorphic modifications. Specific issues the report investigated included, which fish species reproduce naturally; estimates of native and non-native species populations; when and where fish surveys have been conducted; habitat requirements and status of Lahontan Cutthroat Trout (LCT);

Macro-invertebrate populations and surveys; and results of Amphibian surveys (Azad 2007). Available in the CWSD library.

Additionally, the 2013 Carson River Literature Review was completed by Dr. Sudeep Chandra and Jason Barnes for Cal Trout, Inc. Contact CWSD for .pdf version (Chandra 2013).

3.6.1 Special Status Wildlife Species

The Nevada Natural Heritage Program's updated website is <http://heritage.nv.gov/>.

3.6.1.1 Sage Grouse

Update information on Nevada's Sage Grouse habitat and conservation plans is available at http://www.ndow.org/Nevada_Wildlife/Sage_Grouse/.

3.6.1.2 Sierra Nevada Yellow-legged Frog

The Sierra Nevada yellow-legged frog, *Rana sierrae*, became listed as endangered by the State of California on April 1, 2013 and federally listed as endangered June 30, 2014. Two locations for the frogs have been identified in the Carson River Watershed. There is a small population near Kinney Lakes and a relatively large population of over 100 adults with four main breeding sites near the headwaters of Pleasant Valley. Known populations are mainly lake-based, although stream populations do exist. Although there are not many lakes in the Sierra Nevada portion of the Carson River Watershed, habitat can be found anywhere there is perennial water above 5000 feet. However, if the habitat contains introduced fish it is less likely that there will be frogs (Mussulman 2013 pers. coms.). See <http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/TEAnimals.pdf> for a full list of State and Federal listed endangered and threatened animals of California.

3.6.1.3 Yosemite Toad

The Yosemite toad, *Anaxyrus canorus*, is now listed as a threatened species under the Federal Endangered Species Act and critical habitat has been determined as of June 30, 2014. Alpine County, CA contains known habitat for this species.

3.6.1.4 Western Yellow-billed Cuckoo

The Western Yellow-billed Cuckoo, *Coccyzus americanus occidentalis*, became federally listed as a threatened species on November 3, 2014. According to the Sacramento Office of the US Fish and Wildlife website,

“The western population of the yellow-billed cuckoo (Coccyzus americanus), an insect-eating bird found in riparian woodland habitats, winters in South America and breeds in western North America. Once abundant in the western United States, populations have declined for several decades, primarily due to the severe loss, degradation and fragmentation of its riparian habitat as a result of conversion to agriculture, dam construction, river flow management and riverbank protection. Overgrazing and invasive exotic plants have also contributed to declines.” (www.fws.gov).

A portion of the middle Carson River in and adjacent to Fort Churchill State Park and Lahontan Reservoir is proposed as designated critical habitat. Western Yellow-billed Cuckoo historically was seen in this area. The Nevada Comprehensive Bird Conservation Plan (GBBO 2010) suggests riparian habitat restoration wherever opportunities exist throughout the bird's historical range including Northern Nevada corridors along the Carson, Truckee and Walker Rivers. A final determination on the critical habitat will be forthcoming in 2015. More information is available on the Sacramento Office US Fish and Wildlife Service Website, www.fws.gov.

Fish species discussed below.

3.6.2 Beaver: Native or Introduced

There is a typing error in last sentence of second paragraph. The sentence should read: Beaver also ~~east~~ eat Quaking Aspen, willows and other softwoods growing along the Carson River and tributaries.

3.6.3 Bird Habitat

3.6.3.1 Nevada Important Bird Areas

The Important Bird Areas (IBA) program was started in the United Kingdom by Bird Life International and in 1995 the Audubon Society became the IBA partner-designate in the United States (McIvor 2005). "Recognition of IBAs is intended to help birds and the broader suite of wildlife under their umbrella by setting science-based priorities for habitat conservation and promoting positive action to safeguard vital bird habitats (National Audubon Society, 2004b).

The Audubon Society chose to implement the IBA program on a state- by - state basis. In 2005, the Lahontan Audubon Society Published *Important Bird Areas of Nevada*, which identified IBAs throughout the State of Nevada. Goals of the Nevada IBA Program include:

"Formalize the identification of IBAs in Nevada" which meets at least one of the following criteria set for Nevada. (Audubon Society 2005)

NV-1: Sites important to species of concern in Nevada

NV-2: Site harboring an assemblage of species restricted to a unique or threatened natural community.

NV-3: Sites where significant congregations of birds occur.

Four of the Nevada IBA's are within the watershed and they are described as follows:

Carson Valley IBA:

The western side of Carson Valley comprises this IBA containing pasture lands, grasslands, riparian wetlands, and the Carson River corridor. In the shadow of the eastern slope of the Sierra Nevada, this IBA is considered the second most threatened IBA in the state of Nevada. Species include: Tri-Colored Blackbirds, Sandhill Cranes, White-faced Ibis, Bald Eagle, Golden Eagle, Red-tailed Hawk, Ferruginous Hawk, Rough-legged Hawk, Northern Harrier, Cooper's Hawk, Sharp-shinned Hawk, Prairie Falcon, American Kestrel, Peregrine Falcon, Merlin, Swainson's Hawk, Osprey, Barn Owl, Great-horned Owl, Long-eared Owl, Short-eared Owl, Northern

Pygmy Owl, and Flammulated Owl. In addition, the valley's wetlands are home to a diversity of water birds and many species of shorebird stopover in the valley during migration. (P. 38-40)

Carson Range IBA:

The Carson Range is a spur of the Sierra Nevada and represents the entire occurrence of the Sierra Nevada ecoregion in the state of Nevada. Seventy percent of the Carson Range is within the State of Nevada, and the rest is in California. Biodiversity is quite high in the Carson Range. Compared to the rest of the state, the Carson Range is well-watered, and a number of perennial streams and both the Carson and Truckee Rivers descend from the Carson Range. Most of the land is under U.S. Forest Service Management and as such has a lengthy list of land uses. The Carson Range bird community includes these species:

Pygmy Nuthatch, Band-tailed Pigeon, Mountain Quail, Pileated Woodpecker, White-headed Woodpecker, Black-backed Woodpecker, Res-breasted Sapsucker, Winter Wren, Northern Goshawk, Cooper's Hawk, Flammulated Owl, Calliope Hummingbird, Lewis' Woodpecker, Red-naped Sapsucker, White-headed Woodpecker, Olive-sided Flycatcher, Willow Flycatcher, Western Bluebird, Orange-crowned, MacGillivray's, Wilson's Warblers, and the Rosy Finch. (P.32-34)

Carson River Delta IBA:

The Carson River Delta IBA was recognized largely for its habitat values; the site constitutes the last best remnant of a cottonwood-willow riparian forest in northwestern Nevada. Once extensive along the Carson River, this habitat suffered as forests were cut for fuel, grazed, and eliminated as the river was diverted or dammed. The IBA includes the historic flood plain from Fort Churchill downstream to the river's delta at the Lahontan Reservoir. Because riparian forests have been severely impacted in Nevada, many of the bird species dependent on this habitat type have also experienced dramatic declines. The riparian forest is also an important migration corridor, providing stopover habitat to Neotropical migrants. Some of the species in this IBA are the Yellow-billed Cuckoo, Willow Flycatcher, White-faced Ibis, Swainson's Hawk, Western Bluebird, Wilson's Warbler, Bald Eagle, and Cooper's Hawk. (p. 35-37)

Lahontan Valley Wetlands IBA: The Lahontan Valley Wetlands area is a remnant of ancient Lake Lahontan that once covered 8,665 square miles of western and northern Nevada. This IBA includes the critically important resources of Stillwater National Wildlife Refuge, Stillwater Wildlife Management Area, Carson Lake and Pasture, and Soda Lake. Depending on water levels during migration, the area is visited by up to 250,000 of both shorebirds and coots as well as upwards of 29,000 waterfowl. In addition, these wetlands are important breeding habitats for thousands of White-faced Ibis' and American Avocets, and hundreds of Snowy Plovers. Other species within this IBA include the Eared Grebe, Bald Eagle, Long-billed Dowitcher, Black-necked Stilt, and Wilson's Phalarope, pp. 61-64.

3.6.3.2 Nevada Comprehensive Bird Conservation Plan 2010 (NCBC Plan)

The NCBC plan is a statewide document that summarizes the most up-to-date knowledge regarding the conservation status of Nevada's birds and their habitats. It assesses conservation concerns and presents effective conservation strategies for willing private and public partners to implement (GBBO 2010) throughout Nevada. NCBCP is available on-line at

www.gbbo.org/bird_conservation_plan.html. It outlines the specific methods developed to identify the priority bird species addressed in the plan and the priority species assessment outcomes. It is a ten year plan (2011 – 2021). The goals stated in the NCBCP are to:

- a) Summarize, analyze, and integrate all relevant and reliable information about the conservation status, distribution, abundance, and habitat requirements of conservation priority birds in Nevada,
- b) Assess important threats and conservation issues affecting these birds, emphasizing those that can be addressed through management practices,
- c) Stress habitat management as the primary mechanism for bird conservation, recognizing that most threats to Nevada's birds are linked to habitat,
- d) Make this information available to resource managers in a concise, organized, standardized, and user-friendly format, and
- e) Periodically update the plan as new information becomes available, and make updates readily available online (GBBO 2010).

Habitat Implementation Worksheet:

As part of our assistance to land management partners we developed a step-by-step worksheet that will identify specific and quantitative goals for a habitat project in Nevada. We recommend reviewing the [example](#) and then apply it to your own project in this [blank worksheet](#). This was developed with financial support from the U.S. Fish and Wildlife Service, Nevada Field Office, and we encourage all land managers to use this Plan for planning and funding additional bird conservation action in Nevada. For this, feel free to copy-and-paste any useful information from the Plan. Acknowledgment of the Great Basin Bird Observatory much appreciated.

GBBO provided a workshop on how to use this document. The website contains useful information on how to approach habitat conservation and provides a step by step worksheet to assist land managers (see inset for details and a link to the worksheet) (www.gbbo.org/bird_conservation_plan.html).

Also see Fallon Paiute Shoshone Tribal Wetland Section 3.8.2 below.

3.6.4 Update - Fish Populations

~~3.6.2.1~~ 3.6.4.1 Lahontan Cutthroat Trout

There is a typing error in last sentence of second paragraph. The sentence should read: However, they ~~are~~ seem to be intolerant of competition or predation by non-native salmonids, and rarely exist with them.

~~3.6.2.2~~ 3.6.4.2 Paiute Cutthroat Trout

A joint Environmental Impact Statement (NEPA EIS) and Environmental Impact Report (CEQA EIR) for the Paiute Cutthroat Trout Restoration Project was completed in February 2010 by the USFWS and Cal F&G. The CEQA Findings of Fact and Statement of Overriding Considerations document was published in March 2010. According to the USFWS/CDFG websites, the agencies are working in partnership to restore the threatened Paiute cutthroat trout to 9.1 miles of

native habitat by eradicating non-native trout in the Silver King Creek drainage (Carson-Iceberg Wilderness), using the pesticide rotenone. Additional information on this project can be found at <http://www.dfg.ca.gov> and at <http://www.fs.usda.gov>. According to Cal F&G Silver King Creek was treated in 2013 and will be treated in 2014 (Ewing 2013 pers. coms).

3.8 Tribal Overview

3.8.1 Washoe Tribe of Nevada and California Update

The Washoe Tribe has a long commitment to the restoration of Tribal lands and the aboriginal homelands. The Washoe Environmental Protection Department (WEPD) was established in the Tribal government structure in 1998. Several laws and plans to protect the environment of Tribal lands have been established, including:

1. Planning Development law (1995)
2. Water Code (1999)
3. Environmental Protection Code
4. Land Use Management Plan (1995)
5. Nonpoint Source Assessment and Management Program (2000), Draft update 2017 awaiting Tribal and EPA approval.
6. Sampling and Analysis Plan for the Water Quality Monitoring Program (2000), updated and approved in 2015.
7. Development of Water Quality Standards ongoing since 1999.
8. Unified Watershed Assessment (2001)
9. Preliminary Water Quality Data Report (305b) (1997, 2002, 2005).
10. Developed a Community Outreach Program.
11. Noxious Weed Management Plan (2001)
12. Emergency Operations Plan (2004)
13. State Level Multi Hazard Mitigation Plan (2005)
14. Carson River Geographic Response Plan (2006)
15. Wellhead Protection Program (1997) Revised (2006)
16. Integrated Solid Waste Management Plan (2005), updated and approved in 2015.
17. Wetlands Inventory and Assessment mapping.
18. Grazing Management Plan
19. Carson River Geographic Response Plan (2006)
20. BIA Wildland Fire Management Plan (2003), 2017 update in progress.
21. Ambient Air Quality Assurance Project Plan approved in 2014

Development and the revision process for the Tribe's Water Quality Standards have been underway since 1999 with hopes of final approval by the Washoe Tribal Council and EPA in the near future. Treatment as a State (TAS) status for program authorization under §303 and §401 Water Quality Program will be submitted to EPA in future. Utilizing CWA §106 funding the Tribe developed an approved NPS Assessment Report and Management Program Plan and became eligible for funding under CWA §319h Nonpoint Source Pollution Control Program (NPS) in 2000. Since 2000 the Washoe Tribe has implemented several successful projects on the riverbanks along the Carson River and Clear Creek. These projects will address temperature and turbidity issues in the long term, as identified in the water quality monitoring program, by

stabilizing and re-vegetating the riverbanks. See detailed project summaries in updated Appendix G. The WEPD completed a Unified Watershed Assessment (UWA), which listed the Middle Carson as a Category One, and Priority One Watershed.

The primary goal of the Tribe's NPS Program is to identify, control, and abate the impacts of NPS pollution on the quality of the Tribe's surface and ground water resources. This goal will provide for the beneficial use of the surface and groundwater resources. Water quality, riparian and watershed condition must be managed to provide the opportunity for the Washoe Tribe to exercise beneficial and traditional uses.

3.8.2 Fallon Paiute Shoshone Update

The Fallon Paiute-Shoshone Tribe (FPST, Fallon Tribe, Tribe) in Churchill County, Nevada are comprised of 69 acres of Colony land; 3,480 acres of Reservation land; and 4,640 acres of allotted lands located in the Carson Desert hydrographic area (USGS, 1994a). This area is a part of the terminal basin of the Carson River.

It is the mission of the Fallon Paiute-Shoshone Tribe (FPST, Fallon Tribe, Tribe) to maintain current water quality on Tribal lands while also working to improve water quality through the offering of educational programs; conducting of monitoring and assessment; the development of policies, laws, and standards; and the implementation of projects aimed at protecting and improving water quality on Tribal lands. To this end, the Tribe supports the activities of the Surface Water Quality Program including the development of nonpoint source pollution management programs to protect tribal waters and, therefore, the Carson River Watershed. The FPST Environmental Department administers programs that monitor and maintain critical environmental resources. Grants currently under the Environmental Department include the EPA General Assistance Program; EPA Water Pollution Control Program; EPA Nonpoint Source Pollution Control Program; and Tribal Weed & Mosquito Abatement Program.

There are numerous natural and manmade influences on surface and groundwater quality that affect tribal waters. The location of the Reservation exacerbates the risk to tribal waters from nonpoint sources of pollution. Nonpoint sources are the most widespread sources of water pollution. The Fallon Tribe's surface and groundwater resources have been impacted by both on and off Reservation activities that include, but are not limited to, agriculture, illegal or unauthorized waste disposal, hydro-modification, mining, road erosion, storm water runoff, urban runoff, landfills, spills, and septic and sewer systems.

The water resources of the Fallon Tribe are a special consideration because the Tribal lands comprise only a small portion of the Carson River watershed. The location of Tribal lands does not allow the Tribe to have significant control over the waterways and wetland water quality and only minimal control over local groundwater quality. Therefore, it is intended that the Tribe's NPS program will be used in conjunction with other federal, state, and local programs to eliminate NPS issues.

The primary goals of the Fallon Tribe's NPS Program are to identify, control, and abate the impacts of NPS pollution on the quality of the Tribe's surface and groundwater resources. This

goal will provide for the beneficial use of the surface and groundwater resources. Water quality and watershed conditions must be managed and protected for the Tribe to exercise beneficial and traditional uses. The FPST will utilize the NPS Management Plan to achieve water quality goals and targets identified in the NPS Assessment Report by controlling and preventing NPS pollution through a suite of implementation activities selected by tribal and key non-tribal partners. The NPS Management Program will be implemented within the boundaries of the reservation through a relatively seamless approach that considers pollution sources from both tribal and non-tribal lands. Under this approach, tribal water quality staff will work in a cooperative manner to identify nonpoint water sources affecting tribal waters. For NPS pollution originating on land owned by the tribe or individual tribal members, NPS Management Program staff will work with landowners to identify and implement appropriate NPS control measures through voluntary measures. Where NPS pollution sources impacting tribal waters originate on private non-Indian land, program staff will work as appropriate with non-tribal resource agencies, stakeholders, and property owners to develop workable solutions to the NPS challenges identified. The management program is only one part of the solution to the water quality issues facing the tribal properties. The Tribe will work with appropriate state and federal agencies to help ensure that there will be no detrimental effects to tribal surface and groundwater resources from sources outside the Tribe's jurisdictional authority.

The objectives of the Fallon Tribe's NPS Assessment and Management Program are 1) to document known water quality and watershed issues; 2) to facilitate education and outreach programs 3) identify the causes and sources of the NPS pollution and 4) develop a tribal as well as inter-governmental cooperative approach to prioritize, manage, enhance, and protect the Tribe's water resources.

(This update is written in accordance with the Fallon Paiute-Shoshone Tribe's Nonpoint Source Assessment Report and Management Plan (FPST¹ & FPST² 2014.)

3.8.2.1 Fallon Paiute Shoshone Tribal Wetlands

The reconstruction of the Tribal Wetlands began on November 16, 1990 when the United States Congress passed Public Law 101-618 (Title 1-Fallon Paiute-Shoshone Tribal Settlement Act). Congress passed Section 106 of Public Law 101-618 to appropriate funds for the closure of the TJ Drain and the revitalization of the Fallon Paiute Shoshone Tribal wetlands. In 2008, the FPST Tribe contracted with the Bureau of Indian Affairs, with consultation with the U.S Fish and Wildlife Service, and Ducks Unlimited to successfully initiate construction activities.

The TJ Drain was in the Northeast section of the reservation and was approximately 2.5 miles in length. The TJ Drain was intended to facilitate improved water drainage and expansion of Tribal agricultural lands. However, instead of improving agricultural development, the TJ Drain tapped into toxic ground water that was high in salts and minerals which were subsequently transported to the Stillwater National Wildlife Refuge, (east of the reservation). The Stillwater NWR began to realize a decline in wetland vegetation biodiversity and that wildlife was negatively impacted by the toxic waters flowing from the TJ Drain System. The closure of the TJ Drain began on April 14, 2009 with final completion on June 12, 2009.

The active tribal wetlands encompass an area that is approximately 499 acres and is divided into 3 separate management units called “Cells”. Water can be independently delivered to each cell, or can be passed through each cell to achieve wetland water management objectives.

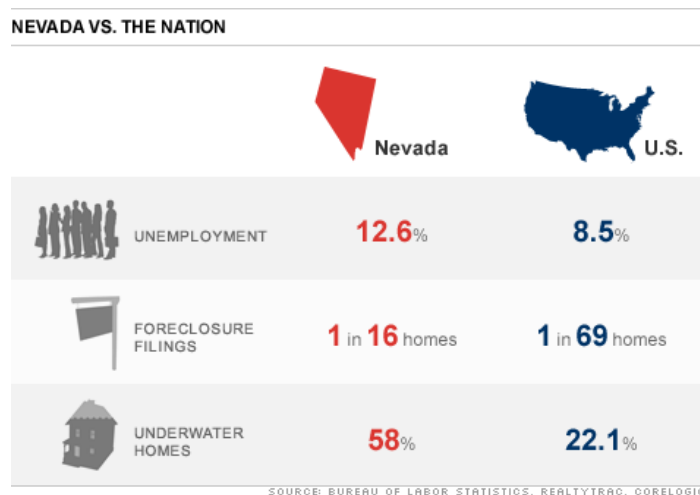
The FPST wetlands has multiple use objectives which includes:

- Grazing
- Wildlife/Habitat Production
- Cultural Plants
- Recreation Values
- Cultural Values
- Hunting

The FPST Tribal wetlands is an area of International importance for shorebirds. Our wetlands are part of the “Western Hemisphere Shorebird Reserve Network” as of August 1988, and is a significant stop-over for migrating birds along the Pacific Flyway. The tribal wetlands serve tribal members and the public through development and maintenance of existing resources to promote, enhance, and achieve wetland and habitat restoration. The tribal wetlands support a great abundance and diversity of waterfowl, wildlife, and fish. The tribal wetlands offer something for everyone to enjoy.

3.10 Land Use Update

Nevada was particularly hard hit by the economic downturn during 2008 – 2011. Nevada lead the nation in home foreclosures and homes where the values dropped below the worth of their mortgages. The below table from the article by Tami Luhby of CNNMoney *Nevada's Triple Economic Whammy* published February 4, 2012 provides some telling statistics.



“Nevada has the dubious distinction of leading the nation in unemployment, foreclosure filings and number of underwater homes. That's not good for the state's economy”

Population estimates by County are available from the Nevada State Demographers website, <http://nvdemography.org/>. Nevada's economy is starting to recover; however, funding sources for environmental management of our watershed resources has been reduced, is much more

competitive to obtain, and requires creative solutions and partnerships to continue to undertake the variety of projects to reach our watershed goals.

Table 3.10.1 Pastures, Rangelands and Farms

Table 3.10.1 Agricultural Land Use				
County	Approx. Acres 2007	Approx. Acres 2016	% change	
Alpine County, CA	8,000	8,000	0	
Douglas County, NV	38,551	37,233	-3%	
Carson City, NV	2,213	1612.5	-27%	
Lyon County, NV	130,051	118,394	-9%	
Churchill County, NV	182,991	206,041	11%	
Total	361,806	371,281	3%	

2007 figures: See CRASP 2007, (Chapter 3 p.35). 2016 figures: based on County zoning and/or assessors' records of agricultural deferment. Douglas County and Carson City is acreage in CR Watershed only. Other Counties include areas outside the CR Watershed.

According to the Lyon County Assessor, there is currently 8,162.615 acres of tax deferred agricultural land in the Carson River portion of the County along the Hwy. 50 corridor.

4.0 History of the Carson River Watershed

4.1.1 Zaca Mine Complex

The last work completed at the site occurred in summer 2007 when an infiltration gallery was installed outside the lower Colorado adit. This work was completed to collect mine waters discharging from the adit portal and introduce them back into the subsurface regime. A similar project was completed in 2004-5 to collect mine waters discharging from the lower advance adit (adjacent to highway 89). These waters were redirected into an infiltration gallery installed along the uphill side of highway 89 for approximately 500 feet. (Ken Maas pers comms December 2013)

No other work or monitoring has been conducted by the US Forest Service to date.

4.1.2 Leviathan Mine Clean-Up Update

Corrected spelling error in the second line of this section. It should read....Comstock mines near ~~Virginia~~ Virginia City.

There is also a spelling error in the third line of the last paragraph of this section (p. 39) that should read...will ~~leas~~ lead to the selection...

Updated reports and information about Leviathan Mine can be found at the US EPA website <http://yosemite.epa.gov>. The most recent report on Bioassessment Monitoring of Acid Mine Drainage Impacts to Local Streams from the 2010 Spring and Fall surveys was completed in 2013. The US EPA is working with the responsible parties to complete the work plan; however, a final remedy has not been determined. The latest information from the Annual Leviathan Mine Technical Update Meeting held January 26, 2017 can be found at this link: <https://yosemite.epa.gov>.

4.1.2.1 Leviathan Mine Supplemental Environmental Project

Supplemental Environmental Projects (SEPs) are defined as environmentally beneficial project that can be included in enforcement settlements with EPA and the Department of Justice in lieu of civil monetary penalties. SEP projects must be related to the violation at issue and further EPA's goal of protecting and enhancing public health and the environment. EPA has broad discretion to settle enforcement actions and may include SEPs as part of any settlement.

Under the \$8 million settlement agreement between the EPA and Atlantic Richfield (AR), AR has agreed to treat acid mine drainage for five years at an estimated cost of \$5.6 million and will reimburse the EPA for \$1.7 million in past cleanup costs and pay \$90,000 in penalties for failing to comply with an EPA order issued in 2000. Included in the settlement is a SEP project that includes the expenditure of \$400,000 on a riparian restoration project at The Nature Conservancy's River Fork Ranch in Carson Valley (Administrative Settlement Agreement and Order on Consent for Removal Action specifications - U.S. EPA Region IX CERCLA docket No. 2008-20).

According to the 2010 Annual Report for the SEP (Atlantic Richfield 2010) the primary goals of the conservation and restoration activities is the restoration of historic geomorphological characteristics (channel and riparian structure) and related floodplain habitat resources. Activities for the SEP include the construction of cattle exclusion fencing in sensitive riparian habitat of the West Fork Carson River, restoration of about 15-20 acres of cottonwood/willow riparian habitat along the West Fork, and the creation of about 2 acres of wetland habitat along the Brockliss Slough. Monitoring of bird populations and plant communities will also be conducted to document the extent of biological community status.

Additional SEP projects are currently being negotiated.

4.1.3.2 Carson River Mercury Site Update

The EPA's website link for the Carson River Mercury Superfund Site contains a wealth of historical and current information and reports: <http://yosemite.epa.gov/r9/sfund/>. The most recent report completed is the third Five-Year Review of the site dated September 2013. The report reviews information and determines whether the chosen remedy is working to protect human health and the environment now and into the future. The report is available at: <http://yosemite.epa.gov/r9/sfund/>. The September 2013 *Explanation of Significant Differences Report* explains changes to the original 1995 Record of Decision. This report is available at: <http://yosemite.epa.gov/r9/sfund/>. June 2016 Community Involvement Plan is available at <https://yosemite.epa.gov>.

4.2 Newland Irrigation Project

Around 4:30AM on Saturday, January 5, 2008, the Truckee Canal breached flooding about 590 homes in Fernley, Nevada. The canal is owned by BOR and operated and maintained by TCID. The breach was contained by the next evening and repairs were completed by February 18, 2008 (USBR 2011). As a result of the breach, legal action ensued and a court order promulgated a change in canal operations and reduced flows significantly. State-of-the-art repairs are required to the canal to return the flows to full capacity (LVEA 2009). After the breach, and completion of repairs to the canal, diversions were limited to 150(cfs). BOR completed a Newlands Project Planning Study Special Report in

Study Objectives (USBR 2013)

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

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

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

- Improve the efficiency of Project water supply deliveries.
- Improve the water supply quantity and quality of the lower

April 2013. Seven alternatives were developed and evaluated on how they met the study objectives (see Study Objectives Inset). According to the Study's Executive Summary, *"the results of this Study may be used to inform decisions regarding the Newlands Project, including the extent of repairs to the Truckee Canal and its future operation; the report is informational only and is not intended to provide a specific recommended action"* (USBR 2013)

The Study is available on the USBR website at the following link:

<http://www.usbr.gov/mp/lbao/newlands.html>.

5.0 Existing Conditions Update

5.1 Air Quality Update

Some of the air quality monitoring sites located in the Watershed have changed. Updated information can be found on the NDEP Bureau of Air Quality Planning (BAQP) webpages located at: <https://ndep.nv.gov/air/air-quality-monitoring>. There have been several air quality exceedances in the Carson River Watershed area over the past several years due to wildfires. The Rim Fire in Yosemite in August/September 2013 and the King Fire August/September 2014 were two fires that caused particulate matter (PM¹⁰) to be exceeded. Several new reports relating to greenhouse gas emissions, and air quality planning, trends, and monitoring are available on-line at the aforementioned website.

5.2 Water Quantity Update

CWSD contracted Resource Concepts, Inc. to complete a [Comprehensive Regional Water System Plan](#) for the Carson River Watershed. The Plan evaluates future water demands and how these new water demands can be met by minimizing the impact on the environment and agriculture. The plan describes how changes to runoff patterns and flows in the Carson River may impact the current water supply picture and possible impacts on future supplies. It also contains updated tables relating to the Watershed population and future demands. Click the link above to access the plan.

5.3 River Bed and Banks Ownership Update

According to Nevada State Lands personnel, the State of Nevada claims ownership of both the East and West forks of Brockliss Slough, along with Home Slough, below the ordinary highwater mark. The “Ordinary high-water mark” is defined in the NRS, and is the line to which high-water ordinarily rises on a bank or shore. A highwater mark determination would require a site visit by State Lands. (Donahue, C; Randals, E; and Marlow, D 2014)

5.4.3 Other Adjudicated Streams

Other streams that feed into the Carson River that are not specifically adjudicated by the Alpine Decree are typically adjudicated by their own decrees for use along the streams. A map of the NV Hydrographic Basins including the [Carson River Watershed hydrographic region and associated hydrographic area numbers](#) is available on the NV Water Resources website (follow provided link). The table below outlines the specific hydrographic areas associated with the Carson River Watershed.

CARSON RIVER REGION (Hydrographic region 8):							
Region Num [1]	Basin Num [2]	Size (sq mi) [3]	Size (acres) [4]	Hydrographic Basin/Sub-Basin Name	Counties Included [5]	Nearest Cities	Desig [6]
8	101	2,022	1,294,080	Carson Desert	Churchill, Pershing, Lyon	Fallon, Stillwater	Yes
8	101A	160	102,400	Carson Desert/Parkard Valley	Pershing	Lovelock	Yes
8	102	480	307,200	Churchill Valley	Lyon, Churchill, Douglas, Storey	Fallon	Yes
8	103	369	236,160	Dayton Valley	Lyon, Storey, Carson City, Douglas	Dayton, Virginia City	Yes
8	104	69	44,160	Eagle Valley	Carson City, Douglas	Carson City	Yes
8	105	419	268,160	Carson Valley	Douglas, Carson City	Minden, Gardnerville	Yes

Source: [Division of Water Resources website](#)

Within these hydrographic areas numbered 101 – 105 (including 101A), are a number of adjudicated streams. The type of decree or other adjudication can be found by searching each County on the Nevada Division of Water Resources website [here](#).

5.5 Flow Regime

USGS Map of Gages on the Carson River

There are numerous active and non-active stream flow gages on the Carson River. Frequently questions arise about which gage is the most appropriate to use for a project and which are active and have a significant period of record for statistical analysis. Recorded periods of record and maps are available for the gages on the [USGS NV Science Center website](#).

5.6 Droughts and Floods Update

Table 5.6-1: Major Floods and Droughts Impacting the Carson River Watershed

Event	Date	Areas Affected	Recurrence Interval (years)	Remarks
Flood*	January 1997	Sierra Nevada Drainages	50-100	Flood of Record in many Sierra NV Drainages
Flood	January 2006	Truckee, Carson, Walker	10-25	
Drought*	January 2007-December 2010	CA and NV		
Drought*	January 2012 – December 2016	CA and NV		
Flood**	July/August 2014	Douglas, Carson City, Lyon Counties		Alluvial Fan flooding
Flood	January 2017	Sierra NV Drainages		Significant precipitation event, State and Federal Disaster Declarations
Flood	February 2017	Sierra NV Drainages		Significant precipitation event, State and Federal Disaster Declarations

Sources:* US Drought Monitor 2017: <http://droughtmonitor.unl.edu/MapsAndData/Graph.aspx> (Look up NV), ** CRC 2014, [River Corridor Working Group Meeting 9/18/2014](#)

FEMA flood maps are being revised throughout the watershed. Lyon County's new maps are in place. Carson City's flood maps were completed March 2017. It is likely that Douglas County's maps will not be available until 2018. The current flood maps are located at each County and by accessing <http://www.nevadafloods.org>.

Relevant information on droughts and flooding can be found on the [USGS Nevada Water Sciences Center webpages](#). Specific historical flood information from 1852 to present is available on the [USGS Carson River Watershed flood chronology webpages](#).

5.7 Groundwater Resources Update

There are five primary groundwater basins located in the Carson River Watershed as designated by the Nevada State Engineer as shown in Table 5.7-1.

Table 5.7-1: Groundwater Perennial Yields for Carson River Basin

Basin Name	Area Sq. Miles	Perennial Yield (AFY)
Carson Valley	419	49,000
Eagle Valley	69	4,900
Dayton Valley	369	8,000 – 20,000
Churchill Valley	480	1,600
Carson Desert	2,022	2,500

Original Source: B & C 2000, revisions RCI 2013

Each of the five basins is “a designated basin” which means that the ground water basin has been formally “designated” by the Nevada State Engineer and, except in minor isolated circumstances there will not be additional groundwater appropriations granted within the basin. The State Engineers map entitled, *Designated Groundwater Basins of Nevada* April 2010 is available in the [Comprehensive Regional Water System Plan](#) available on the CWSD’s website. This map (Figure 2.1) depicts the administrative groundwater basins in the Carson River Watershed listed in Table 5.7-1.

The Nevada State Engineer utilized the perennial yield as a part of his basis for allocating, or restricting water rights within a hydrographic basin. The perennial yield is the amount of usable water in a ground water aquifer that can be withdrawn, which does not exceed the sum of the natural and artificial recharge of the groundwater aquifers. Perennial yield is the greatest in Carson Valley and decreases in each downstream basin. This decrease is due to the rain shadow effects cause by the Sierra. The precipitation in the upper Watershed can be as high as 40 inches per year and decreases as you move east to as low as 4 inches per year in Churchill County. The decrease in perennial yield within the downstream groundwater basins is one of the primary reasons for trying to develop a regional plan to allow for growth in the downstream areas were groundwater supplies are more restricted than in the upper water shed. The plan must also recognize and provide for growth in the upper Watershed. In California, the California Water Resources Control Board only recognizes one groundwater basin in Alpine County and that is the Carson Valley groundwater basin.

The following tables show the perennial yield, amount of water appropriated, and average pumping for each of the five hydrographic basins. Although the amount of water appropriated in each basin is greater than each basin’s perennial yield, this data can be misleading because the State Engineer includes the full water allocation for supplemental water rights (supplemental rights are groundwater rights that can be pumped when the primary groundwater or surface water rights to which the supplement right is linked are unavailable). Also, some water rights are grouped together and are limited to a combined duty that is less than the total individual amount of the grouped rights. A more accurate accounting of the water rights available for municipal use in each Basin is important to determine where growth in water production is feasible and if inter-basin transfers are potential elements in meeting future needs in the Carson Watershed. Inter-basin transfers of groundwater rights are allowed under State Law; however, they require coordination and approval from the various governing agencies. There are also open to any interested party who may decide to protest the change place of use.

5.7.1 Carson Valley

This groundwater basin is bounded by the Sierra Nevada Mountains on the west and the Pine Nut Range on the east. The Carson River, via the west fork and the east fork, flow into the south end of the valley and out the north end. The Town of Minden, Gardnerville Water Company, Gardnerville Ranchos GID, Douglas County, Indian Hills GID, and a small portion of Alpine County and Carson City are included in this basin. Groundwater appropriations and average water pumped for the Carson Valley Basin are provided in Table 5.7.1-1 as taken from the records of the State Engineer.

Table 5.7.1-1 Carson Valley Hydrographic Basin Number 105

Type of Right	Appropriation Amount (AF)	Average Pumped ^{1/} (AF)
Irrigation	51,567	10,301
Municipal/Quasi-Municipal	34,430	10,081
Stockwater	407	119
Commercial	194	61
Other/Env.	9,138	3,029
Domestic	33	3,759
TOTAL:	95,769	27,350

Perennial Yield: 49,000 AF

^{1/} average from 2002 to 2011

Table 5.7-1 only relates to appropriations and pumping in Nevada. While part of the Carson Valley Groundwater Basin is located in Alpine County, there are currently no commercial, municipal, or irrigation wells located Carson Valley portion of Alpine County. The Washoe Tribe has four communities in the Carson River Watershed one of which is in the Upper Watershed. The Washoe Woodfords Community has two drinking water wells in Alpine County serving fifty-nine residences and four commercial buildings. The total number of domestic wells in Alpine County's portion of the groundwater basin is less than 100.

5.7.2 Eagle Valley

This groundwater basin is bounded by the Carson Range on the west and the Carson River on the East. The majority of the basin is located within Carson City. The Carson River does not flow through the Eagle Valley Basin. Groundwater appropriations and average amount of water pumped for the Eagle Valley Basin are provided in Table 5.7.2-1 as taken from the records of the State Engineer.

Table 5.7.2-1. Eagle Valley Hydrographic Basin Number 104

Type of Right	Appropriation Amount (AF)	Average Pumped ^{1/} (AF)
Irrigation	390	33
Municipal/Quasi-Municipal	7,124	5,622
Stockwater	7	1
Commercial	50	31
Other/Env.	355	49
Domestic	0	928
TOTAL:	7,926	6,664

Perennial Yield: 4,900 AF

System Yield: 9,000 AF (includes surface water that flows into the basin)

^{1/} average from 2002 to 2011

5.7.3 Dayton Valley

This basin includes Moundhouse, Dayton, Virginia City, Stagecoach and small portions of eastern Carson City. The Carson River generally travels northeast through the center of this basin. Groundwater appropriations and average amount of water pumped for the Dayton Valley Basin are provided in Table 5.7.3-1 as taken from the records of the State Engineer.

Table 5.7.3-1 Dayton Valley Hydrographic Basin Number 103

Manner of Use	Appropriation Amount (AF)	Average Pumped ^{1/} (AF)
Mining/Milling/Industrial	1,397.2	261.3
Commercial	200.1	61.9
Recreation/Stockwatering	10.1	6.1
Quasi-Municipal	14,698.2	4,374.9
Irrigation	7,269.5	2,533.4
Other	0.0	0.4
Domestic	495.6	1,471.6
TOTAL:	24,070.7	8,709.6

Perennial Yield: 8,000 - 20,000 AF

^{1/} average from 2003 to 2011

5.7.4 Churchill Valley

The Churchill Valley Basin encompasses the Lahontan Reservoir, Silver Springs, and the surrounding areas. The Carson River feeds into Lahontan Reservoir within this basin. Groundwater appropriations and average amount of water pumped for the Churchill Valley Basin are provided in Table 5.7.4-1 as taken from the records of the State Engineer.

Table 5.7.4-1 Churchill Valley Hydrographic Basin Number 102

Manner of Use	Appropriation Amount (AF)	Average Pumped ^{1/} (AF)
Mining/Milling/Industrial	310	1.4
Commercial/Recreation	77	28.7
Stockwatering	57	30.1
Quasi-Municipal	6,461	671.4
Domestic	2	1,125.6
Irrigation	3,938	368.9
TOTAL:	10,845	2,226.1

Perennial Yield: 1600 AFA

^{1/} average from 2004 to 2011

5.7.5 Carson Desert Valley

The Carson Desert Valley Basin encompasses the Fallon area and the surrounding agriculture and desert areas including the Carson Sink. Groundwater appropriations for the Carson Desert Valley Basin are provided in Table 5.7.5-1 as taken from the records of the State Engineer. The State Engineer's office does not prepare a pumping inventory report but it does collect municipal pumping data for the Churchill Desert Valley Basin, which is the reason for the blanks in Table 5.7.5-1. In Orders 722 and 1116 the State Engineer recognized that groundwater recharge is dependent on precipitation and irrigation using surface water; however, Order 1116 reflects the decline in irrigation recharge due to improvements in the delivery system and irrigation practices.

Table 5.7.5-1 Carson Desert - Hydrographic Basin Number 101

Manner of Use	Appropriation Amount (AF)	Average Pumped ^{1/} (AF)
Mining/Milling/Industrial	3,185	
Commercial/Recreation	677	
Stockwatering	877	
Quasi-Municipal	10,904	2,836 ^{1/}
Domestic	19	
Irrigation	3,925	
Other	104	
TOTAL:	19,692	

Perennial Yield: 2500 ^{1/} average from 2011 to 2012

5.8 Groundwater Quality Issues of Concern

5.8.1 Leaking Underground Storage Tanks (LUSTs) Update

The number of LUSTs listed in the original Stewardship Plan was in error as the numbers from the referenced Brown and Caldwell 2005 report actually included sites where groundwater and soil contamination have occurred from both Leaking Underground Storage Tanks (LUSTs) and other corrective actions. According to [NDEP-Bureau of Corrective Actions project tracking database](#) the total number of sites for LUSTS and other corrective actions as of July 6, 2016 in the Carson River Watershed is 35. This is a significant reduction from the July 2004 data that originally reported 414.

[NDEP-Bureau of Corrective Actions tracking database](#) specifies the facility name, location, report date, type of contaminants leaking, report date, etc. This database also lists types of corrective actions cases including spills from mobile devices and non-LUST spills. Based on this information, CWSD calculates that the current number of active LUST sites in each County's portion of the Carson River Watershed where contaminants have entered the soil and/or groundwater to be:

Alpine County	0
Carson City	5
Churchill County	6
Douglas County	1
Lyon County	2
Storey County	0

Alpine County data from Alpine County, CA. Nevada data from NDEP – Bureau of Corrective Actions on-line database 2016.

5.8.3 Septic Tanks Update

A 2013 study on nitrate increases due to septic tanks has been completed by the USGS entitled [*The Distribution and Modeling of Nitrate Transport in the Carson Valley Alluvial Aquifer, Douglas County, Nevada* \(Naranjo et al 2013\)](#). The study was funded by CWSD and Douglas County. Below is a small excerpt from the conclusions of the study indicating that septic use in the Watershed continues to be an issue that local governments will need to address in the near future.

“The continued increase in nitrate-N concentrations based on samples collected from long-term trend wells located throughout Carson Valley indicated that increases in nitrate-N was not limited to just the Ruhenstroth and Johnson Lane areas, but also could be of concern for other down-gradient areas in the valley where septic-system density is greater than one per 3 acres. The presence of high nitrate-N concentrations in some areas of the valley could be an indication that the dilution capacity of the aquifer has been exceeded, and further development should consider the cumulative effects of septic-system use.”

The study used hypothetical models that looked at two scenarios relating to termination of septic tank use and continuation vs. discontinuation of domestic pumping. The study states, *“The results of the hypothetical scenarios indicated that nitrate-N transport in the alluvial aquifer was largely influenced by groundwater pumping, and usage for consumptive purposes should continue to be monitored into future.”*

The full study is available on the USGS website, <http://pubs.usgs.gov/sir/2013/5136/>.

5.9 Reclaimed Water Update

A link to the [2009 Reclaimed Water Use Analysis](#) completed for CWSD by Walker and Associates is in CWSD’s on-line resource library.

5.10 Physical Channel and Reach Characteristics Update

The BLM contracted Otis Bay Ecological Consultants who prepared and completed an Executive Summary entitled, *Assessment of the Middle Carson River and Recommendations for the Purpose of Recovering and Sustaining the Riverine Ecosystem*, June 2007 (Otis Bay 2007). Although the larger report was never finalized; several recommendations were made in the Executive Summary. Some of these recommendations, although scientifically based would need to be re-evaluated as there are legal issues associated with the Alpine Decree that deem them unrealistic. The Executive Summary is available at the CWSD offices. Table 5.10-2 Summary

of River Reach Characteristics from Stateline to Lahontan Reservoir has been updated. See below.

Table 5.10-2: Updated Summary of River Reach Characteristics from Stateline to Lahontan Reservoir

NAC Reach and/or Sub-Reach ¹		Interfluve Reach and/or Sub-Reaches <i>within</i> NAC Reach	1996 Interfluve <u>Relative</u> Channel Stability ² Listed by sub-reach if applicable	Approx. Total L, miles	Approx. Total L, feet	Restoration Priority	Approx. L protected or completed rehab, feet ³	Approx. L proposed protection or rehab, feet	Comments for 2017 update
445A.1804 EF Stateline to Hwy 395 (Riverview)		E1 EF Stateline to Washoe Bridge	Stable	9.2	48,576	low	0	0	Google maps show numerous sandbars indicative of river transporting a large sediment load from upstream reaches.
445A.1806 EF 395 to Muller Lane	EF Hwy 395 to HWY 88	E2 Washoe Bridge to Country Club Dr. E3 Country Club Dr. to Lutheran Bridge E4 Lutheran Bridge to Hwy 88	S1 Stable S2 mod.unstable S1, S2 moderately unstable S1 mod. unstable S2 unstable	6.5	34,320	S1, S2 low S1, S2 high S1, S2 high	0 820 5280	1300 0 0	Douglas County proposing meander removal & stabilization upstream of Virginia Rocky Diversion. Reach undergoing geomorphological assessment first. Carson Valley CD rehabilitated N riverbank next to the Gardnerville Golf Course in 2011. No recent activity. Completed work done after '97 flood.
	EF Hwy 88 to Muller Lane	E5 Hwy 88 to Muller Lane	S1 extremely unstable S2 unstable.	2.1	11,088	S1 low S2 high	4400	0	Prior rehab estimated from riprap/structures seen in Google Maps. No recent bank projects. USGS Algae Study occurred in this reach. See Chapter 7, p. 68.
445A.1808 Carson River at Genoa Lane to the EF at Muller Lane and to the WF at Stateline	WF at Stateline to Muller Lane	W1 Waterloo Lane to Muller Lane	Stable	11.3	59,664	low low	0	0	No activity. Not a priority. Interfluve assessed reach in 1996 using aerial photos and survey only.
	East & West Fork Muller Lane to Genoa Lane	W2 West Fork Muller Lane to Genoa E6 East Fork Muller Lane to Genoa	Both moderately unstable	4.3	22,704	WF - low EF - high	10,560	0	Total Mileage is length of EF+WF reach. Major restoration activity on EF suspended after loss of State Q1 bond funding. TNC River Fork Ranch protects 2 river miles, primarily WF, upper end EF.
445A.1812 Carson River at Genoa Lane to Cradlebaugh Bridge		C1 Genoa Lane to Cradlebaugh Bridge	Willowbend - stable Remainder of reach - moderately unstable	4.6	24,288	high	0	0	Some tribal river bank projects implemented prior to 2007 have failed and have not been repaired.
Also includes Brockliss Slough via Tributary Rule		B1 Segment above Hwy 88 B2-B6 Hwy 88 to Genoa Lane	No access/assessment Stable, B3 moderately stable (Centerville to Waterloo)	16.2	85,536	low	0	0	
445A.1814 Carson River at Cradlebaugh Bridge to Mexican Ditch Gage		C2 Cradlebaugh to Old McTarnahan Bridge	S1 moderately stable S2 stable S3 unstable.	7.2	38,016	S1, S2 low S3 high	21,120	0	1 st 4 miles in easement. No known recent activity.
445A.1816 Carson River at Mexican Ditch Gage to New Empire		C3 Old McTarnahan to Deer Run Road	S1 moderately unstable-section between USGS Gage & Dam not rated. S2 very stable S3 stable	7	36,960	S1 low S2,S3 low	33,000 (Google map estimate)	600 feet within already protected open space property	Most of the river corridor in this reach protected via open space or easement by Carson City. CVCD implementing project on Anderson Ranch to stabilize bank. New access point for boaters on N side of river off Morgan Mill Road.
445A.1818 Carson River at New Empire to Dayton Bridge		C4 Deer Run Road to Ricci Diversion C5 Ricci Diversion to Dayton Bridge	very stable 1 st part of reach not rated S1 stable S2 moderately unstable	10.4	54,912	low S1 low S2 high	24,000 3230	0 0	C4 ends at mouth of canyon DVCD has completed approx.50 projects since 1997 in Reaches C5-C10
445A.1822 Carson River at Dayton Bridge to Weeks Bridge		C6 Dayton Bridge to Quilici/Minor Property C7 Quilici/Minor Property to Chavez Diversion C8 Chavez Diversion to Break-a-heart (just upstream Houghman Howard Diversion) C9 Houghman Howard Diversion to Buckland Station Bridge (Weeks Bridge)	S1 stable S2 mod. unstable S3, S4 unstable S5 mod. unstable S6 extremely unstable S1 mod. unstable S2 unstable S3 stable S1, S2 unstable very small section at end of reach - stable S1 unstable, very end of reach - moderately unstable S2 unstable	25.8	136,224	S1 low S2-S6 high S1,S2 high S3 low S1,S2 low S1,S2 high	10,200 15,000 0 3100	0 525 0 1100	New bank project on Minor Ranch in 2015. Buckland Diversion Bank Stabilization upstream of Fort Churchill will be implemented in 2017.
445A.1824 Carson River from Weeks Bridge at Hwy 95 to Lahontan Reservoir		C10 Buckland Station to Lahontan Reservoir	S1 Moderately unstable S2 Stable	6.3	33,264	S1,S2 low	460	0	

TOTALS:111585,600131,200352522% of river corridor stabilized

Footnotes: 1 – Nevada Administrative Code 2 – Fluvial Geomorphpic Assessment of the Carson River, Interfluve, 1996 3 – Total river corridor miles protected/rehabilitated starting in 1997 over all sub reaches within larger reach. Did not separate out low priority vs.high.

5.11 Potential Causes of Non-Point Source Pollution

Table 5.11-1 Updated Contributing Land Use Activities to Nonpoint Source Pollution

Land Use	Activities	Pollution Problems
Urban Development	Automobile maintenance, lawn and garden care, painting, pet waste, habitat modification, stormwater, land coverage	Petrochemicals, antifreeze, nitrate, heavy metals, phosphate, pesticides, paints, bacteria, chlorides, trash, surfactants, temperature, pharmaceuticals*
Mining	Mineral excavation/extraction, gravel, habitat modification	Sediment, heavy metals, acid drainage, nitrate, phosphate
Forestry/Silviculture	Timber harvesting, road construction, fire control, weed control, habitat modification	Sediment, pesticides
Land Disposal	Septic systems, treated effluent, landfills, recycling centers, habitat modification	Bacteria, nitrate, phosphate, trash, pharmaceuticals*
Agriculture (Also see Table 5.11.6-1)	Flood and other irrigation, tillage, cultivation of alfalfa and pasture grass, pest control, fertilization, animal waste management, confined animal feeding operations, habitat modification	Sediment, nitrogen, phosphorus, pesticides, bacteria, trash
Construction	Land clearing and grading, habitat modification, land coverage	Sediment, temperature
Roads	Salting/Sanding/Construction and Maintenance/grading/excavation/stormwater; hazardous waste spills, habitat modification, land coverage	Sediment, chlorides, petrochemicals, surfactants, trash, other industrial chemicals, temperature
Recreation and Trails	Construction and Maintenance, habitat modification, land coverage	Sediment, trash, pesticides, temperature
Open Space/Wildland Management	Wildfires, wildfire management activities (grading, removal of vegetation), Invasive Species Management, habitat modification	Sediment, fire retardants, surfactants, pesticides

*US. No studies have been conducted to date in our watershed. See EPA regarding best management practices <https://www.epa.gov/hwgenerators/collecting-and-disposing-unwanted-medicines> and <https://www.epa.gov/hwgenerators/proposed-rule-management-standards-hazardous-waste-pharmaceuticals> regarding the Federal Rule published in Federal Register November 5, 2015.

5.11.1 Construction and Urban Development

Urban development slowed down during the economic recession from 2007 to 2012. The Carson River Watershed is still recovering from the impacts of this recession. In certain instances, development projects were left partially completed. Sites were abandoned after mass grading and/or roads and other infrastructure were partially completed. These sites have contributed to non-point source pollution from sediment run-off and dust, and in some instances, are now sources for invasive weed dispersal which contributes to loss of native vegetation and can lead to further degradation of water quality. Since 2012, development throughout the watershed has gradually picked up.

5.11.6 Agriculture

5.11.6.3 *Dairies and other concentrated animal feeding operations (CAFOs)*

According to the NV Dairy Commission there are a total of 20 dairies operating the Watershed, with 19 in the Fallon area, and one operating in Carson City at the Northern Nevada Correctional Center.

5.11.9 Septic Tanks

See Section 5.8.3 for update.

5.11.10 Mass Wasting and Natural Sediment Transport

There is a desire to conduct a Sediment Transport Study of the Carson River. See Table 8.8 Suggested Action # 5, p. 120.

5.11.11 Mining

5.11.11.2 Leviathan Mine

See EPA Region 9 Leviathan Mine website. All EPA related data regarding Leviathan Mine is available [here](#). Also see [Lahontan Water Quality Control Board website](#) for California's actions relating to Leviathan Mine.

5.11.11.4 Comstock Mine

Comstock Mining Inc. is a Nevada based gold and silver mining company with property in the Comstock District (Virginia City, NV). See [NDEP's Comstock Mining webpage](#) for information on permitting and project description and maps.

5.11.12 Recreation

Since 2007 a number of trails have been designed and built within the Carson River Watershed. [Muscle Powered](#) in Carson City, the [Carson Valley Trails Association](#) in Douglas County, and [Alpine Trails Association](#) in Alpine County have all worked with local government, the County's and local landowners to provide access to public lands in the region. Trails are designed and maintained to ensure user safety, limit ecological damage and erosion. Follow the links to each of their websites to learn more and also see Section 8.6.1 for more details.

5.11.14 Fire

The Carson River Watershed has experienced several fires since 2006 including the Bison Fire in 2013, the Ray May fire in 2011 (both in Douglas County), and the Washington Fire in Alpine County, CA in 2015. Annual historical fire data can be obtained for each County within the watershed by accessing the [Western Great Basin Coordination Center website](#) and by month on the [Sierra Front Dispatch Center WildWeb](#).

Post fire restoration and revegetation efforts have varied in both application and success due to the recent drought. CWSD provided some emergency funding to revegetate a small fire in Carson City. These efforts limit sediment transport and invasive weed infestations. The Alpine Watershed Group is working with the USFS Carson Ranger District and the Sierra Nevada Alliance on forest health initiatives in the upper watershed.

5.12 Noxious Weeds Update

An up to date list of Nevada's noxious weeds can be found on the Nevada Department of Agriculture's website at <http://agri.nv.gov/>. The list can be shown in specific weed categories A-C at [NV Noxious Weed List by Category](#) (2012).

California's list of noxious weeds can be found on the [California Department of Food and Agriculture website](#). California regulations regarding weeds and invasive species can be found [here](#).

Spelling error correction: The noxious weeds that are most well known in the watershed are Tall Whitetop (*Lepidum latifolium*) (TWT) and hoary ~~erest~~-cress.

5.13 Aquatic Invasive Update

See Section 8.5 – Invasive Species in this Supplemental Update of the CRASP.

6.0 Clean Water Act Responsibilities Update

6.2 State Mandates

6.2.1 Water Quality Management 208 Plan Update

In 2008, CWSD hired Walker and Associates to evaluate each of the waste water plants treated effluent to determine what additional treatment would be necessary to discharge to the Carson River. The report, entitled *Reclaim Water Use Analysis-Carson River Watershed*, concluded it was not economically viable to treat the waste water to be able to discharge directly into the Carson River (Walker and Associates/Brown and Caldwell 2009).

6.2.1.1 Additional Section 208 Planning Studies completed:

- See Section 7.4.3 Algae Study (East Fork).
- In April 2015, the CWSD Board approved the Low Impact Development (LID) in the Carson River Watershed report prepared by Resource Concepts, Inc. This report highlights the LID practices that are most appropriate for the Carson River Watershed. The document includes specific LID practices that will work well in our arid environment, describes existing LID policies and on-going LID implementation occurring in Northern Nevada, and outline specific actions to move forward with LID in our watershed. To view the report, go to <http://www.cwsd.org/wp-content/uploads/2015/06/2015-04-07-LID-Carson-Watershed.pdf>.

6.2.2 Stormwater Programs Update

6.2.2.1 Nevada Municipal Separate Stormwater and Sewer Systems or MS4's:

Four entities in an area initially identified as the Carson City Urban Area by the EPA are subject to the General Permit for "Small MS4s" administered through the NDEP's Bureau of Water Pollution Control. Carson City, Indian Hills, and Douglas County (Johnson Lane and Clear Creek) and Nevada Department of Transportation each meet the EPA's population criteria for Small MS4s. Each County operates under a standard MS4 permit with separate MS4 plans. These plans are available by contacting each entity.

6.2.2.2 Regional MS4 Development (Lyon County, Carson City, Douglas County, and Indian Hills GID):

Combined Municipal Separate Storm Sewer System (MS4) Plan for Indian Hills General Improvement District (GID) area, portions of Douglas County in the Clear Creek and Johnson Lane areas, Lyon County areas near Moundhouse, Carson City, and NDOT in the Clear Creek Watershed

The area subject to the General Permit for "Small MS4s", and initially identified as the Carson City Urban Area by the EPA, is multi-jurisdictional including non-contiguous parts of Carson City, Indian Hills, and Douglas County (Johnson Lane and Clear Creek). With future population growth, the regulated "Small MS4" area has potential to expand in Douglas County (Minden/Gardnerville, Ranchos area), Lyon County (Dayton area) and Churchill County/ City of Fallon (City of Fallon and surrounding area). Presently each jurisdiction manages their MS4 area separately. The impetus for developing a Carson River Regional Stormwater Management Plan

is to coordinate education/outreach messages, expand public participation, and encourage consistent approaches to Best Management Practices along the Carson River corridor.

CWSD originally funded a request from Indian Hills GID to pursue the development of a regional MS4 to comply with the revised EPA General Permit as managed by NDEP in 2013. Resource Concepts, Inc. (RCI) was hired and began the process. Additional funding was obtained in 2014 through NDEP's Stormwater Circuit Rider program for RCI to finalize the plan. A working group consisting of local utility managers and regulators formed to address stormwater management on a regional basis for potential urban areas in the upper and middle Carson River watershed. Active participants include Indian Hills GID, Douglas County, Carson City, Lyon County, CWSD, and the NDEP Bureaus of Water Pollution Control and Water Quality Planning. NDOT, Churchill County and the City of Fallon are not participating in the regional MS4 working group at this time.

A series of meetings has been held to identify the goals of the regional plan and address each of the "Minimum Control Measures" (MCM) required in the general Stormwater permit. Needs, opportunities and constraints of the different jurisdictions were discussed for each MCM and presented to the group. A document identifying joint rationale statements and best management practice approaches is in draft form. The document will be a tool to coordinate between jurisdictions and facilitate introduction of new areas to the Small MS4 program per any future requirements from EPA/NDEP. Additional funding may be required to ensure adoption of the final document.

6.2.2.3 California Stormwater Program

The Lahontan Regional Water Quality Control Board (LRWQCB) regulates pollutant discharges in stormwater to CA surface waters. CalTrans holds an MS4 permit in the Alpine County area. There are no other MS4 Phase I or II permits in the Carson River Watershed portion of Alpine County. Additional information on the Stormwater Program and specific permits associated with polluted runoff can be found by following this link to their [website](#).

6.2.3.1 California Surface Waters Revision

The LRWQCB is the responsible entity for water quality standards in the California portion of the watershed. The "Water Quality Control Plan for the Lahontan Region," also known as the "Basin Plan", sets forth these standards. The standards include designated beneficial uses of water, the narrative and numerical objectives that must be maintained or attained to protect the beneficial uses, and the state Non-degradation Policy (California State Water Resources Control Board Resolution 68-16). The USEPA has also promulgated numerical standards for toxic "priority pollutants" in the "National Toxics Rule" and "California Toxics Rule" that apply to surface waters of the upper watershed in California. For more information on these rules please visit the following website:- http://www.waterboards.ca.gov/water_issues/programs/npdes/ref.shtml#ntr_ctr.

Objectives which apply to all surface waters

Narrative and numerical water quality objectives apply to all surface waters within the Lahontan region for the following parameters:

Ammonia	Pesticides
Bacteria, Coliform	pH
Biostimulatory Substances	Radioactivity
Chemical Constituents (spelling error)	Sediment
Chlorine, Total Residual	Settleable Materials
Color	Suspended Materials
Dissolved Oxygen (DO)	Taste and Odor
Floating Materials	Temperature
Oil and Grease	Toxicity
Nondegradation of Aquatic Communities and Populations	Turbidity

For more information and equations for the objectives please refer to the Basin Plan which is available on http://www.swrcb.ca.gov/rwqcb6/water_issues/programs/basin_plan/index.shtml. Amendments to the plan and information on the TMDL program can be found on this website: <http://www.epa.gov/region09/water/tmdl/california.html>.

Update: Percent Sodium Standard Proposed Revision

The LRWQCB has updated the water quality standard for “percent sodium”. The “percent sodium” standard was changed to “Sodium Adsorption Ratio” (SAR) in 2006. It was determined in 2008 that the new SAR standard had never been exceeded on the West Fork Carson River from the headwaters to Paynesville and was removed from the 303(d) list of impaired waters. The East Fork Carson River also does not exceed the SAR standard. See the Basin Plan for all current standard exceedances at:

http://www.waterboards.ca.gov/lahtontan/water_issues/programs/basin_plan/docs/ch3_wqobjectives.pdf

http://www.waterboards.ca.gov/lahtontan/water_issues/programs/basin_plan/references.shtml

The South Tahoe Public Utility District (STPUD) samples the West Fork Carson River for SAR and %Na (in addition to other WQ parameters) as part of their Reclamation Permit Monitoring requirements for treated wastewater stored in Harvey Place Reservoir and applied to irrigated land. The river and other surface waters are monitored regularly to detect any groundwater discharges or potential line breaks in the wastewater systems that are located near or pass under the waterbodies. STPUD issues quarterly reports documenting all monitoring results. Data collected for the West Fork at Woodfords and at Paynesville indicate low SAR values suitable for agricultural use. Refer to Section 7.2.2 for additional information regarding the water quality monitoring conducted by STPUD.

Update: Objectives for fisheries management activities using the fish toxicant rotenone

These objectives were revised in 2011 and approved by the State of California in 2012. The changes allow the Water Board to permit activities such as the use of rotenone to eliminate non-native fish, the use of pesticides to control mosquitos or herbicides to control invasive aquatic weeds. Documentation and revisions to the Basin Plan can be found at

http://www.waterboards.ca.gov/lahtontan/water_issues/programs/basin_plan/pesticidebpa.shtml.

Spelling error: The third category for water quality objectives pertains to fisheries management activities using the fish toxicant rotenone. Because the application of rotenone solutions and the detoxification agent, potassium permanganate, can cause water quality objective exceedances (both inside and outside of the project area) specific objectives have been developed for the following parameters: color, pesticides, species composition and toxicity. Specific information on these objectives can be found in Chapter Three of the Basin Plan.

6.2.3.2 Nevada Surface Waters Update

The Nevada State Environmental Commission has established water quality standards for the Carson River as provided in Nevada Administrative Code (NAC) 445A. Table 6.2.3.2-1 shows the progression of the standards from 1967 to **2012** (No new standards have been developed and no additional standard revisions have occurred since 2012).

Table 6.2.3.2-1: Chronology of Main Water Quality Standards Revisions for “Designated Waters” in the Carson Basin

Date	Action
1967	Water pollution control regulations were adopted for the East Fork Carson, West Fork Carson, main Carson rivers and Bryant Creek including numeric criteria for numerous parameters (pH, temperature, dissolved oxygen, biological oxygen demand, chlorides, phosphorus, nitrates, total dissolved solids).
1972-75	Numeric criteria for color, turbidity, and fecal coliform were added.
1978-80	Beneficial uses were added. Also, significant changes in the numeric criteria occurred. Nitrite criteria added.
1984	Beneficial uses were reworded (fish species of concern were identified). Tables were reformatted to current form. Antidegradation RMHQs were added. Significant changes in the numeric criteria occurred. Ammonia criteria added.
1994	Some RMHQs were revised. pH criteria were revised.
2002	<i>E. coli</i> numeric criteria were added and ammonia numeric criteria were revised.
2006	Revisions related to the aquatic life beneficial use for toxics
2008	Class Waters redefined as designated waters. Standards tables reorganized and reformatted.
2008	Revisions to Molybdenum aquatic life standard under toxics
2012	Updates to aquatic life toxic standards and statewide fecal coliform standards.

Source: Pahl 2004/NDEP 2014

Note: RMHQ – Requirements to Maintain Existing or Higher Quality

In 2008, Class Waters were removed from the NAC and redefined as designated waters. This includes Clear Creek, which originates near Spooner Summit off Hwy 50, and flows through Carson City, discharging into the Carson River between Cradlebaugh Bridge and Mexican Ditch Dam. Clear Creek was originally considered a Class A water from its origin to the USGS gaging station in the Canyon and Class B water from the gaging station to the confluence with the river. Because of the addition of so many new designated waters to the NAC, the regulations were reorganized and renumbered. The new citations specific to the Carson River can be found at **NAC 445A.1792 through NAC 445A.1864. The complete Water Controls section is found at**

<http://www.leg.state.nv.us/NAC/NAC-445A.html#NAC445ASec11704>.

Spelling Error: The relationship between flows and water quality is important when assessing the health of the river system. The Nevada Administrative Code (NAC) recognizes that standards may be exceeded during extreme flow events, such as drought and flood, and that these **exceedances** should not be considered a violation of the standards. NAC 445A.121(8) states, “The specified standards are not considered violated when the natural conditions of the receiving water are outside the established limits, including periods of extreme high or low flow.....”.

A summary of the Nevada standards (including beneficial uses and numeric criteria) as stated in the NAC for the main Carson basin water is provided in Appendix C. Appendix C is out of date, see <http://www.leg.state.nv.us/NAC/NAC-445A.html#NAC445ASec11704> and scroll down the NAC list to the Carson Region NAC 445A.1792-445A.1864. There are also standards for toxic material and water quality criteria for total ammonia that applies to all surface waters in Nevada. This information can be found on the NDEP website at <http://www.leg.state.nv.us/NAC/NAC-445A.html#NAC445ASec118> for ammonia and <http://www.leg.state.nv.us/NAC/NAC-445A.html#NAC445ASec1236> for toxics.

6.2.4 303(d) Impaired Waters List Update

Nevada is required by the CWA, sections 303d and 305b, to conduct a comprehensive analysis of water quality data associated with Nevada's surface waters to determine whether state surface water quality standards are being met and designated uses are being supported. NDEP adopted the integrated reporting process with the Nevada 2008-10 Water Quality Integrated Report, combining the 303d and 305b reports into a single document to create consistency in the beneficial use assessments and determinations of whether a waterbody is “impaired” or “supported” for assigned beneficial uses. The link to the EPA approved integrated report documents can be found at https://ndep.nv.gov/uploads/documents/IR2010_Final_Report.pdf. The link to the final approved 2012 report can be found at https://ndep.nv.gov/uploads/documents/IR2012_Report_Final.pdf.

Listing a water body as impaired in California is governed by the [Water Quality Control Policy for developing California's Clean Water Act Section 303\(d\) Listing Policy](#). The State and Regional Water Boards assess water quality data for California's waters every two years to determine if they contain pollutants at levels that exceed protective water quality criteria and standards. This biennial assessment is required under Section 303(d) of the [Federal Clean Water Act](#). http://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/.

6.2.5 TMDL Development and Load Reduction Objectives

6.2.5.1 Lahontan Regional Water Quality Control Board

The California NPS Pollution Control Program is the most up to date NPS program. The purpose of the program is to improve California’s ability to effectively manage NPS pollution and to conform to the requirements of the CWA and the Federal Coastal Zone Act Reauthorization Amendments of 1990. The program and plans including updates can be found at the following website: http://www.waterboards.ca.gov/water_issues/programs/nps/plans_policies.shtml.

Specifics on the TMDLs can be found at:
http://www.waterboards.ca.gov/water_issues/programs/tmdl/
and
http://www.waterboards.ca.gov/lahtontan/water_issues/programs/tmdl/index.shtml.

6.2.5.1.1 Existing California TMDLs

This section addresses *element h*.

Indian Creek Reservoir Update

Spelling errors: Monitoring at the reservoir (which had been used for wastewater disposal until 1989) showed decreases in the concentrations of most wastewater related constituents including total phosphorus (TP) levels. However, concentrations of TP remained at levels which scientific literature indicates will maintain **eutrophic (sp)** conditions. **Eutrophic (sp)** symptoms include blooms of blue-green algae, low transparency, and depletion of dissolved oxygen in the hypolimnion. TP was selected as the quantitative focus for the TMDL due to frequent violations of the water quality objectives and because of TP as a factor in reservoir eutrophication. The primary numeric target is an annual mean concentration in the water column of 0.02 mg/L TP (CRWQCB 2002). This target represents the threshold between mesotrophic and eutrophic conditions. The Lahontan Water Board suggests that this target can be attained by significantly reducing TP loading from the sediment. Suggested methods include increased flushing, removal of phosphorus-rich sediment, or chemical treatment to prevent phosphorus release to the water column.

The interim TP target of 0.04 mg/L for the Indian Creek Reservoir TMDL has been attained. The most recent status report can be found at:

http://www.waterboards.ca.gov/lahtontan/water_issues/programs/tmdl/indian_creek/docs/icr_imp_lstrpt.pdf

Aspen, Bryant and Leviathan Creek Update:

For the TMDL Summary of Management Measures and Outcomes: See

http://www.waterboards.ca.gov/about_us/performance_report_1415/plan_assess/docs/fy1314/1112_r6_leviathan_aspen_bryantcreeks_metal.pdf.

West Fork Carson River

Lahontan Regional Water Quality Control Board plans to focus on completing a TMDL for the West Fork of the Carson River with a tentative target date between 2019 – 2025 for nitrogen, phosphorus, nitrates, chloride, sulfates, TDS, fecal coliform and turbidity. In 2016, U.S. EPA designated a handful of pilot watersheds around the country for "Vision Priority". They worked with Lahontan to identify West Fork Carson River as one of those pilot areas. Lahontan and the EPA will develop a "TMDL Alternative" by 2022 instead of the individual TMDL's general required through CWA/303d listings. A "TMDL Alternative" will likely be a watershed restoration plan. See Critical Areas Management Table 8.2 and the adjacent map for more details.



6.2.5.2 Nevada Division of Environmental Protection Update

Truckee River Standards:

The Bureau of Water Quality Planning of the Nevada Division of Environmental Protection (NDEP) has begun a review of the Truckee River water quality standards contained in Nevada Administrative Code 445A.1682 through 445A.1694. More information can be found at https://ndep.nv.gov/uploads/documents/Presentation_workshop_01_28_2014.pdf. Documents from the Third Party (City of Reno, Sparks and Washoe County) review process can also be found at <http://www.truckeeriverinfo.org/tmdl>. The standard review is the precursor to any potential changes in the Truckee River TMDLs. The Pyramid Lake Paiute Tribe completed their water quality standards review and EPA approve the revised water quality standards on 12/23/2015.

Lahontan Reservoir Standards:

The Bureau of Water Quality Planning of the Nevada Division of Environmental Protection (NDEP) has updated the water quality standards for Lahontan Reservoir in Nevada Administrative Code 445A.1792 and 445A.1824. Information regarding changes to the standards, which were last updated in 1984, can be found at: <https://ndep.nv.gov/water/rivers-streams-lakes/water-quality-standards/current-and-past-actions/lahontan-reservoir-standards-review>

6.2.5.2.1 Existing Nevada TMDLs Update

This section addresses *element h.*

Carson River

Total Phosphorus, Total Suspended Solids, and Turbidity TMDL Updates

Routine water quality samples collected by NDEP for TP, TSS and Turbidity between July 2004 and January 2013 were analyzed for the Carson River Watershed Adaptive Stewardship Plan. Table 6.2.5-1 summarizes this analysis. Samples represent ambient water quality conditions only.

Table 6.2.5-1 2014 Water Quality and TMDL Summary

<i>Parameter</i>	<i>West Fork at Paynesville</i>	<i>East Fork at Riverview</i>	<i>Carson River at Mexican Gage</i>	<i>Carson River at New Empire</i>	<i>Carson River at Weeks</i>
Add gages line here					
Annual Average TP Standard (std), mg/L	≥0.1 at Stateline	≥0.1	≥0.1	≥0.1	≥0.1
Data Record	7/04 – 1/13	7/04 – 1/13	7/04 – 1/13	7/04 – 1/13	7/04 – 1/13
# Samples	21	15	20	11	18
Average Concentration	0.02	0.03	0.14	0.14	0.10
# Samples = or exceeding std as SV	0	0	15	7	6
% Samples = or exceeding std as SV	0	0	75	64	33
% Exceeding TMDL	0	0	75	64	33
Single Value(SV) TSS Standard, mg/L	≤25 at Stateline	≤80	≤80	≤80	≤80
Data Record	11/05 – 1/13	11/05 – 1/13	11/05 – 1/13	11/05 – 10/12	11/05 – 1/13
# Samples	17	11	16	8	14
Average Concentration	5	7	14	13	27
# Samples = or exceeding std	0	0	0	0	1
% Samples = or exceeding std	0	0	0	0	7
% Exceeding TMDL	0	0	0	0	7
Single Value (SV) Turbidity Standard, NTU	≤10 at Stateline	≤10	≤10	≤10	≤50
Data Record	11/05 – 1/13	11/05 – 1/13	11/05 – 1/13	11/05 – 10/12	11/05 – 1/13
# Samples	17	11	16	8	14
Average Concentration	1.58	3.01	7.74	8.60	9.67
# Samples = or exceeding std	0	0	4	1	1
% Samples = or exceeding std	0	0	25	12.5	7
% Exceeding TSS surrogate TMDL	0	0	0	0	0
% std exceedances applies to:	at Stateline NAC 445A.1796	Stateline to HWY 395 (Riverview) NAC 445A.1804	Cradlebaugh to Mexican Gage NAC 445A.1814	Mexican Gage to New Empire NAC 445A.1816	Dayton Bridge to Weeks Bridge NAC 445A.1822
% TMDL exceedances applies to:	at Stateline NAC 445A.1796	Stateline to Hwy 395 (Riverview) NAC 445A.1804	EF Riverview & WF Stateline to Mexican Gage NAC 445A.1806, 1808,1812, &	Mexican Gage to New Empire NAC 445A.1816	New Empire to Weeks Bridge NAC 445A.1818 & 1822

Figures 6.2.5-1-4 compare the average concentration data collected and analyzed for the 2005 or 2007 TMDLS with the more recent data. The overall averages are lower for the more recent data sets. However, the number of samples in the earlier data sets is much larger. *The differences observed are likely an artifact of the amount of data analyzed and not because there has been any improvement in water quality.* The averages, medians or overall distribution of the data do not significantly change by combining the most recent data with the original data sets.

Figure 6.2.5-1

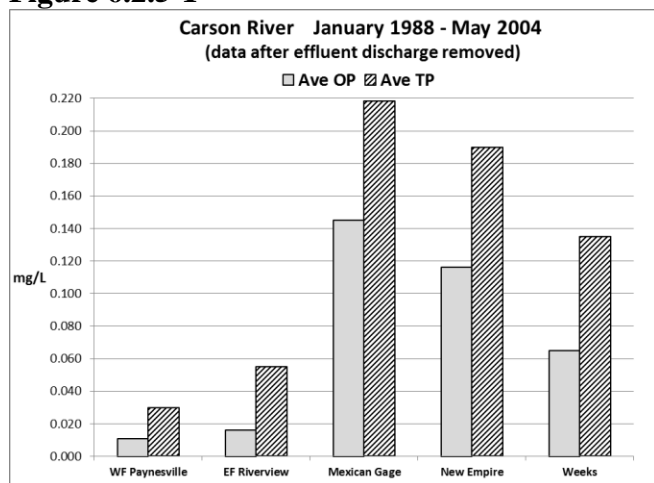


Figure 6.2.5-2

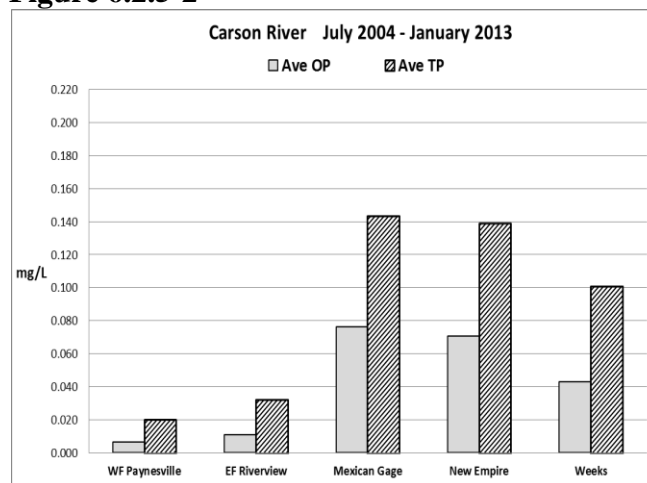


Figure 6.2.5-3

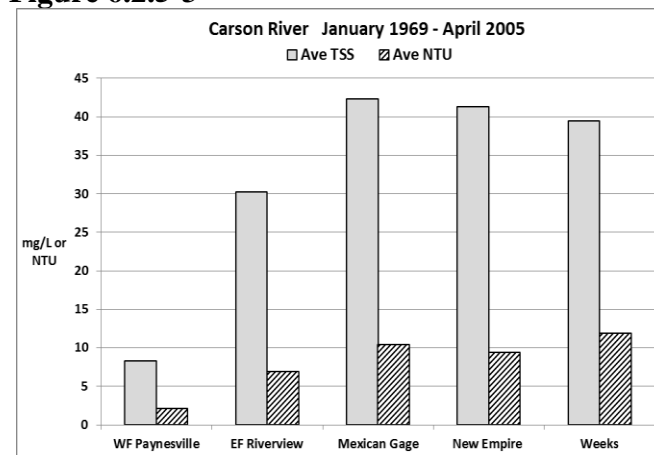
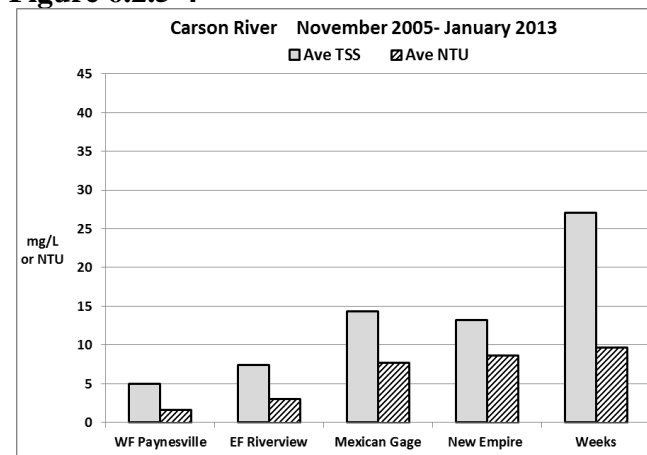


Figure 6.2.5-4



The water quality targets represented by the Duration Curve Total Maximum Daily Loads developed in 2005 for TP and in 2007 for TSS and Turbidity illustrate the percentage of time during which the value of a given parameter (e.g. flow, loading) is equaled or exceeded. Each target is determined by multiplying the water quality standard for the parameter of interest by the period of record daily flow values to obtain the curve after applying a conversion factor. Individual sample loads (water quality sample concentration x flow on the day sample was collected x a conversion factor) are plotted against the curve. Samples below the curve meet the TMDL. Samples above the curve exceed the TMDL. Because Turbidity cannot be expressed as a mass load, TSS is used as a surrogate variable. To develop the surrogate, TSS is plotted as a function of turbidity and a predictive equation is developed to calculate a TSS value that corresponds to the Turbidity standard. The predicted standard is then used to construct the duration curve TMDL. It should also be noted that because there was more Turbidity data than TSS at each site, not all the turbidity values could be used to develop the predictive equation for the original TMDL. Only 5 TMDLs were developed at the selected monitoring sites due to the proximity to nearby long term USGS flow gaging stations. This explains why some of the standard exceedances are evaluated for different reaches than the TMDL exceedances (last two rows of Table 6.2.5-1). If greater than 10% of the observed sample loads exceed the duration

curve established for one of the five identified TMDL sites, the entire upstream reach to the next TMDL site is not meeting the target.

The TMDLS are meant to evaluate long term changes in pollutant load, not short-term impairment in contaminant concentration. Therefore, data is analyzed differently for the TMDLs compared to the 303(d) impaired waters list and the Integrated Reports (IRs) prepared by NDEP (refer to Updates for Section 6.2.4). The Integrated Reports assessed data from different time periods (see section summary). The IRs also evaluated waterbody impairment for TP based on annual averages. Annual averages were not utilized in the TMDL analyses. The individual data points are compared to the appropriate duration curve and evaluated for seasonal differences in concentration and loading. The percentage of sample loads exceeding the duration curves for the period 7/04 through 1/13 is less than the percentage exceeding the target curves developed for the 2005 (https://ndep.nv.gov/uploads/water-tmdl-docs/carson_tmdl_093005.pdf) and 2007 (https://ndep.nv.gov/uploads/water-tmdl-docs/carson_river_tmdl_07.pdf) TMDLs. Again, this result may simply be due to the less frequent sample collection and not because actual load reductions had occurred because of project implementation (*element b*). Figures 6.2.5-5 and 6.2.5-6 provide updated example load duration curves for TP at East Fork Riverview and Mexican Gage.

Figure 6.2.5-5

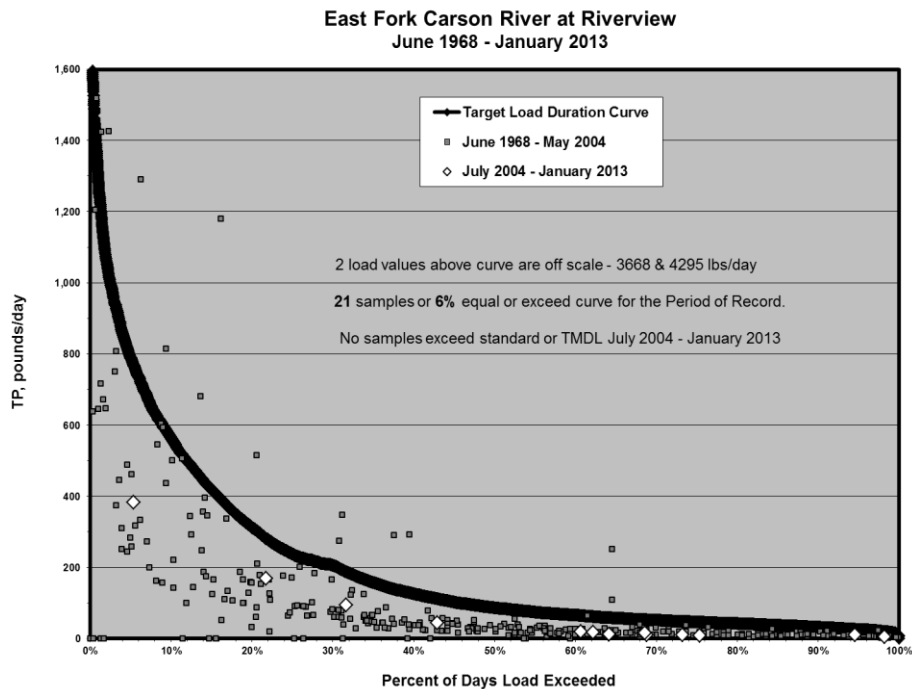
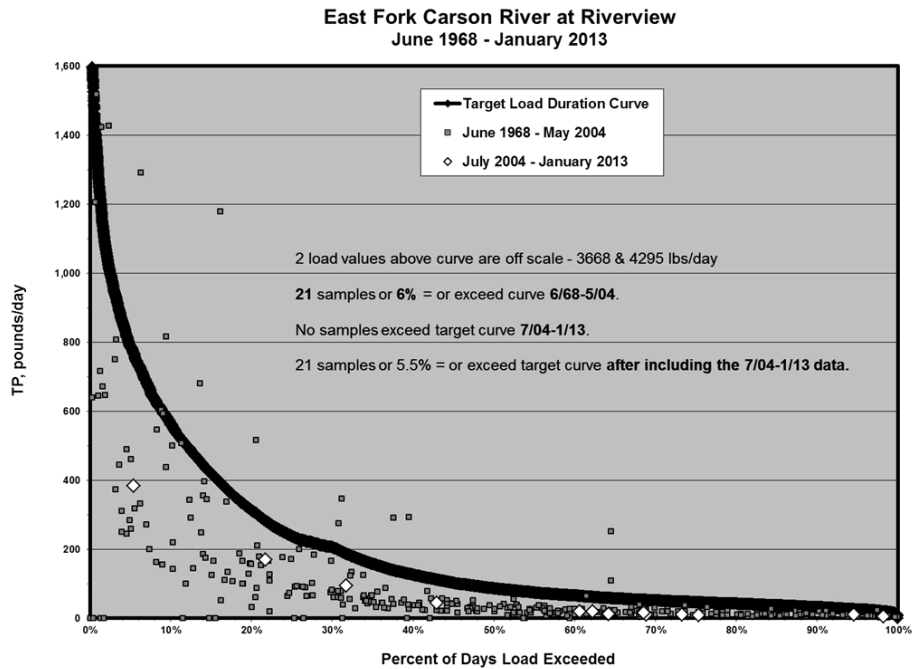
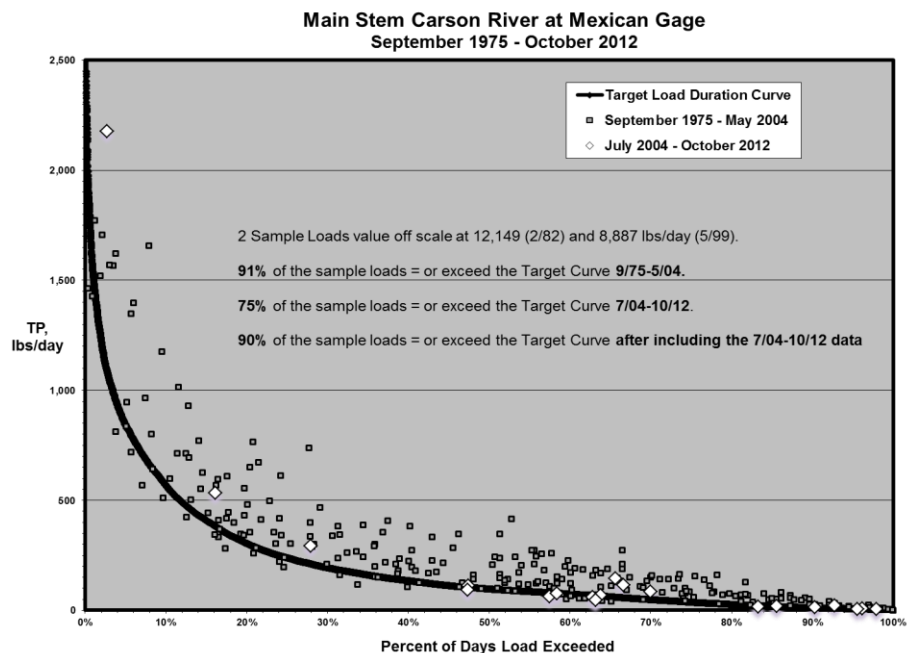
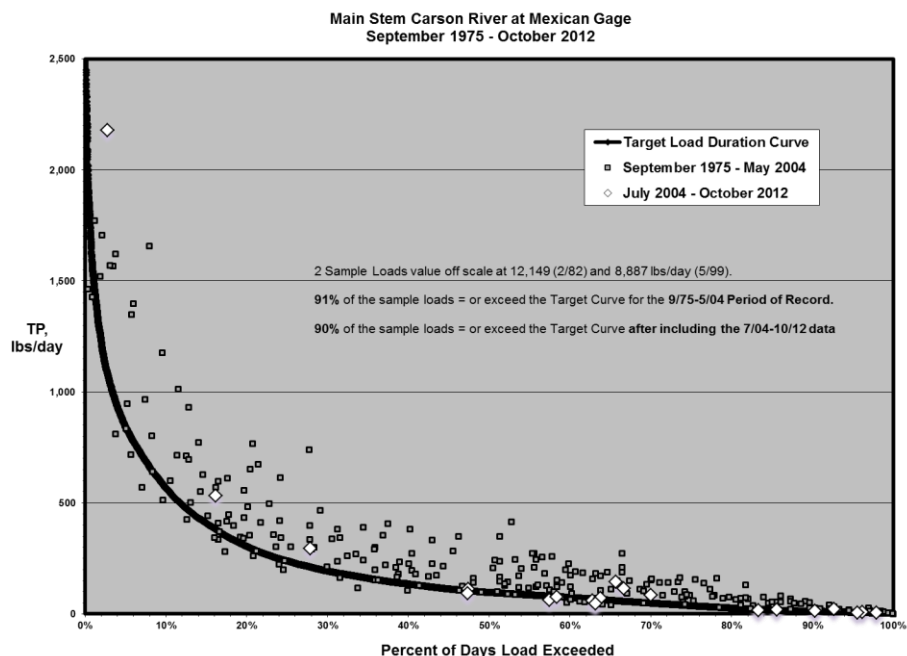


Figure 6.2.5- 6 Replaces Figure 6.2.5.2.1-1



The most TMDL exceedances were found at Mexican Gage between 2004 and 2012. As listed in Table 6.2.5-1, 15 out of the 20 samples (75%) collected at between July 2004 and October 2012 equaled or exceeded the 0.1 mg/L standard and equaled or exceeded the TMDL (target load duration curve) developed for Mexican Gage. Twelve of the samples exceeding the TMDL occurred at flows less than 200 cfs. As, expected, the three highest loads occurred during spring runoff. The highest P concentrations were measured during the summer months (Figure 6.2.5-7). A seasonal plot is also provided for TSS and Turbidity (Figure 6.2.5-8).

Figure 6.2.5-7 New Figure and Analysis

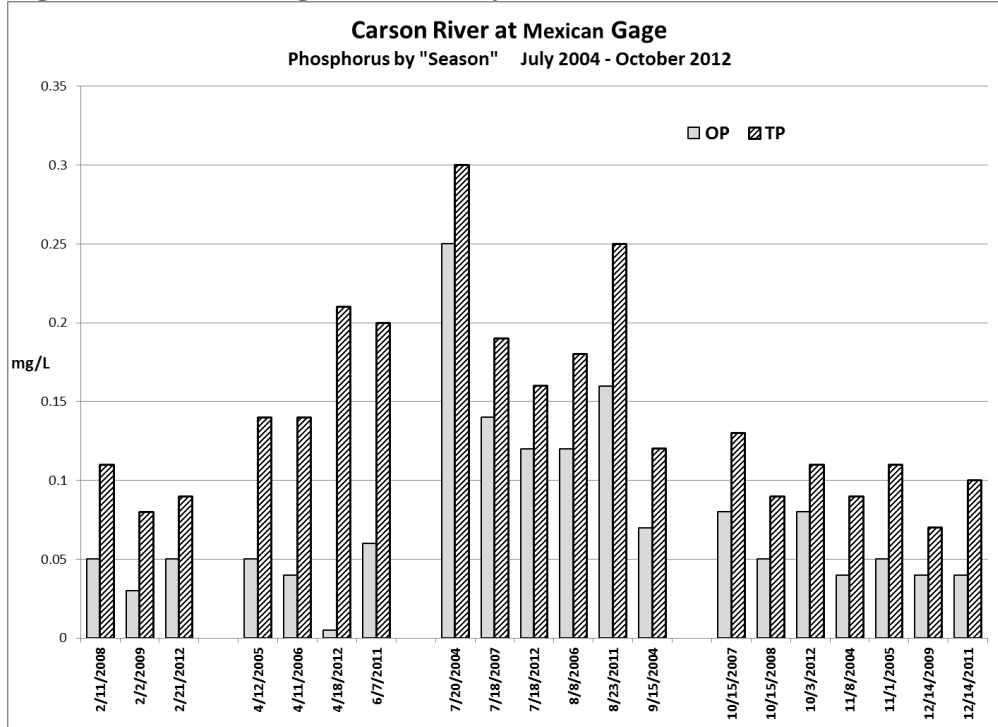
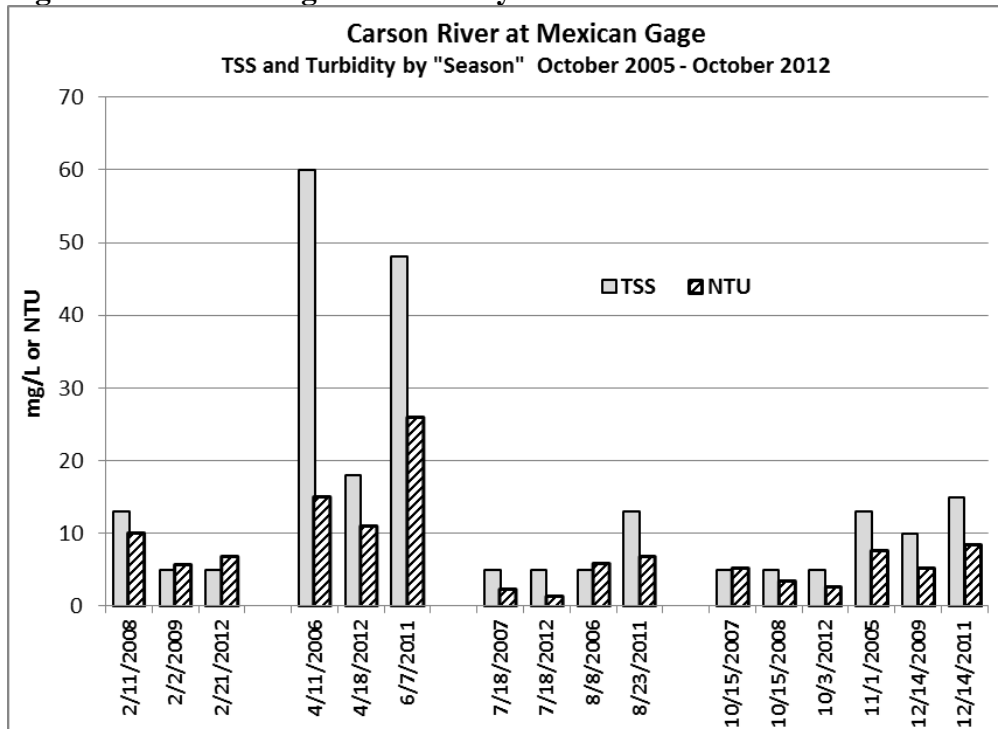


Figure 6.2.5-8 New Figure and Analysis



Summary

NDEP conducted less frequent monitoring on the Carson River between July 2004 and January 2013 compared to the period used for the 2005 and 2007 TMDLs because of shifting priorities and budget constraints. This makes it difficult to determine if water quality has either improved or deteriorated. A larger number of samples may have indicated an increase in loads and exceedances of the standards or TMDLs was occurring particularly if collected during periods of high flow (e.g. storm events).

Initial trend analyses do indicate that TP concentrations collected between 1993 and 2012 are decreasing at WF Carson River at Paynesville, Carson River at Carson City (Mexican Gage) and Carson River at Fort Churchill (Weeks). No trends in TP (either decreasing or increasing) were detected at EF Carson River near Gardnerville (Riverview), Carson River at Deer Run Road (New Empire) or the Carson River below Lahontan Reservoir for samples collected between 1993 and 2012. No trends for Turbidity were determined for the six selected monitoring sites. TSS trends were not determined because too many of the samples analyzed were measured at less than the reporting limit.

Reach restoration or corridor protection milestones have been achieved as approximately 29% (31 miles) of the river corridor between the CA Stateline and Weeks Bridge upstream of Lahontan Reservoir has been stabilized, revegetated or protected as a conservation easement or open space (See revised Table 5.10-2). The 31 miles is not contiguous.

Several the river reaches assessed for the 2008/2010 IR (https://ndep.nv.gov/uploads/documents/IR2010_Final_Report.pdf) indicate non-support of the beneficial uses (impairment) for specific TMDL parameters. The 2008/2010 IR evaluated data collected over a seven-year period, between October 2002 and September 2009. The 2012 IR, which evaluated data collected between October 2006 and September 2011, was approved by EPA in December 2014. See https://ndep.nv.gov/uploads/documents/IR2012_Report_Final.pdf to update Appendix D. The 2014 IR (https://ndep.nv.gov/uploads/water-wqm-docs/IR2014_Report.pdf) evaluated data collected between October 2007 and September 2012.

Information from Attachment 6 (EPA approved TMDL list) from the 2008/2010, the 2012 and the 2014 IR is summarized in Table 6.2.5-2a. Several reaches of the river are also impaired for additional parameters such as Temperature and Dissolved Oxygen and are summarized in Table 6.2.5-2b. Because TMDLs were developed for TP, TSS and Turbidity, these parameters are removed or “delisted” from the 303(d) list (See Attachment 4 in the Integrated Reports) even if the standards are exceeded.

Table 6.2.5-2a TMDL sites and Current Impairments (WQ Standards Exceedances) Updates Table 6.2.5.2.1-1a and 1b in the 2007 Adaptive Stewardship Plan

“TMDL” Site	Corresponding Reach upstream of TMDL site	Nevada Administrative Code (NAC) segments <i>within</i> TMDL Reaches	2008/2010 Integrated Report Impaired for TP, TSS or Turbidity?	2012 Integrated Report Impaired for TP, TSS or Turbidity?	Draft 2014 Integrated Report Impaired for TP, TSS or Turbidity?	Applicable USGS Gaging Station
West Fork at Paynesville (Stateline)	Data collected and TMDL developed used to compare to downstream WQ	445A.1796	TSS	No Impairment	No impairment	Woodfords #10310000
East Fork at Riverview	East Fork at Stateline to Riverview	445A.1804	TSS, Turbidity	No Impairment	No impairment	Near Gardnerville #10309000
Carson River at Mexican Gage	EF Riverview to Hwy 88 EF Hwy 88 to Muller	445A.1806	Turbidity Turbidity	Turbidity No impairment	Turbidity No impairment	Near Carson City #1031100
	WF Stateline to Muller	445A.1808	TP	TP	TP	
	EF and WF Muller to EF & WF Confluence to Genoa	445A.1808	TP, Turbidity	TP, Turbidity	TP, Turbidity	
	Genoa to Cradlebaugh* Cradlebaugh to Mexican Gage	445A.1812 445A.1814	TP, TSS, Turbidity TP, Turbidity	TP, TSS, Turbidity TP	TP, TSS, Turbidity TP	
Carson River at New Empire Bridge	New Empire to Mexican Gage	445A.1816	TP, Turbidity	TP, Turbidity	TP, Turbidity	Deer Run Road #10311400
Carson River at Weeks Bridge	New Empire to Dayton Dayton to Weeks	445A.1818 445A.1822	TP, TSS TP, TSS	TP, TSS TP	TP, TSS TP	Near Fort Churchill #10312000

*The standards proscribed in regulation for the reach from Genoa to Cradlebaugh (NAC445A.1812) are also applied to Brockliss Slough because of the “Tributary Rule”. The Slough enters the main stem Carson River between Genoa Lane and Cradlebaugh Bridge. Brockliss Slough is currently impaired for TP (2014 Draft IR) from its divergence from the West Fork to the confluence with the Main Stem Carson River.

Table 6.2.5-2b Current Non-TMDL Impairments (WQ Standards Exceedances) Updates Table 6.2.5.2.1-1a and 1b in the 2007 Adaptive Stewardship Plan

Monitoring Site	Corresponding Reach upstream of Monitoring Site	Nevada Administrative Code (NAC) segments	2008/2010 Integrated Report	2012 Integrated Report	2014 Integrated Report	Applicable USGS Gaging Station
West Fork at Paynesville (Stateline)	NA	445A.1796	Zinc	No Impairment	No Impairment	Woodfords #10310000
East Fork at Riverview	East Fork at Stateline to Riverview	445A.1804	T	T	T	Near Gardnerville #10309000
Carson River at Mexican Gage	EF Riverview to Hwy 88 EF Hwy 88 to Muller	445A.1806	T No impairment	T No Impairment	T No Impairment	Near Carson City #1031100
	WF Stateline to Muller	445A.1808	E. coli, T	E. coli, T	E. coli, T	
	EF and WF Muller to EF & WF Confluence to Genoa	445A.1808	T	T	T	
	Genoa to Cradlebaugh* Cradlebaugh to Mexican Gage	445A.1812 445A.1814	DO, T T	DO, T E. Coli, T	DO, T E. Coli, T	
Carson River at New Empire Bridge	New Empire to Mexican Gage	445A.1816	DO, T	E. coli, DO, T Hg in Fish Tissue	E. coli, DO, T Hg in Fish Tissue	Deer Run Road #10311400
Carson River at Weeks Bridge	New Empire to Dayton	445A.1818	Hg in Fish Tissue, Sediment	Hg in Fish Tissue, Sediment	Hg in Fish Tissue, Sediment	Near Fort Churchill #10312000
	Dayton to Weeks	445A.1822	Hg in Fish Tissue, Sediment & in the water column	Hg in Fish Tissue, Sediment & in the water column	Hg in Fish Tissue, Sediment & in the water column	

*The standards proscribed in regulation for the reach from Genoa to Cradlebaugh (NAC445A.1812) are also applied to Brockliss Slough because of the “Tributary Rule”. The Slough enters the main stem Carson River between Genoa Lane and Cradlebaugh Bridge. Brockliss Slough is currently impaired for the non -TMDL parameters E. coli, Iron, DO and Temperature (Draft 2014 IR) from its divergence from the West Fork to the confluence with the Main Stem Carson River.

7.0 Monitoring and Assessment Update

Since the 2007 plan was adopted by CWSD numerous monitoring and assessment projects have been completed or are in process. These projects include:

7.1 Carson River Report Card Project Update

The intent of the Report Card was to present a comprehensive characterization of the past and current health of the Carson River and its aquatic life from a Clean Water Act perspective. Topics covered included: Background, Nutrients and Dissolved Oxygen Assessment, Temperature Assessment, Total Suspended Solids and TSS Assessment, Lahontan Reservoir Assessment, Physical Condition Assessment, Biological Condition Assessment, and Trace Metals Assessment.

Refer to the following webpage for detailed information on the findings:

<https://ndep.nv.gov/water/rivers-streams-lakes/special-reports/carson-river-watershed-project>

7.2 Water Quality Monitoring Programs Updates

7.2.1 California Surface Water Ambient Monitoring Program Update

Link to California Surface Water Ambient Monitoring Program updated

http://www.waterboards.ca.gov/water_issues/programs/swamp/

7.2.2 South Tahoe Public Utility District Monitoring Update

In October 2008, South Tahoe Public Utility District completed the *Recycled Wastewater Monitoring Program Evaluation Report* for Alpine County, California (Alpine County 2008). The study objective was to evaluate and determine the adequacy of the monitoring program in collecting data to assess the impact of using recycled wastewater for pasture crop irrigation on surface water, groundwater, and soil resources in Alpine County. A series of recommendations have been and continue to be carried out in relation to the study. This report is available in the CWSD physical library.

The South Tahoe Public Utility District (STPUD) stores treated effluent at Harvey Place Reservoir in Alpine County which is used by local agriculture for irrigation. STPUD monitors 10 surface water sites within the West Fork Carson River and Indian Creek Watersheds. Data taken from their 2013 Annual Performance Report (STPUD 2014) is presented in Figure 7.2.2-1 for three parameters – TP, TSS and Turbidity. The 2014 data from the 2014 Annual Performance Report (STPUD 2015) is missing two surface monitoring sites. Therefore, 2014 data is shown in Figure 7.2.2-2 below. For additional information refer to the contact information found at <http://www.stpud.us/alpineco.html>.

SW-01 Carson River Woodfords

SW-02 Indian Creek, Upper

SW-03 Indian Creek, Mid

SW-04 Indian Creek, Lower

SW-05 Carson River, Paynesville

SW-06 Carson River, Stateline

SW-07 Fredricksburg Ditch, Upper

SW-08 Irrigation Ditch along Carson R. Road

SW-09 Carson River, Dressler Lane

SW-10 Indian Creek at Bruns

The average concentrations for TP in the river are lower than in Indian Creek or the irrigation **ditches**. **The 1981-2013 average values for TSS, Turbidity and TP are also lower in the river samples collected by STPUD than the Nevada standards for the Carson River, West Fork at the Stateline** (NAC445A.1796) See standards at: <http://www.leg.state.nv.us/NAC/NAC-445A.html#NAC445ASec1796>.

FIGURE 7.2.2-1

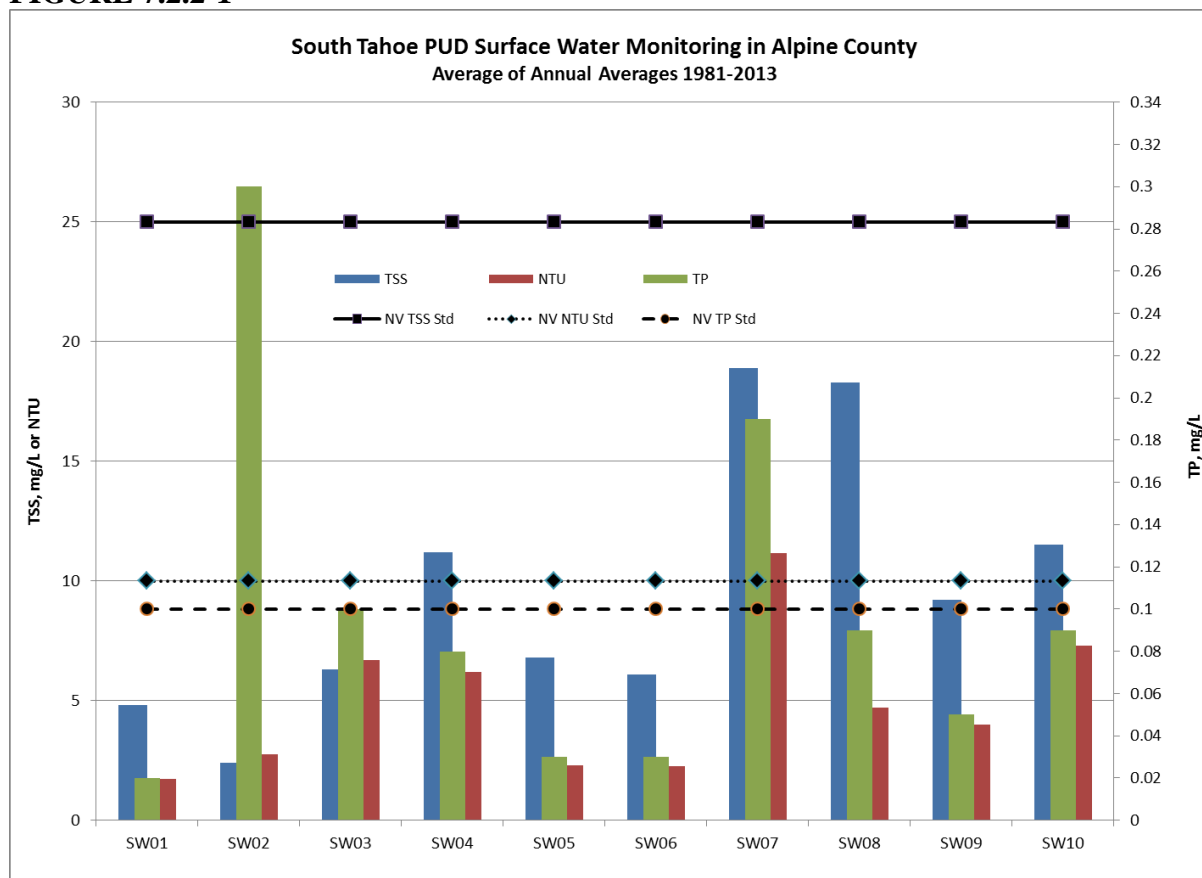
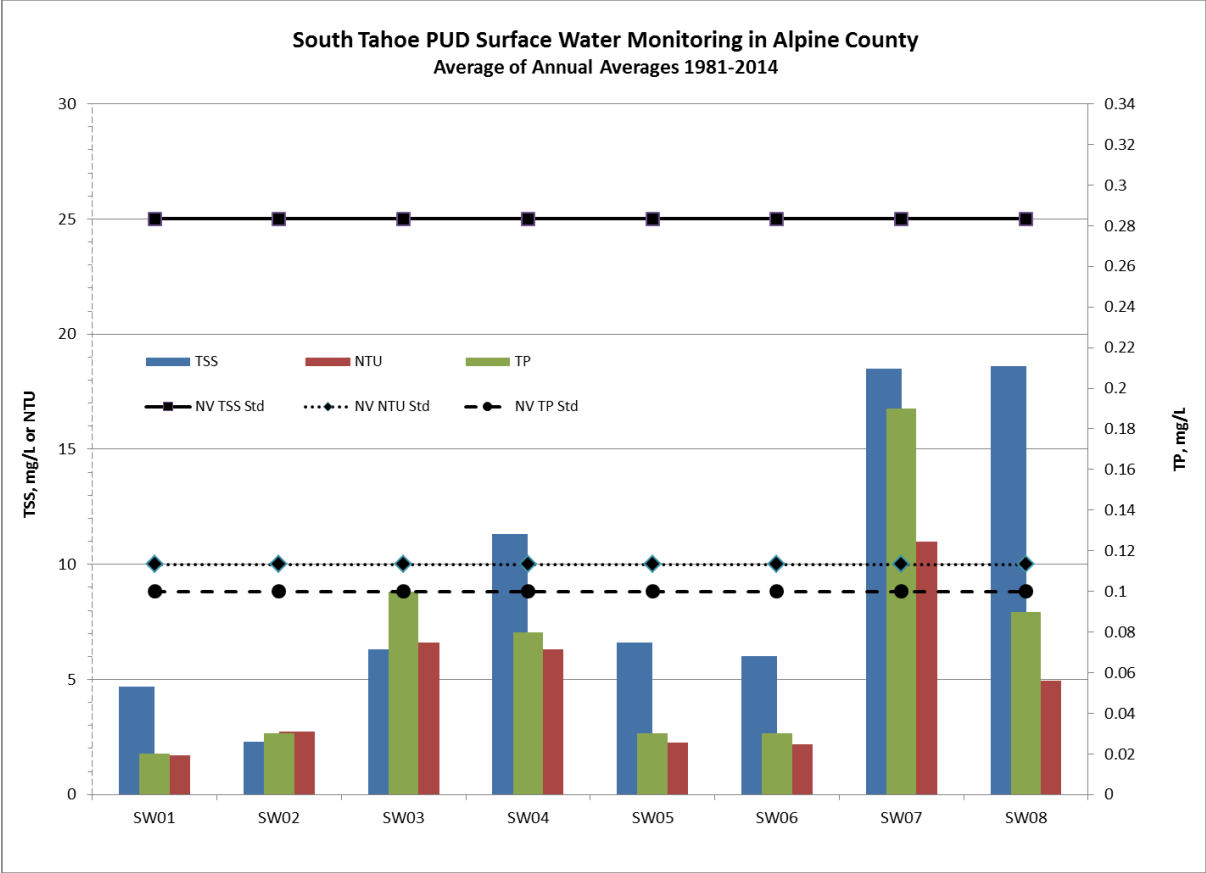
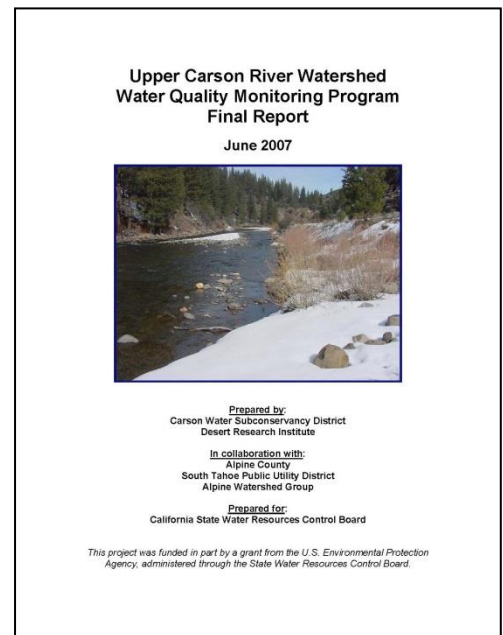


FIGURE 7.2.2-2



7.2.3 Upper Carson River Watershed Water Quality Monitoring Program Update (CWSD & DRI 2007)

In May 2002, Alpine County in cooperation with the Carson Water Subconservancy District, Desert Research Institute (DRI), South Tahoe Public Utility District (STPUD) and the Alpine Watershed Group received funding from the State Water Resources Control Board to conduct a water quality monitoring program (program) in the Upper Carson River Watershed in Alpine County, California (watershed). The objective of the program is to begin to identify and quantify the various sources of contaminants, where possible, and to give public officials additional information to design proper remedial measures, including the development of total maximum daily loads (TMDL's). The overall goal of the program is to provide necessary data to guide restoration efforts aimed at improving water quality and biological resources in the watershed. Water quality data was collected over a two-year period from April 2004 through January 2006 at eight sites in the upper watershed within the East and West Fork drainages. A final report of the project was published June 2007 which contains findings and recommendations.



Significant findings include:

- The median Total Phosphorus (TP) concentration is more than twice as high in the Indian Creek basin than the median for the East or West Forks basins.
- During high water events TP and other constituents tend to increase significantly.
- Sampling of the West Fork in June 2005 showed TP concentrations up to 0.12 mg/L. Since West Fork water is potentially diverted to Indian Creek Reservoir during this time of year, this level of TP is of concern considering that the interim target for Indian Creek Reservoir is 0.04 mg/L.
- Maximum values for total and fecal coliform for West Fork and Indian Creek sites exceeded 24,000 counts.
- Median value for total coliform for East Fork sites is 410, 230 for West Fork sites, and 150 for Indian Creek sites. In general, Wolf, Millberry, Markleeville and Bryant Creeks show higher median values for total coliform.
- Ranges of values for nitrates are significantly higher in the West Fork and Indian Creek basins than the East Fork basin.
- Median values in the West Fork basin for ortho-phosphate concentrations were lower than East Fork or Indian Creek basins.
- All of the high sodium adsorption ratio values and sodium values are found in the Indian Creek basin.

Recommendations from the project include:

- Additional monitoring for TP should be conducted to better identify the source(s) of TP and if it is natural or man-induced.
- Continued monitoring of Millberry, Markleeville and Wolf Creeks for total coliforms should be conducted in order to isolate the source(s) of contamination.

- Sources of funding should be secured in order to continue the monitoring effort developed for this program to ensure a large dataset.
- Sites should be monitored on a monthly basis to ensure a large dataset at the same frequency as the STPUD monitoring program and satisfy regulatory requirements for the computation of the mean of the monthly means.

The report is available for download at:

<http://www.cwsd.org/newcms/admin/Uploads/finalacwqprog.pdf>

7.2.4 Volunteer Citizen Water Quality Monitoring Program Update

The Alpine Watershed Group (AWG) is a community-based nonprofit organization whose mission is to preserve Alpine County's watersheds for generations to come. Since 2004, AWG has maintained a volunteer-supported field monitoring program that conducts water sampling and records stream observations in the Upper Carson River. Volunteers collect, measure and record data regarding water quantity, water quality, biologic diversity and resiliency of stream habitat along both the East and West Forks of the Carson River. The volunteer monitoring establishes a baseline dataset that assists AWG and local land managers to better understand the health of our local watersheds.

The primary types of monitoring conducted by AWG volunteers are:

- **Ambient**
Ambient monitoring is conducted four times a year at 8 sites on the Upper East and West Fork Carson River and their tributaries. The parameters assessed include water and air temperature, dissolved oxygen, pH, conductivity, and turbidity.
- **Bacteria**
Bacteria sampling is done through a partnership with the Lahontan Regional Water Quality Control Board on a bi-weekly basis from March-October. Samples are collected and analyzed for total coliform and E. coli counts.
- **Discharge**
Stream discharges are collected along the upper reaches of the West Carson River throughout the summer. AWG volunteers download data loggers and measure stream discharge with the intent to develop a stream discharge curve for that reach of the watershed, allowing for the quick assessment of available water at any river stage.
- **Bio assessment**
Bio assessments are conducted annually to assess a stream's ability to support its dependent ecologies. Surveys include collecting aquatic insects (macroinvertebrates), stream discharge measurements, and assessing bank cover and in-stream habitat characteristics.

See AWG's website at: <http://www.alpinewatershedgroup.org/> for further information (Pers. coms. Sarah Green 2015).

7.2.5 NDEP Routine Water Quality Monitoring Program – Update

Table 7.2.5-1 below indicates the long-term water quality monitoring undertaken by NDEP on a quarterly basis. Full sampling has been ceased due to reduced funding and staffing levels.

Table 7.2.5-1 NDEP Long Term Water Quality Sampling Sites

C8	West Fork Carson River @ Paynesville	Carson River, West Fork
C9	East Fork Carson River @ Riverview	Carson River, East Fork
C15	East Fork Carson River @ Williams Slough	Carson River, East Fork
C13	Carson River @ Mexican Gage	Carson River
C1	Carson River @ New Empire Bridge	Carson River
C10	Carson River @ Weeks Bridge	Carson River
C18	Carson River Below Lahontan Dam	Carson River
C5	Brockliss Slough @ Muller Lane	Brockliss Slough, including East and West Branches
C6	East Brockliss Slough @ Muller Lane	Brockliss Slough, including East and West Branches

7.2.8 Washoe Tribe of Nevada and California Water Quality Monitoring Update

The Washoe Tribe of Nevada and California has adopted a Sampling and Analysis Plan for the Water Quality Monitoring Program (SAP) and submits an annual Monitoring and Assessment Report to the EPA. A total of 14 sites are monitored for water quality looking at chemical (taken quarterly), physical, and toxicological components. Biological and macroinvertebrate monitoring protocols have been approved in the SAP; however, the Washoe Tribe is not currently conducting bio/bmi monitoring (Michelle Hochrein, personal email 12/19/2016).

Additionally, the Tribe completed a draft Non-point Source Assessment and Management Program Plan 2016 with public comments submitted in November 2016. The final draft is scheduled to be completed in 2017. The plan states the primary purpose is to identify, control, reduce and abate NPS pollution impacting surface and ground water resources on tribal lands (WTNC 2016).

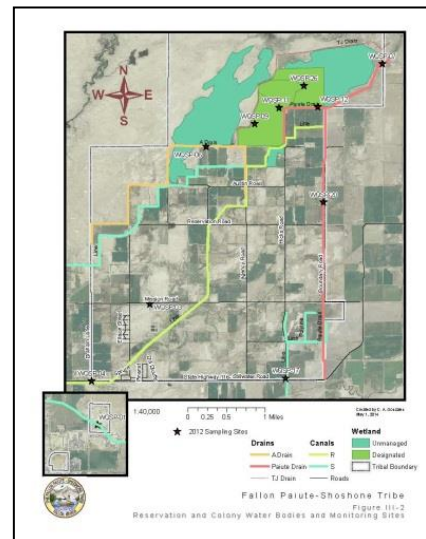
7.2.9 Clear Creek USGS Monitoring Study

The USGS is continuing to monitor sediment and selected water quality characteristics in the Clear Creek watershed in Eagle Valley for NDOT. Three sites are monitored for streamflow, suspended and bed sediment, major ion chemistry, trace elements, nutrients, dissolved oxygen, pH, specific conductance, alkalinity, and petroleum hydrocarbons. For more information contact the Nevada Water Science Center, U.S. Geological Survey,

<http://nevada.usgs.gov/water/studyareas/clearcreek.htm>.

7.2.10 Fallon Paiute Shoshone Tribe Water Quality Monitoring

The Fallon Paiute Shoshone Tribe has adopted a Monitoring Strategy and conducts annual water quality sampling on a quarterly basis at 10 sites minimum. Due to recent budgets, the Tribe is monitoring only core parameters; however, they are set



up to monitor more parameters if additional funding is available during a year. An annual water quality report summarizes the data for each year (Gonzales 2014, pers. coms.).

7.2.11 Lahontan Reservoir Water Quality Standards Update

The current Lahontan Reservoir water quality standards were set in 1984 based upon 1970s/80s EPA guidance and water quality conditions. According to the February 2014 *Draft Water Quality Standards Review: Carson River from US Highway 95A to Lahontan Dam DRAFT Rationale Document*, NDEP decided to review Lahontan Reservoir's water quality standard in 2013 for the following reasons:

- One of the NDEP-BWQP's goals is to improve water quality standards through the assignment of more appropriate beneficial uses and water quality criteria. It has been nearly 30 years since the existing standards were set and last evaluated. Our understandings of beneficial uses and criteria have evolved and we believe that there are some areas for which the existing standards can be improved.
- Since the time the existing standards were set, there have been significant changes in nutrient loadings to Lahontan Reservoir from the Carson River and the Truckee Canal. Nutrient concentrations in the Carson River and Truckee Canal have shown a marked reduction following upgrades to the Truckee Meadows Water Reclamation Facility (TMWRF) in the 1980s and the removal of direct treated effluent discharges to the Carson River by 1987. As a result, average loadings of total nitrogen and total phosphorus have dropped by about 60% and 50%, respectively (Pahl, 2007).
- For several years, NDEP has been working with Reno, Sparks, TMWRF, Washoe County and TMWA in a 3rd Party review of the existing Truckee River Nitrogen and Phosphorus TMDL (Total Maximum Daily Load) which sets load limits for both point and nonpoint sources in the Truckee watershed. Any TMDL revisions will be constrained by Truckee River water quality standards (both Nevada and Pyramid Lake Paiute Tribe) and Lahontan Reservoir water quality standards. Before the TMDL is completed, it is desirable that appropriate standards are in place.

For more information go to: <https://ndep.nv.gov/water/rivers-streams-lakes/water-quality-standards/current-and-past-actions/lahontan-reservoir-standards-review>.

7.2.12 (Update of original section 7.2.9) Summary of Water Quality Characterization Projects/Studies

Table 7.2.12-1 & 7.2.12-2 (Update of Table 7.2.8-1 & 2) below provides overview of projects/studies that have been completed since the 2007 plan.

Table 7.2.12-1: Characterization of Carson River Water Quality Completed Studies - 2016 Update

Completed Projects and Studies				
Title	Location	Dates	Lead Organization/ Partners	Description
Carson River Report Card	Nevada State Line to Lahontan Reservoir	2005 - 2007	NDEP	In 2004 NDEP began developing an assessment, or report card, of the Carson River Watershed. The report card compiled current knowledge about the chemical, physical, and biological health of the Carson River watershed.
Occurrence of Anthropogenic Organic Compounds in Ground Water and finished Water of Community Systems in Eagle and Spanish Spring Valleys, Nevada, 2002 - 2004		2006	USGS	
Quality of Nevada's Aquifers and their Susceptibility to Contamination, 1990-2004		2006	USGS	
Carson River Special Dissolved Oxygen and Temperature Monitoring Project - 2005	EF, WF, Brockliss Slough	March 2006	NDEP	A supporting document for the Carson River Report Card.
Occurrence of Anthropogenic Organic Compounds in Ground Water and finished Water of Community Systems in Eagle and Spanish Spring Valleys, Nevada, 2002 - 2004	Eagle Valley/Spanish Springs Valley, NV	2006	USGS	The purpose of this report is to characterize the occurrence and concentrations of anthropogenic organic compounds in ground waters used as primary sources of public supply in the Eagle and Spanish Springs Valleys of the NVBR Study Unit and to compare the data collected to data from water samples collected from other drinking-water supplies nationwide.
Carson River Relative Bed Stability Investigation	Stateline to Lahontan	2006	NDEP, EPA	Determine substrate stability at various locations throughout the system.
Clear Creek Water Quality Monitoring Program	Clear Creek	2006	CCWSC, NDEP	Program provided additional baseline water quality data for the Clear Creek Watershed.
2004 Nutrient Levels in Carson Valley Groundwater based upon Discharge Monitoring Reports	Carson Valley	July 2006	NDEP	A supporting document for the Carson River Report Card.
Quality of Nevada's Aquifers and their Susceptibility to Contamination, 1990-2004	Nevada	2006	USGS	The purpose of this report is to characterize the quality of ground water and evaluate the susceptibility of Nevada's aquifer systems to anthropogenic contamination.

Completed Projects and Studies				
Title	Location	Dates	Lead Organization/ Partners	Description
Airborne Thermal Infrared Remote Sensing	EF, WF, CR	November 2006	DRI; Watershed Sciences	Report about Thermal Remote Sensing Survey
Dissolved Oxygen Dynamics in the Carson River, Nevada: Results from field programs during the summers of 2003 and 2004	Carson Valley Carson City	December 2006	DRI	Report about 2003-2004 study conducted to determine DO concentrations during summer months.
Water Budgets and Potential Effects of Land and Water-Use Changes for Carson Valley, Douglas County, Nevada, and Alpine County, California	Carson Valley, Douglas County, NV and Alpine County, CA	2006	USGS	USGS Report
Precipitation and Runoff Simulations of the Carson Range and Pine Nut Mountains, and Updated Estimates of Ground-Water Inflow and the Ground-Water Budget for Basin-Fill Aquifers of Carson Valley, Douglas County, Nevada, and Alpine County Nevada	Alpine County, California and Carson Valley, Nevada	2007	USGS	USGS Scientific Investigations Report 2007-5205
Groundwater Management Plan	Alpine County	2007	Alpine County	
Waterfall Fire Resource Assessment	Carson City	2007	Resource Concepts	
Assessment of the Middle Carson River and Recommendations for the Purpose of Recovering and Sustaining the Riverine Ecosystem		2007	BLM	Report created by Otis Bay Ecological Consultants
Upper Carson River Water Quality Monitoring Program	EF, WF	March 2007	Alpine County, CWSD, STPUD, DRI	Goal of project is to provide baseline water quality data. Final report completed in June 2007.
Modeling the Effect of Riparian Shading on Water Temperature for Portions of the Carson River, Western Nevada, USA	CR	May 2007	University of Nevada, Reno	Master's Thesis about Riparian Shading in Carson Valley to Carson City
Summary of Stream Temperature Metrics for the Carson River	EF, WF, CR	June 2007	NDEP	A supporting document for the Carson River Report Card
Lahontan Reservoir: General Analysis of Water Quality Data	Lahontan	July 2007	NDEP	This paper provides a general review of the physical and chemical data collected from Lahontan Reservoir from 2003 to 2005.

Completed Projects and Studies				
Title	Location	Dates	Lead Organization/ Partners	Description
Characterization of Turbidity and Total Suspended Solids in the Upper Carson River, Nevada	EF, WF, CR	September 2007	DRI, NDEP	Report of monitoring done at four sites: Diamond Valley (WF); Riverview (EF); Genoa Lakes (CR); and Brunswick Canyon (CR).
A Review of Nutrient Conditions and Associated Water Quality Standards for the Carson River	Headwaters to Terminus	November 2007	NDEP	A supporting document for the Carson River Report Card.
Trends in Nutrient Loads to Lahontan Reservoir	CR	December 2007	NDEP	A supporting document for the Carson River Report Card
Analysis of Streamflow Trends, Ground-Water 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
Characterization of Turbidity and Total Suspended Solids in the Upper Carson River, Nevada	EF, WF, CR	January 2008	DRI, NDEP	Report of monitoring done at four sites: Diamond Valley (WF); Riverview (EF); Genoa Lakes (CR); and Brunswick Canyon (CR).
A Review of Temperature Conditions and Associated Water Quality Standards for the Carson River	Headwaters to Terminus	March 2008	NDEP	A supporting document for the Carson River Report Card
A Review of Suspended and Bedded Sediments (SABS) and Associated Water Quality Standards for the Carson River	Headwaters to Terminus	April 2008	NDEP	A supporting document for the Carson River Report Card
Reclaimed Water Use Analysis	EF, WF, CR, Tahoe, Entire WS	2009	CWSD	Analysis of all water purveyors who store & treat reclaimed water in the Carson River watershed.
Validation of the 2004 BAE Systems LiDAR Topography Dataset for the Carson Valley Portion of the Dataset	Carson Valley	September 2009	CWSD	Study conducted by RO Anderson the determine in 2004 LiDAR met Fema map standards
Validation of the 2004 BAE Systems LiDAR Topography Dataset for the Dayton Valley Portion of the Dataset	Dayton Valley	March 2010	CWSD	Study conducted by RO Anderson the determine in 2004 LiDAR met Fema map standards

Completed Projects and Studies				
Title	Location	Dates	Lead Organization/ Partners	Description
Precipitation and Runoff Simulations of Select Perennial and Ephemeral Watersheds in the Middle Carson River Basin, Eagle, Dayton, and Churchill Valleys, West-Central Nevada.	Middle Carson River Basin	2011		USGS Study
Assessing Potential Effects of Changes in Water Use with a Numerical Groundwater-Flow Model of Carson Valley, Douglas County, Nevada, and Alpine County, California	Carson Valley, Douglas County, NV and Alpine County, CA	2012	USGS	USGS Study
<u>The distribution and modeling of nitrate transport in the Carson Valley alluvial aquifer, Douglas County, Nevada</u>	Carson Valley, Douglas County, NV	2013	USGS	The purpose of this report is to 1) analyze the spatial and temporal nitrate N concentrations in groundwater to quantify the relationship between concentration and land use, and 2) to simulate nitrate N transport under current and future conditions by using a numerical model of two subdivisions within Carson Valley for purposes of evaluating two scenarios for managing septic system usage.
Comprehensive regional Water System Plan for the Carson River Watershed	Carson River Watershed	8/21/2013	CWSD	The purpose of the Comprehensive Regional Water System Plan is to evaluate future water demands and how these new water demands can be met by minimizing the impact on the environment and agriculture. The plan touches on how changes in runoff patterns and flows in the CR may impact current and possibly future water supplies. Also, the report reviews basic data related to specific hydrologic basins and available water rights (per State Engineer), and actual reliable water availability.
East Fork Algae Investigation	Highway 88 and Muller Lane	6/30/2015	NDEP, USGS, CWSD	Investigation to determine potential sources of excessive nutrient loading. Includes groundwater and surface water sampling plus algae sampling and identification.

Completed Projects and Studies				
Title	Location	Dates	Lead Organization/ Partners	Description
Lahontan WQ Standard Update	Lahontan Reservoir		NDEP/EPA	Update of WQ Standards and beneficial uses, link to NDEP webpage: http://www.leg.state.nv.us/NAC/NAC-445A.html#NAC445ASec1824
AWG Citizen Monitoring Program	EF, WF	2007-2011	AWG	Basic field parameters, bacteria, photo monitoring in Markleeville Creek. Lead to eminent listing of Markleeville Creek.

Notes:

BS – Brockliss Slough EF – East Fork Carson River CCWSC – Clear Creek Watershed Council CWSD – Carson Water Subconservancy District
 USGS – U.S. Geologic Survey CR – Main Stem Carson River NDEP – Nevada Division of Environmental Protection DRI – Desert Research Institute
 WF – West Fork Carson River

Table 7.2.12-2: Characterization of Carson River Water Quality Projects/Studies Underway/Proposed- 2017 Update

Project and Studies Underway				
Title	Location	Dates (Estimated Completion)	Lead Organization Partners	Description
NDEP Water Quality Monitoring	Stateline to Lahontan Reservoir	Ongoing	NDEP	Routine water quality monitoring.
STPUD Routing Monitoring	WF, Indian Creek	Ongoing	STPUD	Routine water quality monitoring
AWG Citizen Monitoring Program	EF, WF	Ongoing	AWG/FOHV	Routine water quality monitoring, photo monitoring, and gage monitoring
Clear Creek WQ Monitoring for NDOT Erosion Control Work on US Hwy. 50	Clear Creek	In process, proposed to continue to 2021	Jena Huntington, USGS/NDOT	Three sites are monitored for streamflow, suspended and bed sediment, major ion chemistry, trace elements, nutrients, dissolved oxygen, pH, specific conductance, alkalinity, and petroleum hydrocarbons.
Middle Carson River Groundwater Study	Eagle Valley, Dayton Valley, and Churchill Valley GW basins	2017	USGS Eric Morway, USBR	The Middle Carson River Groundwater model is being developed by the USGS. The funding partner is BOR. The Middle Carson River Groundwater reach includes Eagle Valley, Dayton Valley, and Churchill Valley GW basins. The reach is from Carson City to Lahontan Reservoir. The goal of the project is to model the

				interactions of groundwater and surface water in this reach. The USGS is currently conducting some “what if” scenarios on various groundwater pumping rates and their possible impact on surface water flows. The project should be completed in 2017. The contact person on this project is Eric Morway with the USGS.
Carson Valley Arsenic and other geochemical mobility in groundwater used for public supply	Carson Valley, Douglas County, NV	June 2018	Angela Paul and Ramon Naranjo, USGS	Collection of arsenic and associated geochemical data important to occurrence and mobility of arsenic in groundwater used for public supply in the Carson Valley.
Groundwater and WQ Monitoring Program in Douglas and Lyon Counties	Douglas and Lyon County	6/30/2019	Steve Berris USGS	\$53,190 Groundwater monitoring of 20 wells in the Fish Springs and Silver Springs areas that may be subject to water level changes. Water quality monitoring of 11 wells in the same area.
Update of Streamflow and Climate Records in the Carson River Watershed 1940-2017	Watershed Wide	10/31/2017	Dr. Alexandra Lutz, DRI	The revised review will update the 2009 review and re-test the trends that were statistically significant and those that were discernible, but did not meet the significance threshold. Additional data and land use changes will be included in the revision, as well as the several years of below average precipitation and this year’s pluvial information will be given careful consideration.

Notes:

AWG – Alpine Watershed Group
CCWSC – Clear Creek Watershed Council
CR – Main Stem Carson River
CWSD – Carson Water Subconservancy District

DRI – Desert Research Institute
EF – East Fork
EPA – U.S. Environmental Protection Agency
NDEP – Nevada Division of Environmental Protection
NDOT- Nevada Department of Transportation

SOW – Scope of Work
STPUD – South Tahoe Public Utility District
TNC – The Nature Conservancy
USGS – U.S. Geological Survey
WF- West Fork

7.3 Physical Condition Assessments Update

7.3.3 Clear Creek Assessment

Areas of concern within the Clear Creek drainage were identified in the “Clear Creek Erosion Assessment” that was completed in 2003. NDOT has funded a series of erosion control projects to reduce the sediment loads entering Clear Creek. NDOT has partnered with the Carson Valley Conservation District to work with contractors to stabilize several drainages originating from Highway 50 using a variety of techniques. See NDOT slide show at <https://www.nevadadot.com/uploadedFiles/NDOT/Micro-Sites/StormWater/CWSDforumClearCreek2015Presentation.pdf> for more information.



Before



After

7.3.5 HSI/LiDAR River Corridor Assessment and Survey

In 2009 and 2010, CWSD retained RO Anderson to conduct validation studies of the Carson and Dayton Valley portions of 2004 LiDAR dataset for floodplain management purposes. The LiDAR dataset accuracy requirement to meet Federal Emergency Management Agency’s (FEMA) criteria for a two-foot contour interval is a root mean squared error (RMSE) which does not exceed 18.5 cm. Both the Carson and Dayton Valley portions of the dataset were confirmed to meet FEMA’s accuracy standards in 2009. The report of Carson Valley’s results was published in November of 2009 and the Dayton Valley’s results were published in March 2010 and are available at www.cwsd.org.

7.3.6 Middle Carson River Geomorphic and Biological Assessment

Otis Bay Consulting completed the final draft of The Middle Carson River Geomorphic and Biological Assessment and Recommendations for Ecosystem Preservation and Recovery in August, 2007. Below is a summary of Otis Bay’s recommendations for the management and recovery of the Carson River Riverine Ecosystem:

- Use a variety of means to establish a riverine corridor.
- Establish a mechanism to acquire, hold and manage water rights for ecosystem flows.

- Determine the geomorphic conditions of the river and make specific plans for improvement.
- Establish or assign an organization to take charge of riverine ecosystem recovery.
- Identify species and communities at risk.
- Determine viability of existing vegetation communities, fauna, and habitat types.
- Determine a suite of focal species or focal habitat types.
- Determine the location, distribution, and abundance of focal species and focal habitats.
- Develop and implement specific, detailed recovery plans for each river segment.
- Develop and implement a quantitative monitoring plan to assess progress made toward management goals and to measure ecosystem trends.
- Adaptively manage the riverine corridor and revise management actions when necessary.

A final Executive Statement is available in CWSD's library, at <http://www.cwsd.org>. The USBR never finalized the full report from a draft version and has no plans to do so as of June 2015.

7.4 Biological Monitoring Programs

7.4.1 NDEP Benthic Macroinvertebrate Monitoring

A report entitled *Benthic Macroinvertebrates Index Development and Physical Habitat Evaluation for Truckee River, Carson River & Walker River* was completed in September 2007.

According to NDEP there is not regularly scheduled sampling of any streams in the Carson River Basin unless a stream has a probabilistic dataset. Sampling has occurred in the Ash Canyon Tributary (x2), EF Carson and Clear Creek since the original 2007 Stewardship Plan (Denton 2014).

There is no formal IBI at this time; however, the Western Center for Monitoring and Assessment of Freshwater Ecosystems (Chuck Hawkins, Utah State) developed an Observed to Expected (O/E) and MMI Predictive Models based on reference conditions streams throughout Nevada. They found that the O/E was not as sensitive as expected and the MMI proved to be a better model for reference condition. Currently, the California Waterboards are using both the O/E and MMI developed for them for their stream condition index. A list of sites NDEP has monitored in the Carson Basin since the bioassessment program was started is available with the reported MMI reference condition. This information is just informative only and is not a formal standard of water quality (Denton 2014).

7.4.2 AWG Biological Assessment

(See Section 7.2.4 for AWG full monitoring program details)

The AWG conducts annual bio assessment on at three sites on Markleeville Creek. These assessments are done at average summer flow usually in late August or early September. The study looks at health of riparian vegetation, stream bank stability, degree of gravel incumbent and diversity of macroinvertebrates. The survey is conducted along a 300' stretch of creek, where kick nets are used to collect a composite sample of macroinvertebrates. Samples are sent to a lab for identification (Fryer 2014).

7.4.3 East Fork Carson River Excessive Algae Investigation

NDEP provided CWSD Clean Water Act 208 Planning funds to investigate excessive algae blooms on the East Fork of the Carson River. CWSD and USGS entered into a cooperative agreement to conduct the study in May of 2010. Research and field work was conducted during the summer and fall of water years 2010

and 2012. USGS completed draft report June 30, 2015. The project investigated the interactions of groundwater and surface water and potential sources of groundwater nitrate loading to the East Fork Carson River from Highway 88 to Muller Lane that may be one of the factors resulting in excessive algae growth. A combination of approaches were employed including assessment of the amount of groundwater discharging to the stream, the nutrient concentrations of the groundwater and



potential sources of the nitrate, surface water monitoring and estimates of chlorophyll-a and biomass. Over the course of this investigation, the following tasks were to be completed:

- Groundwater and nutrient contributions to the stream investigation
- Surface water investigation
- Eutrophication evaluation using Chlorophyll-a and biomass
- Findings documentation and final project report

The final report is currently in peer review as of December 2016 and should be completed and published by October 2017. Go to <http://nevada.usgs.gov/water/studyareas/carsonalgae.htm> for further information.

8.0 Management and Implementation Actions Update (Revision combines Chapters 8 and 9 in original 2007 CRASP)

The management actions in this plan are consistent with NDEP's updated [319 Non-point Source Program Management Plan](#) and [California Nonpoint Source Program Implementation Plan 2014 – 2020](#). Chapter 8, as stated in the original 2007 plan, meets *elements c, e, and g* of a Watershed Plan for EPA purposes. In combination with the original Chapter 9, it also meets *elements d, f and i*.

This chapter focuses on management and implementation of projects to maintain and enhance the health of the Carson River Watershed. There are several interrelated tables associated with this chapter (see Table List). The tables are located at the end of the chapter. An explanation of the tables including instructions on how to read them and how they are interrelated/coordinated is described below. These tables and associated project maps meet *elements c, f and g* of the nine elements of a Watershed Plan.

8.0 Tables List:

Table 8.1: NV Critical Areas Management Table p.72
 Table 8.2: CA Critical Areas Management Table p. 75
 Tables 8.3-8.7 Project Tables: (See pp. 82 - 117)
 8.3 Proposed Projects p. 82
 8.4 Current Projects p. 100
 8.5 Completed Projects p. 105
 8.6 Fallon-Paiute Shoshone Proposed Projects p. 112
 8.7 Washoe Tribe Proposed and Completed Projects p. 115
 Table 8.8 Carson River Adaptive Stewardship Plan Suggested Actions for Future Management and Implementation Table p. 119

Table 8.1 and 8.2 NV and CA Critical Areas Management Table

Table 8.1 is located at the end of the chapter and addresses *element c, f, and g* of the 319 element criteria. The table contains the following columns:

(1) Critical Areas	(2) Category 5 Impairment and/or TMDL parameters from Integrated Report	(3) Potential Source	(4) Recommended Management Measure to be implemented	(5) Performance Indicator	(6) Milestone measuring progress towards attaining WQ Objective
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Column 1: The Critical Areas are the reaches of the Carson River associated with specific impairments according to either NV or CA's 303(d) list. The critical area is repeated amongst each Chapter 8 table as a means to interrelate the types of management measures that may be achieved through specific projects located in Table 8.3-8.7 and/or Table 8.8 Suggested Actions.

Column 2: This column specifies the different impairments/pollution types listed per Category 5 in NV and Categories 4 and 5 in CA of their respective Integrated Reports for water quality impairment.

Column 3: This column lists the potential sources of these impairments.

Column 4: Sets out the recommended management measures to implement to reduce the impairments associated with Column 2.

Column 5: Provides performance indicators associated with the recommended management measures.

Column 6: Addresses milestones that measure progress toward attaining water quality standards in NV and CA.

Table 8-1: NV Critical Area Management Measures and Water Quality Objectives

Where feasible, implement projects that will improve riparian habitat and water quality in the Carson River and tributaries over the long term, ultimately reducing the number of river reaches identified as Category 4 and 5 impaired by the NDEP's Integrated Reports for NV. The critical areas represent the reaches where management measures will focus; however, when opportunities arise, projects and programs may be outside these identified critical areas.

Critical Areas	Category 5 Impairment and/or TMDL parameters from Integrated Report	Potential Source	Recommended Management Measure to be implemented	Performance Indicator	Milestone measuring progress towards attaining WQ Objective
EF Carson River-Stateline to Genoa including Bryant Creek Mainstem Carson River Genoa Lane to Lahontan	TP, TSS, NTU, DO, T, Phosphorus TDS (Arsenic, Iron, Nickel-Bryant Creek only)	Hydrologic Modification – channel & flow alteration Sediment Transport from upstream	❖ 250 linear feet of River bank stabilization, rehabilitation, floodplain restoration or revegetation per year (NV SMP Milestone) including weed removal and reseeding/revegetation.	❖ 50 lbs/yr TP & 50 tons/yr TSS kept out of river (R5 model estimate) ❖	Decreasing trend in concentration or standard/TMDL exceedance
		Urban Development & Runoff	❖ Implement at least one LID/urban runoff project in the next 5 years	❖ Determine appropriate load reduction as part of LID/urban runoff infrastructure project	
		Agriculture – crop & livestock management	❖ Install cattle exclusions along River and irrigation return flow ditches where appropriate and if feasible ❖ Install stock watering systems ❖ Floodplain remains agricultural, removed from development, established as a conservation easement or designated as open space where feasible.	❖ Feet of fencing installed ❖ # of stock water systems installed ❖ Increase in acres of floodplain preserved or conserved above 2015 baseline	

Critical Areas	Category 5 Impairment and/or TMDL parameters from Integrated Report	Potential Source	Recommended Management Measure to be implemented	Performance Indicator	Milestone measuring progress towards attaining WQ Objective
WF Carson River Stateline to Muller Brockliss Slough Cradlebaugh to New Empire	E. coli	Urban Development & Runoff	❖ Implement at least one LID/urban runoff infrastructure project in the next 5 years	❖ Determine appropriate load reduction as part of LID/urban runoff infrastructure project	Decreasing trend in concentration or standard/TMDL exceedance
		Agriculture-crop & livestock management	❖ Install cattle exclusions along River and irrigation return flow ditches where appropriate and if feasible ❖ Install stock watering systems	❖ Feet of fencing installed ❖ # of stock water systems installed	
New Empire to Carson Sink	Mercury	Past Mining Practices	❖ Mercury issues to be addressed through Carson River Mercury CERCLA process. See http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/ViewByEPAID/NVD980813646	❖ Mercury issue dependent on CERCLA performance indicators yet to be determined	Decreasing trend in concentration or standard exceedance
Lahontan Reservoir	Iron, Mercury in Fish Tissue, Mercury in Sediment, DO, TP, TSS, Turbidity	Past Mining Practices Hydrologic Modification – channel & flow alteration Sediment Transport from upstream Urban Development & Runoff	❖ Mercury issues to be addressed through Carson River Mercury CERCLA process. See http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/ViewByEPAID/NVD980813646 ❖ See upstream management measures.	❖ Mercury issue dependent on CERCLA performance indicators yet to be determined ❖ Sediment, DO, TP, TSS, Turbidity may be reduced based on upstream performance indicators	Decreasing trend in concentration or standard exceedance

Critical Areas	Category 5 Impairment and/or TMDL parameters from Integrated Report	Potential Source	Recommended Management Measure to be implemented	Performance Indicator	Milestone measuring progress towards attaining WQ Objective
Carson River-Lahontan Dam-Carson Sink	Mercury, Iron, Manganese, Mercury in Fish Tissue. Mercury in Sediment, TDS	Past Mining Urban Development & Runoff Agriculture-crop & livestock management	<ul style="list-style-type: none"> ❖ Mercury issues to be addressed through Carson River Mercury CERCLA process. See http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/ViewByEPAID/NVD980813646 ❖ Implement at least one LID/urban runoff project in the next 5 years. ❖ Implement at least one agricultural best management practices project in next 5 years. 	<ul style="list-style-type: none"> ❖ Determine appropriate load reduction as part of LID/urban runoff infrastructure project 	Decreasing trend in concentration or standard exceedance
Fallon Paiute Shoshone Tribal surface water	TDS, Turbidity, E. Coli, Nitrogen, Phosphorous	Agriculture Non-Point Source Sediment Transport from upstream	<ul style="list-style-type: none"> ❖ Implement at least one BMP over the next 5 years from the approved FPST Nonpoint Source Management Program Plan or equivalent. 	<ul style="list-style-type: none"> ❖ Implementation of the BMP 	A decrease in concentrations of the impaired parameters

Table 8.2: California Critical Area Management Measures and Water Quality Objectives

Where feasible, implement projects that will improve riparian habitat and water quality in the Carson River over the long term, ultimately reducing the number of river reaches identified as impaired listed on the 303 (d) list Categories 4 (a & b) and 5 for CA. California has different standards than NV requiring separate table. The critical areas represent the reaches where management measures will focus; however, when opportunities arise, projects and programs may be outside these identified critical areas.

Critical Areas	Category 4 (a & b) and 5 Impairment from CA 2012 Integrated Report	Potential Sources per listings in CA 2012 Integrated Report and CA Non-Point Source Implementation Plan 2015	Management Measure to be implemented	Performance Indicator	Milestone measuring progress towards attaining WQ Objective
Upper Watershed CR East Fork to NV Stateline	Boron, Phosphorus, Sulfates, TDS	Source Unknown According to 2012 Integrated Report Natural Geothermal sources (Boron) Hydrologic Modification – channel & flow alteration Sediment Transport from upstream Road Development and Runoff	❖ 250 linear feet of River bank stabilization, floodplain rehabilitation or revegetation per year including weed removal and reseeding/revegetation.	❖ Expected reduction of constituents based on river project calculations	Decreasing trend in concentration or standard exceedance TDS TMDL expected 2021 Other constituent TMDL's expected 2025 TMDL expected 2025
Wolf Creek	Sedimentation/ Siltation	Nonpoint Source Range Grazing-Riparian and/or Upland Road Development and Runoff Silviculture Fuels Reduction	❖ Limit land use decisions that will cause additional sedimentation/siltation. ❖ Identify appropriate management measures to limit sources of impairment and implement best management practices to control sources. See the California State Water Resources Control Board (SWRCB), California Coastal Commission (CCC), and other state agencies seven management measures to address agricultural, forestry operations, and other sources of nonpoint source (NPS) pollution of State waters (California Water Quality Board 2015) and implement accordingly.	❖ Implement Identified BMPs.	Decreasing trend in concentration or standard exceedance TMDL projected to be completed 2019

Critical Areas	Category 4 (a & b) and 5 Impairment from CA 2012 Integrated Report	Potential Sources per listings in CA 2012 Integrated Report and CA Non-Point Source Implementation Plan 2015	Management Measure to be implemented	Performance Indicator	Milestone measuring progress towards attaining WQ Objective
Aspen, Bryant, Leviathan Creeks	Metals	<p>Acid Mine Drainage</p> <p>Inactive Mining</p> <p>Mine Tailings</p> <p>Nonpoint Source</p>	<p><i>These pollutants are being addressed through a CERCLA remediation program and through ongoing work by Lahontan Water Board staff.</i></p> <ul style="list-style-type: none"> ❖ TMDL Summary of Management Measures and Outcomes: See http://www.waterboards.ca.gov/about_us/performance_report_1415/plan_assess/docs/fy1314/11112_r6_leviathan_aspen_bryantcreeks_metal.pdf 	<ul style="list-style-type: none"> ❖ See CERCLA remediation program at http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/ViewByEPAID/CAD980673685 	<p>See CERCLA remediation program at http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/ViewByEPAID/CAD980673685</p> <p>TMDL Summary of Management Measures and Outcomes: See http://www.waterboards.ca.gov/about_us/performance_report_1415/plan_assess/docs/fy1314/11112_r6_leviathan_aspen_bryantcreeks_metal.pdf</p>
Monitor Creek	Aluminum, Iron, Manganese, Silver, Sulfates, TDS	<p>Acid Mine Drainage</p> <p>Inactive Mining</p> <p>Mill Tailings</p> <p>Mine Tailings</p> <p>Natural Sources</p> <p>Nonpoint Source</p> <p>Point Source</p>	<p><i>This listing is expected to be addressed through the CERCLA remediation process.</i></p>	<ul style="list-style-type: none"> ❖ See CERCLA remediation program at http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/ViewByEPAID/CAD980673685 	<p>See CERCLA remediation program at http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/ViewByEPAID/CAD980673685</p> <p>TMDL's on each constituent expected 2019</p>

Critical Areas	Category 4 (a & b) and 5 Impairment from CA 2012 Integrated Report	Potential Sources per listings in CA 2012 Integrated Report and CA Non-Point Source Implementation Plan 2015	Management Measure to be implemented	Performance Indicator	Milestone measuring progress towards attaining WQ Objective
CR West Fork Headwaters to Paynesville	Chloride, Nitrate, Nitrogen, Phosphorus, Sulfates, TDS, Turbidity, and (Fecal Coliform - Woodfords to Paynesville only)	<p>Source Unknown according to Integrated Report</p> <p>Hydrologic Modification – channel & flow alteration</p> <p>Sediment Transport from upstream</p> <p>Agriculture-crop & livestock management (See http://www.waterboards.ca.gov/lahtontan/publications/forms/available_documents/microbial_report.pdf.)</p> <p>Recreation Activities</p> <p>Rural/Urban Development & Runoff</p> <p>Septic/On-site wastewater treatment</p>	<ul style="list-style-type: none"> ❖ 250 linear feet of River bank stabilization, rehabilitation or revegetation per year including weed removal and reseeding/revegetation. ❖ Implement at least one LID/urban runoff infrastructure project in the next 5 years ❖ Identify appropriate management measures to limit sources of impairment and implement best management practices to control sources. See the California State Water Resources Control Board (SWRCB), California Coastal Commission (CCC), and other state agencies BMPs for hydromodification, agricultural practices, etc. to limit non-point source pollution of State waters (California Water Quality Board 2015). ❖ Floodplain remains agricultural, removed from development, established as a conservation easement or designated as open space where feasible. 	<ul style="list-style-type: none"> ❖ Expected reduction of constituents based on river project/LID project calculations ❖ Implementation of Management Measures ❖ Short term: Interim standard of 200 FC/100 ml to be attained by 2017 as measured by standard water quality scientific procedures (CAWQCB 2015) ❖ Long Term: Meet Basin Plan water quality objectives for bacteria (currently is 20 FC colonies/per 100 ml ut may be modernizing the standard) (CAWQCB 2015) ❖ Create baseline figure of acres of floodplain preserved. ❖ Increase in acres of floodplain preserved or conserved above baseline. 	<p>Decreasing trend in concentration or standard exceedance</p> <p>TMDLs for Nitrogen ad Phosphorus expected 2019</p> <p>TMDL for Nitrate expected 2021</p> <p>TMDLs for Chloride, Sulfates, TDS, and Turbidity expected 2025</p> <p>TMDL for Fecal Coliform expected 2019</p>

Critical Areas	Category 4 (a & b) and 5 Impairment from CA 2012 Integrated Report	Potential Sources per listings in CA 2012 Integrated Report and CA Non-Point Source Implementation Plan 2015	Management Measure to be implemented	Performance Indicator	Milestone measuring progress towards attaining WQ Objective
CR West Fork Paynesville to Stateline	Fecal Coliform	<p>Source Unknown per Integrated Report</p> <p>Initial source tracking results by AWG using Lahontan tests indicate ruminants are the likely source of fecal coliform. Results are unpublished to date.</p> <p>Agriculture-crop & livestock management (grazing)</p> <p>Rural/Urban Development & Runoff</p> <p>Recreation Activities</p> <p>Septic/On-site wastewater treatment</p>	<ul style="list-style-type: none"> ❖ Implement at least one LID/urban runoff infrastructure project in the next 5 years. ❖ Implement at least one agricultural best management practices project in the next 5 years. ❖ Identify other appropriate management measures to mitigate source of impairment. See SWRCB agricultural management measures in CR West Fork Headwaters to Paynesville (California Water Quality Board 2015). ❖ Floodplain remains agricultural, removed from development, established as a conservation easement or designated as open space where feasible. 	<ul style="list-style-type: none"> ❖ Determine appropriate load reduction as part of LID/urban runoff infrastructure project ❖ Monitor pre and post agricultural bmp project bacteria data and provide for Rivers and Ranches Grant final report summary expected Dec. 2017 ❖ Short Term: Interim standard of 200 FC/100 ml to be attained by 2017 as measured by standard water quality scientific procedures (CAWQCB 2015) ❖ Long Term: Meet Basin Plan water quality objectives for bacteria (currently is 20 FC colonies/per 100 ml but may be modernizing the standard) (CAWQCB 2015) ❖ Create baseline figure of acres of floodplain preserved. ❖ Increase in acres of floodplain preserved or conserved above baseline. 	<p>Decreasing trend in concentration or standard exceedance</p> <p>TMDL for Fecal Coliform expected 2019</p>

Critical Areas	Category 4 (a & b) and 5 Impairment from CA 2012 Integrated Report	Potential Sources per listings in CA 2012 Integrated Report and CA Non-Point Source Implementation Plan 2015	Management Measure to be implemented	Performance Indicator	Milestone measuring progress towards attaining WQ Objective
Indian Creek Reservoir	Phosphorus	<p><i>Reservoir is eutrophic. Most significant source of nutrient loading is release of phosphorus from sediment.</i></p> <p>Erosion/Siltation</p> <p>Habitat Modification</p> <p>Flow Alteration/Regulation/Hydromodification</p> <p>Internal Nutrient Cycling (primarily lakes)</p> <p>Pasture Grazing-Riparian and/or Upland; Agriculture</p> <p>Municipal Wastewater</p>	<ul style="list-style-type: none"> ❖ The USEPA approved the TMDL in 2003. <p>TMDL Progress Report: http://www.waterboards.ca.gov/rwqcb6/water_issues/programs/tmdl/indian_creek/docs/icr_stpud_2014.pdf</p> <ul style="list-style-type: none"> ❖ http://www.waterboards.ca.gov/lafronton/water_issues/programs/tmdl/indian_creek/docs/imp_icr_2015.pdf ❖ Continue operation of Oxygen Delivery System during late spring/summer to inhibit TP flux (CAWQCB 2015). 	<ul style="list-style-type: none"> ❖ The primary numeric target is an annual mean concentration in the water column of 0.02 mg/L total phosphorus. Currently, the interim target of 0.04 mg/L is in effect (CAWQCB 2015). 	<p><i>Reductions in internal phosphorus loading from the sediment are expected to ameliorate other problems associated with eutrophication.</i></p>

Critical Areas	Category 4 (a & b) and 5 Impairment from CA 2012 Integrated Report	Potential Sources per listings in CA 2012 Integrated Report and CA Non-Point Source Implementation Plan 2015	Management Measure to be implemented	Performance Indicator	Milestone measuring progress towards attaining WQ Objective
Indian Creek	Chloride, Fecal Coliform, DO	Unknown according Integrated Report Pasture Grazing-Riparian and/or Upland	❖ Implement at least one agricultural best management practices project in the next 5 years.	❖ Monitor and analyze pre and post agricultural bmp project bacteria data collected/	Decreasing trend in concentration or standard exceedance TMDL on Fecal Coliform expected 2019 TMDL's on Chloride and DO expected 2025

Tables 8.3 – 8.7 (Revised from Tables 8.1.1-1--8.1.1-3)

Tables 8.3-8.7 update and partially replace tables 8.1.1-1 through 8.1.1-3 from the original 2007 Plan and follow this section. These tables provide summaries for several projects completed since 2007, that are currently in process, or are projected for future implementation. They also address *elements c, d and f*. We have focused our efforts on the proposed project tables (Table 8.3) for this update. The in progress and completed project tables (8.4 & 8.5 respectively) may be only partially complete. Each table is based on partner organizations providing up-to-date information. Table 8.6 (Fallon Paiute-Shoshone Tribe) & 8.7 (Washoe Tribe of NV & CA) specifically relate to our Tribal partners proposed, current and completed projects. More details on some of the listed projects can be found on the project summary sheets located in the updates to Appendix G.

Tables 8.3 - 8.7 can be used in conjunction with Tables 8.1 and 8.2 as they are the implementation projects to meet the outlined management measures per critical area. See an explanation of the tables per column below. The Map I.D. Code Column is listed as to be determined (TBD) on many projects and is being updated as the watershed maps in Appendix F are updated. Map updates are being completed simultaneously with this update and are listed as suggested actions in Table 8.8: Carson River Watershed Adaptive Stewardship Plan Suggested Actions for Future Management and Implementation. The map of Alpine Watershed Group projects in Alpine County, CA (See p. 119) has been completed to allow review by California State Agencies. Other Alpine County projects have not been mapped and may be self-evident based on project description.



CWSD is a unique bi-state agency that is responsible for coordinating the Carson River Coalition and the integrated watershed planning process for the Carson River Watershed. This Regional Watershed Coordination Program is an ongoing effort that is funded by various groups including the Clean Water Act 319 funding, CWSD funding and multiple other federal, state and local government grants. The program coordinates implementation of the Carson River Stewardship Plan and tracks these efforts. Given this is an Adaptive Stewardship Plan for the CRW, the types of projects listed in the plan have been expanded to be more inclusive of all the work completed throughout the watershed. Many of these projects meet multiple objectives including water quality objectives. The Carson River Watershed Coordination Program is listed in our Outreach and Education Section below; although it is so much more comprehensive in nature. It, like water quality, serves multiple objectives and project categories. The project categories are shown in revised Figure ES-1 located on p.5 of this report and in the adjacent picture.

The five tables (8.3-8.7) include completed, current and proposed projects from a variety of entities including Federal, Regional, State, and local government entities and non-governmental entities. There are two federally recognized Tribal entities in the watershed,

the Washoe Tribe of Nevada and California and the Paiute-Shoshone Tribe. Again, Tables 8.6 & 8.7 detail Tribal projects.

Each table (8.3-8.7) is organized by the column headings below and then separated by project type.

(1) Critical Area*/Tributary Reach/ Project Area	(2) Interfluvial Sub-Reach**	(3) Project Title/Description	(4) Project Manager & Partners ****	(5) Estimated Completion Date	(6) Estimated Completion Costs	(7) Map I.D. Code***
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Column 1: This corresponds to the Critical Areas outlined Table 8. 1: the NV and CA Critical Areas Management. Not every project is in a critical area reach of the river; therefore, this column also shows the location within the CRW. For instance, a project may be listed as being on Hot Springs Creek or Markleeville Creek which is a tributary to the East Fork of the Carson River. There may still be water quality benefits that either directly or more likely indirectly impact the Carson River environment.

Column 2: This column refers to Table 5. 10-2: Summary of River Reach Characteristics from Stateline to Lahontan Reservoir. If the project is located in a Critical Area that was also mapped during the Interfluvial study, this column refers to the Table 5.10-2 where additional historical information is provided on that reach of the river.

Column 3: This column provides the project name and brief description.

Column 4: Outlines project lead and partners in the project.

Column 5: The estimated completion date is to help ensure the projects have a timeline and remain in line for budget consideration. These estimates do not include salaries for Watershed Program Coordination Staff or other paid positions.

Column 6: Estimated completion costs for the project. These figures are the project leads best estimate based on 2016 rates. These may be more or less depending on final calculations.

Column 7: The Map Identification refers to the 2007 project maps and the revised project maps. This ID Code may be left blank in some cases as the revised project maps are in progress.

Project Tables 8.3- 8.7:

Table 8.3 Proposed Projects

Critical Area*/Tributary Reach/ Project Area	Interfluve Sub-Reach**	Project Title/Description	Project Manager & Partners ****	Estimated Completion Date	Estimated Completion Costs	Map I.D. Code***
Floodplain Management/Meadow Restoration Projects						
Alpine County						
West Fork Carson River Headwaters to Paynesville*	N/A	Upper Hope Valley Meadow Restoration and Aquatic Habitat Enhancement - Implementation	USFS, CWSD, AWG, FOHV, Alpine County, American Rivers, Trout Unlimited	Contingent upon funding availability	\$243,870	AWG-5
Markleeville Creek/ Upper East Fork Carson River*	N/A	Markleeville Creek Floodplain Restoration Project (Floodplain restoration/river rehabilitation) - Implementation	Alpine County, Alpine Watershed Group, Markleeville Public Utility District, U.S. Forest Service	Contingent upon funding availability	\$1,750,000	AWG-1
Also See River Rehabilitation						
Douglas County						
EF Carson River Stateline to Genoa	E-5,E-6 88 to Muller Muller to Genoa	Park Property Potential Conservation Easement for Floodplain & Riparian Corridor Preservation	Private Property Owner, Legacy Land & Water, TNC, Douglas County	Contingent upon easement agreement & funding	TBD	TBD

Table 8.3 Proposed Projects

Critical Area*/Tributary Reach/ Project Area	Interfluve Sub-Reach**	Project Title/Description	Project Manager & Partners ****	Estimated Completion Date	Estimated Completion Costs	Map I.D. Code***
Stephanie Way Detention Basin	N/A	Stephanie Way Flood Control Facility	Douglas County, Private landowners, FEMA, CWSD	Contingent upon funding availability		TBD
Johnson Lane Storm Water Drainage Study	N/A	Johnson Lane Storm Water Drainage Study	Douglas County, FEMA, CWSD	Dec-17	\$285,000	TBD
Smelter Creek Detention Basin	N/A	Smelter Creek Flood Control Facility	Douglas County, Private landowners, FEMA, CWSD	Contingent upon funding availability		TBD
Carson City						
Mainstem Carson River Genoa to Weeks	C-3 Old McTarnahan Bridge to Deer Run	Golden Eagle Lane (Flood Protection, Rehabilitation / Stabilization)	Carson City Open Space	Dec-16	\$140,000	TBD
Mainstem Carson River Genoa to Weeks	C-3 Old McTarnahan Bridge to Deer Run	East Silver Saddle Ranch and Sierra Vista Lane drainage improvements	Caron City Open Space and Carson City Public Works			TBD
Mainstem Carson River Genoa to Weeks delete?	C-3	Voltaire Canyon Floodplain Restudy/Remapping	CWSD, FEMA, and Carson City Public Works		\$98,000	TBD
Clear Creek (Carson River Tributary)	C-2 Cradlebaugh to Old McTarnahan Bridge	Forest Legacy Project Old Woods Ranch/Schulz Investments Conservation Easements Project	Carson City, NV Land Trust, USFS - HTNF, CWSD	TBD	\$2,832,000 Forest Legacy Grant request 2017	TBD

Table 8.3 Proposed Projects

Critical Area*/Tributary Reach/ Project Area	Interfluve Sub-Reach**	Project Title/Description	Project Manager & Partners ****	Estimated Completion Date	Estimated Completion Costs	Map I.D. Code****
Lyon County						
Mainstem Carson River Genoa to Weeks	C-9 Houghman Howard Diversion to Bucklands Station (Weeks)	Phase 2 Revegetation Dayton Valley Conservation District, Hodges/Fort Churchill State Park	DVCD, NV State Parks, private landowners,	Dec-18	\$250,000	TBD
Mainstem Carson River Genoa to Weeks	C-10 Bucklands Station (Weeks) to Lahontan Reservoir	Phase 3 Revegetation Dayton Valley Conservation District, Fort Churchill State Park, Bureau of Reclamation	DVCD, NV State Parks, US Bureau of Reclamation	Dec-19	\$250,000	TBD
Mainstem Carson River Genoa to Weeks	C-4 to C-10 Deer Run/New Empire to Lahontan Reservoir	Title 15 Land Use and Development Code Update - Including Transfer of Development Rights to incentivize floodplain protection	Lyon County, Farr West Engineering	Dec-17		TBD
Churchill County						
Carson River Lahontan Dam- Carson Sink	N/A	Sheckler Reservoir Shunt Flood Control Facility	Churchill County, , private landowners, FEMA, CWSD	Contingent upon funding availability		TBD
Carson River Lahontan Dam- Carson Sink	N/A	Innndation Maps/Stormwater Area Drainage Master Plan below Lahontan Reservoir	Churcill County, private landowners, FEMA, CWSD	Dec-19	\$300,000	TBD

Table 8.3 Proposed Projects

Critical Area*/Tributary Reach/ Project Area	Interfluve Sub-Reach**	Project Title/Description	Project Manager & Partners ****	Estimated Completion Date	Estimated Completion Costs	Map I.D. Code***
Watershed-wide Projects						
Regional	N/A	Flood Awareness Week	NDWR, NDEP, Counties, FEMA, USACE, NDEM, NOAA, CWSD, CRC	on-going	\$55, 000	N/A
River Rehabilitation/Stabilization/Habitat Enhancement Projects						
Alpine County						
Also see Floodplain Management Section						
West Fork Carson River Headwaters to Paynesville*	N/A	USFS-HTNF Resource Conditions Assessment on FS lands. Development of integrated watershed improvements for aspen, fuels reduction, species of concern.	USFS, CWSD, AWG, FOHV, Alpine County, American Rivers, Trout Unlimited	Begin 12/1/2018, Completion TBD	TBD based on projects	TBD

Table 8.3 Proposed Projects

Critical Area*/Tributary Reach/ Project Area	Interfluve Sub-Reach**	Project Title/Description	Project Manager & Partners ****	Estimated Completion Date	Estimated Completion Costs	Map I.D. Code****
Douglas County						
EF Carson River Stateline to Genoa	E-1 Stateline to Washoe Road	Old Ruhenstroth Dam Removal and Bank Repair	CWSD, USFS, Washoe Tribe, Planet Savvy	TBD based on feasibility study	TBD based on feasibility study	TBD
EF Carson River Stateline to Genoa	E-3	East Fork Streambank Stabilization - Bio Repair	CVCD, NDEP, CWSD, Douglas County, Private Landowners	Dec-17	\$116,000	TBD
Mainstem River Genoa to Weeks	C-2 Cradlebaugh to Old McTarnahan Bridge	Cradlebaugh Bridge - bank rehab downstream	CVCD, NDEP, CWSD, Douglas County, Private Landowners	TBD	TBD	TBD
Carson City						
Goni Wash (Mainstem River Genoa to Weeks)	C-3 Old McTarnahan Bridge to Deer Run	Goni/Lompa Water Quality Project	Carson City, landowners	Jul-19	\$100,000	TBD
Clear Creek (Mainstem River Genoa to Weeks)	C-2 Cradlebaugh to Old McTarnahan Bridge	Schultz Ranch Subdivision Phase I & II	Carson City, private landowners	Jul-19	Privately funded	TBD

Table 8.3 Proposed Projects

Critical Area*/Tributary Reach/ Project Area	Interfluve Sub-Reach**	Project Title/Description	Project Manager & Partners ****	Estimated Completion Date	Estimated Completion Costs	Map I.D. Code***
Lyon County						
See Water Quality Projects						
Churchill County						
Carson River Lahontan Dam - Carson Sink	N/A	Sagouspi Dam Debris and Sediment Removal/Bank Stabilization	Churchill County, LCD, Emergency Management, TCID		\$10,000	TBD
Carson River Lahontan Dam - Carson Sink	N/A	The Lahontan Conservation District's Carson River Restoration Project - Clearing and Snagging	LCD, Churchill County, CWSD	Ongoing	\$21,000	TBD
Watershed-wide Projects						
All reaches	N/A	Weed control	Douglas County, Alpine County, Carson City, Lyon County, Churchill County, Alpine/Upper Carson CWMA,CCWC, West Central LC CWMA, ChC CWMA, CWSD, BLM, USFS, private landowners, USFWS, FPST, WTNC, TNC	Ongoing		Watershed Wide
Water Quality Projects						
Alpine County						
CR West Fork Headwaters to Paynesville	N/A	LID Implementation at new County Behavioral Health facility	Alpine County	Dec-19	TBD	TBD

Table 8.3 Proposed Projects

Critical Area*/Tributary Reach/ Project Area	Interfluve Sub-Reach**	Project Title/Description	Project Manager & Partners ****	Estimated Completion Date	Estimated Completion Costs	Map I.D. Code****
Markleeville Creek (CR East Fork to NV Stateline)	N/A	Incorporate LID approach in landscaping at County Courthouse and Administrative office building	Alpine County	Dec-18	\$20,000	TBD
CR West Fork Headwaters to Paynesville	N/A	On-site WWTP effluent connections to STPUD C-line	Alpine County, private landowners	Ongoing	TBD	TBD
Douglas County						
Carson River East Fork Stateline to Genoa/ CR West Fork Stateline to Genoa		Snapshot Day Water Quality Monitoring	Douglas County, The Nature Conservancy, Washoe Tribe, DC School District, NDEP, CWSD	Annually Oct/Nov		TBD
Carson City						
See River Rehabilitation/Stabilization projects						TBD

Table 8.3 Proposed Projects

Critical Area*/Tributary Reach/ Project Area	Interfluve Sub-Reach**	Project Title/Description	Project Manager & Partners ****	Estimated Completion Date	Estimated Completion Costs	Map I.D. Code***
Lyon County						
Mainstem Carson River Genoa to Weeks	C-7	Riverpark Phase II Drainage/WQ Treatment (Floodplain/Stormwater Management)	Lyon County, private landowners	Unknown	Privately funded	TBD
Mainstem Carson River Genoa to Weeks	C-4 to C-10 Deer Run to Lahontan Reservoir	Low Impact Development Standards (Floodplain/Stormwater Management)	Lyon County	2017	Unknown	N/A
Mainstem Carson River Genoa to Weeks	C-7 Minor Property to Chavez Diversion	MCR 111C REPAIR Dayton Valley Conservation District-Lehman/Evans (Northside)	DVCD, NDEP, CWSD, private landowners	Dec-17	\$86,845	TBD
Mainstem Carson River Genoa to Weeks	C-7 Minor Property to Chavez Diversion	MCR 10C REPAIR Dayton Valley Conservation Minor Ranch (Southside)	DVCD, NDEP, CWSD, private landowners	Dec-17	\$66,500	TBD
Mainstem Carson River Genoa to Weeks	C-7 Minor Property to Chavez Diversion	Monitor/cross sections potential MCR 050 Rolling A Ranch	DVCD, NDEP, CWSD, private landowners	2023	\$40,000	TBD
Churchill County						
N/A						

Table 8.3 Proposed Projects

Critical Area*/Tributary Reach/ Project Area	Interfluve Sub-Reach**	Project Title/Description	Project Manager & Partners *****	Estimated Completion Date	Estimated Completion Costs	Map I.D. Code***
Watershed-wide Projects						
New Empire to Carson Sink	C-4 to C-10	Mercury Site Coordination	Counties, State, EPA, CWSD	Ongoing		TBD
Water Supply Projects						
Alpine County						
N/A						
Douglas County						
East Fork Carson River Stateline to Genoa		Future South East Valley Intertie Potential (South of Buckeye Road) (See RCI 2013). Would include River Crossing	Gardnerville, Minden, CWSD, Douglas County	TBD	\$4,100,000	
West Fork Carson Stateline to Genoa	W-1, W-2 Waterloo to Muller Muller to EF Confluence	State Route 756 East-West Future Intertie (See RCI 2013). Would include River and Slough Crossings	Gardnerville Ranchos, Jobs Peak/Sheridan Acres, Douglas County, CWSD	TBD	\$2,900,000	
West Fork Carson Stateline to Genoa	W-1, W-2 Waterloo to Muller Muller to EF Confluence	Muller Lane Future Intertie (See RCI 2013). Would include River and Slough Crossings	Town of Minden, Douglas County, CWSD	TBD	\$3,200,000	
West Fork Carson Stateline to Genoa	W-1, W-2 Waterloo to Muller Muller to EF Confluence	Foothill Road Future Intertie. Subject to Muller Lane Intertie (See RCI 2013).	Town of Minden, Douglas County, CWSD	TBD	\$3,100,000	

Table 8.3 Proposed Projects

Critical Area*/Tributary Reach/ Project Area	Interfluve Sub-Reach**	Project Title/Description	Project Manager & Partners ****	Estimated Completion Date	Estimated Completion Costs	Map I.D. Code****
Mainstem Carson River Genoa Lane to Weeks		Future North East Valley Intertie (North of Buckeye Road)/Future N/S Phase 2 - Hwy 395 line /Future Jacks valley Intertie / Future Gardnerville Water - Gardnerville Ranchos GID- Centerville Lane Intertie (See RCI 2013)	Gardnerville, Minden, CWSD, Douglas County	TBD	\$16,000,000	
Carson City						
Regional	N/A	Douglas County/Carson City Intertie - Vista Grande Blvd.	Douglas County, Carson City, Indian Hills GID, CWSD	TBD	\$500,000	TBD
Regional	N/A	E/W Transmission Main Project Saliman to West Side	Carson City, Minden, CWSD	TBD	\$4,500,000	TBD
Regional	N/A	Carson City/Lyon County Supplemental Intertie	Carson City, Lyon County, CWSD	TBD	\$9,000,000	TBD
Lyon County						
See Carson City						
Churchill County						
N/A						
Watershed-wide Projects						
Regional	N/A	USBR Basin Plan		on hold		

Table 8.3 Proposed Projects

Critical Area*/Tributary Reach/ Project Area	Interfluve Sub-Reach**	Project Title/Description	Project Manager & Partners ****	Estimated Completion Date	Estimated Completion Costs	Map I.D. Code***
Regional	N/A	Comprehensive Regional Water System Plan Update	CWSD, Counties, Watershed Water Purveyors	TBD	\$6,000	
Regional	N/A	Water Rates Study	CWSD, Counties, Watershed Water Purveyors	on-going	\$4,000	
Invasive Species Projects						
Alpine County						
Hot Springs Creek	N/A	Grover Hot Springs State Park	California State Parks, Alpine Watershed Group, Alpine Trails Association, Alpine County, Carson Water Subconservancy District, Washoe Tribe	Jul-19		AWG-4
Upper Carson - East Fork and West Fork	N/A	Markleville Creek Day - Weed component	AWG, FOHV, Grover SP, Alpine County, CWSD	Ongoing	\$5,000 per year	AWG-4
Douglas County						
County-wide/Carson River and area tributaries	E-1 to E-6, W-1, W-2, C1, C-2, Brockliss	Noxious and Nusiance Weed Program	Douglas County,CVCD, CWSD, Alpine/Upper Carson CWMA, private landowners/ Washoe Tribe	On-going	\$115,000 Annually funded	

Table 8.3 Proposed Projects

Critical Area*/Tributary Reach/ Project Area	Interfluve Sub-Reach**	Project Title/Description	Project Manager & Partners ****	Estimated Completion Date	Estimated Completion Costs	Map I.D. Code****
East Fork/Mud Lake		Noxious and Invasive Weed Program	USFS	On-going	TBD	
Carson City						
City-wide/Carson River Mainstem -	C-3	Noxious and Nusiance Weed Program	CC, CWSD, Private Landowners, Carson City Weed Coalition, Washoe Tribe	On-going	\$15,000 CWSD	N/A
Lyon County						
County-wide/Carson River Mainstem	C-4 to C-10	Noxious and Nusiance Weed Program	Lyon County,DVCD, CWSD, West Central Lyon County CWMA, Private Landowners	On-going	\$15,000 CWSD,	N/A
Churchill County						
County-wide/Carson River	N/A	Noxious and Nusiance Weed Program	Churchill County,LV and SCD, CWSD, Churchill County CWMA, FPST, Private Landowners	On-going	\$15,000 CWSD	N/A

Table 8.3 Proposed Projects

Critical Area*/Tributary Reach/ Project Area	Interfluve Sub-Reach**	Project Title/Description	Project Manager & Partners ****	Estimated Completion Date	Estimated Completion Costs	Map I.D. Code***
Watershed-wide Projects						
Regional	NA	Weed mapping, data consolidation, weed control CWSD, National Fish and Wildlife Foundation, BLM Challenge Cost Share Grant	Douglas County, Alpine County, Carson City, Lyon County, Churchill County, Alpine/Upper Carson CWMA, CCWC, West Central LC CWMA, ChC CWMA, CWSD, BLM, USFS, private landowners, USFWS, FPST, WTNC, NFWF	Depending on Budgeting and Grant Award	~120,000	N/A
Regional	N/A	Eddmap workshop and mapping workday	NDA, CWSD, CWMA, Conservation Districts, Ag community, Trails groups, OHV groups, NGOs	Depending on Budgeting and Grant Award	\$8,000	N/A
Regional	N/A	Non-motorized invasive species trail signage and boot scrappers for CRW Trails	CWSD, Federal, State and County entities, CWMA's, Conservation Districts, NDA, CVTA, Muscle Powered	Depending on Budgeting and Grant Award	\$60,000	N/A

Table 8.3 Proposed Projects

Critical Area*/Tributary Reach/ Project Area	Interfluve Sub-Reach**	Project Title/Description	Project Manager & Partners ****	Estimated Completion Date	Estimated Completion Costs	Map I.D. Code***
Recreation Projects						
Alpine County						
Carson River East Fork to NV Stateline	N/A	Reference as same project above East Carson River Hot Springs Planning and Restoration Meadow rehabilitation/ Water Quality Enhancement	AWG, CWSD, Friends of Hope Valley, HTNF - USFS	Dec-19	TBD	AWG-2
Douglas County						
EF Carson Stateline to Genoa	E-3, E-4	Cottonwood Slough Bridge Expansion	Douglas County, NDOT	2018	\$630,000	TBD
EF Carson Stateline to Genoa	E-3, E-4	Lutheran Bridge Expansion	Douglas County, NDOT	2018	\$630,000	TBD
EF Carson Stateline to Genoa	E-5	Martin Slough Shared Use Path	Douglas County, NDOT	2017	\$810,545	TBD
EF Carson Stateline to Genoa		Genoa Lane River Access	Douglas County, State of NV,	2017	Unknown	TBD
Carson City						
N/A						
Lyon County						
N/A						
Churchill County						

Table 8.3 Proposed Projects

Critical Area*/Tributary Reach/ Project Area	Interfluve Sub-Reach**	Project Title/Description	Project Manager & Partners ****	Estimated Completion Date	Estimated Completion Costs	Map I.D. Code***
Carson River Lahontan Dam - Carson Sink		River Access Parks and Aquatic Trail	Churchill County, CWSD, NV State Lands, LCD, Private Land owners			
Watershed-wide Projects						
Regional	N/A	Outdoor Recreation Education Evening in Schools (min. of 4 events)	OHV groups, CWMAs, Hiking/Biking Groups, Rec Clubs, CWSD, NDEP, FOHV, AWG, Watershed Middle and High Schools, NDOT	Dec-19	\$10,000	
Regional	TBD	Physical and on-line Map of Carson River Public Access Points	Douglas County, Alpine County, Carson City, Lyon County, Churchill County, CWSD, BLM, USFS, private landowners, USFWS, FPST, WTNC	Ongoing	\$3,500	
Outreach and Education Projects						
Alpine County						
CR	N/A	Trout in the Classroom	AWG, Alpine County Unified School District, Diamond Valley School, Friends of Hope Valley, USFS (Lake Tahoe Basin)	Ongoing	\$20,000 per year	N/A

Table 8.3 Proposed Projects

Critical Area*/Tributary Reach/ Project Area	Interfluve Sub-Reach**	Project Title/Description	Project Manager & Partners ****	Estimated Completion Date	Estimated Completion Costs	Map I.D. Code***
CR East Fork and West Fork Headwaters to Stateline	N/A	School-based watershed education	AWG, Alpine County Unified School District, Diamond Valley School, Friends of Hope Valley	Ongoing	\$30,000 per year	N/A
CR East Fork and West Fork Headwaters to Stateline	N/A	Education Signage along Hwy. 88 Corridor	FOHV, CDFW	Jul-05	\$4,000	N/A
CR East Fork and West Fork Headwaters to Stateline	N/A	Alpine Aspen Festival	AWG, FOHV, USFS, CWSD, CRC partners	Annual on-going	\$16,000	N/A
CR East Fork and West Fork Headwaters to Stateline - Markleeville Creek	N/A	Markleeville Creek Day	AWG, FOHV, local and CRC partners	Annual on-going	\$19,000	N/A
CR East Fork and West Fork Headwaters to Stateline	N/A	Friends of Hope Valley Annual Workday	FOHV, AWG	Annual on-going	\$10,000	N/A
Douglas County						
Johnson Lane Area	NA	Storm drain marking with medallions that read "No Dumping, Drains to River".	River Wranglers, Douglas County Stormwater Program	ongoing	\$1,000	N/A

Table 8.3 Proposed Projects

Critical Area*/Tributary Reach/ Project Area	Interfluvial Sub-Reach**	Project Title/Description	Project Manager & Partners ****	Estimated Completion Date	Estimated Completion Costs	Map I.D. Code***
County Wide	NA	CRS Activity 330 flood hazard notification - properties affected by map changes	Douglas County Engineering Division/Stormwater Program Manager	Each April, and as needed dependent on map changes	rough estimate: \$10,000	N/A
North Douglas County within MS4 permit area	N/A	Outreach and water quality monitoring, stormdrain maintenance	Douglas County Engineering Division/Douglas County Public Works	annually	\$89,000 Costs will increase as permit area increases	N/A
County Wide	N/A	County wide floodplain management and stormwater outreach, site visits, website information	Douglas County Engineering Division/Stormwater Program Manager	ongoing	rough estimate: \$20,000	N/A
Carson City						
City wide, properties located in SFHA	N/A	CRS Activity 330, flood hazard notification	Carson City Stormwater Management Program	Each September	\$4,200	N/A
City wide, Lawn care businesses	N/A	MS4 outreach, stormdrain maintenance	Carson City Stormwater Management Program	Each September	\$350	N/A
City wide, all properties with structures	N/A	MS4 outreach, water quality information related brochure	Carson City Stormwater Management Program	biannual	\$15,000	N/A
City wide	N/A	Floodplain and stormwater related information for Website	Carson City Stormwater Management Program	constant	\$5,200	N/A
Lyon County						

Table 8.3 Proposed Projects

Critical Area*/Tributary Reach/ Project Area	Interfluvial Sub-Reach**	Project Title/Description	Project Manager & Partners ****	Estimated Completion Date	Estimated Completion Costs	Map I.D. Code***
N/A						
Churchill County						
N/A						
Watershed-wide Projects						
Regional	N/A	River Wranglers Youth Watershed Education Program	CRC, EE Partners, NDEP, CWSD	ongoing	\$120,000 annually	N/A
Regional	N/A	Family Stem Nights	CWSD, Sierra NV Journeys, CRC-EWG	2017-2018	\$3,500 annually	N/A
Regional	N/A	Watershed-Literacy Action Program Phase III - Campaign Design/Creation and Kick-off, Spanish on-line map, Geomorphology 101	CRC, EE Partners, NDEP, CWSD	Dec-18	\$135,000	N/A
Regional	N/A	Watershed-Literacy Action Program Phase IV - Campaign next steps	CRC, EE Partners, NDEP, CWSD	Dec-20	\$100,000	N/A
Regional	N/A	Watershed-Literacy Action Program - Follow-up Watershed Survey	CRC, EE Partners, NDEP, CWSD	Dec-22	\$80,000	N/A
Regional	N/A	Watershed/Carson River Coalition Coordination Program	CWSD, CRC, NDEP, EPA	Ongoing	\$200,000 annually	NA
Regional	N/A	CWSD overview video update	CWSD, NDEP	Dec-18	\$14,000	N/A

Table 8.3 Proposed Projects

Critical Area*/Tributary Reach/ Project Area	Interfluvial Sub-Reach**	Project Title/Description	Project Manager & Partners ****	Estimated Completion Date	Estimated Completion Costs	Map I.D. Code***
Regional	N/A	Leviathan Mine Video update	CWSD, EPA	Dec-18	\$10,000	N/A

* See Tables 8.1 8.2: NV-CA Critical Area Management Measures**Interfluvial Reach and/or Sub-Reaches within NAC Reach if applicable. See Table 5.10-2. ***Map ID codes refer to 2007 maps, new projects will be mapped in the future.

Table 8.4 Current Studies/Projects

Critical Area	Sub-Reach**	Project Title	Project Manager & Partners ****	Estimated Completion Date	Map I.D. Code
Floodplain Management/Meadow Restoration Projects					
Alpine County					
West Fork Carson River Headwaters to Paynesville*	N/A	American Rivers' Upper Hope Valley Meadow Restoration (Meadow and river restoration/ Floodplain and habitat enhancement)	Alpine Watershed Group, American River, Friends of Hope Valley, Institute for Bird Populations, USFS	Fall 2018	AWG-6
West Fork Carson River Headwaters to Paynesville*	N/A	Hope Valley Restoration and Aquatic Habitat Enhancement - Planning & Assessment	AWG, California Department of Fish & Wildlife, Friends of Hope Valley, American Rivers	Fall 2018	AWG-5
Hot Springs Creek	N/A	Grover Hot Springs State Park Meadow Restoration and ADA Access (Floodplain Management/Meadow rehabilitation/ Water Quality Enhancement)	California State Parks, Alpine Watershed Group, Alpine Trails Association, Alpine County, Carson Water Subconservancy District	2019	AWG-4

Table 8.4 Current Studies/Projects

Critical Area	Sub-Reach**	Project Title	Project Manager & Partners ****	Estimated Completion Date	Map I.D. Code
West Fork Carson River Headwaters to Paynesville*	N/A	Faith Valley Meadow Restoration (Meadow and river restoration/ Floodplain and habitat enhancement) - Planning	American Rivers, USFS, Wildlife Conservation Board, National Fish & Wildlife Foundation; Alpine Watershed Group, Friends of Hope Valley, Institute for Bird Populations, USFS, Trout Unlimited	Fall 2018	AWG-3
Douglas County					
Alluvial Fan Area	N/A	Alpine View Estates Floodplain Restudy/Remapping	Douglas County, CWSD	Mar-16	TBD
Carson City					
Mainstem Carson River to New Empire	C-3	Carson River Channel Clearing and Snagging - Flood Protection	Carson City Open Space, Carson Truckee Water Conservancy District	Nov-15	TBD
Mainstem Carson River to New Empire	C-3	Eagle Valley Golf Course A & B Drainage/Floodplain Restudy and Remapping	Carson City, CWSD	Mar-17	TBD
Churchill County					
Carson River-Lahontan Dam-Carson Sink	N/A	Sagouspi Dam Debris/ Sediment Removal Flood Control and River Rehabilitation	Churchill County, LCD, ChCEmergency Management, ChC Mosquito, Vector and Noxious Weed Control District, TCID, CWSD	Apr-16	TBD
Carson River-Lahontan Dam-Carson Sink	N/A	Debris Removal Flood Control	LCD, NRCS, NDF	Ongoing	TBD
Watershed-wide Projects					

Table 8.4 Current Studies/Projects

Critical Area	Sub-Reach**	Project Title	Project Manager & Partners ****	Estimated Completion Date	Map I.D. Code
East Fork/West Fork Stateline through mainstem to Lahontan Reservoir	N/A	Carson River Watershed Floodplain Model update, Protocol and procedures to update model	CWSD, FEMA, the Counties, USACE, USBR	2018	NA
Regional	N/A	Floodplains as Community Assets Videos	CWSD, FEMA, NDEP, CRC	Dec-17	NA
Regional	N/A	Flood Awareness Week	NDWR, NDEP, Counties, FEMA, USACE, NDEM, NOAA, CWSD, CRC	on-going	NA
Alluvial Fan Areas	N/A	Alluvial Fan Workshop and Alluvial Fan Mapping Exercise	USACE, NDWR, CWSD, UNCE	2018	TBD
All reaches	N/A	Floodplain Ordinances	CWSD, FEMA, Counties		NA
River Rehabilitation/Stabilization Projects					
Alpine County					
Upper East Fork	N/A	East Carson OHV Restoration	USFS, USBLM, Alpine County, AWG		TBD
Lyon County					
Main Stem Carson River Genoa Lane to Weeks	C-7	MCR 48 Minor Ranch	DVCD, NDEP	Mar-17	TBD
Main Stem Carson River Genoa Lane to Weeks	C-9	MCR 49 Ft. Churchill/Buckland Project	DVCD, NDEP	Mar-17	TBD
Water Quality Projects					
Alpine County					
Carson River West Fork Headwaters to Paynesville	N/A	Fishing Filament Recycling Centers	FOHV, CDFW, USFS	On-going	TBD
Upper East Fork	N/A	Adopt-A-Highway	Caltrans, AWG	Ongoing	TBD

Table 8.4 Current Studies/Projects

Critical Area	Sub-Reach**	Project Title	Project Manager & Partners ****	Estimated Completion Date	Map I.D. Code
Upper Carson - CR West Fork and East Fork Headwaters to Stateline	N/A	Citizen's Volunteer Water Quality Monitoring, Ambient, Bioassessment, Habitat, Photo and Flow	AWG, Friends of Hope Valley, Lahontan Regional Waters Quality Board	Ongoing	TBD
Upper Carson - East Fork and West Fork	N/A	Alpine County Hazardous Fuels Reduction & Healthy Watershed Project	Alpine Watershed Group, Alpine County, Sierra Nevada Conservancy, Alpine Fire Safe Council, American Rivers, US Forest Service, Carson Water Subconservancy District, Eastern Alpine County Volunteer Fire Department, Washoe Tribe of Nevada and California, Woodfords Washo Community Council	Jan-17	TBD
Douglas County					
County-wide	N/A	Stormwater Service Fee	Douglas County	Dec-16	TBD
See Carson City Below					
Carson City					
Clear Creek (Carson River Tributary)	C-2	Monitoring Sediment and Water Quality in Clear Creek	USGS, NDOT	2016	TBD
Clear Creek (Carson River Tributary)	C-2	Clear Creek Erosion Control along Hwy. 50, Spooner to 395	NDOT, CVCD	Majority completed October 2015, ongoing	TBD
Lyon and Churchill County					
Regional	N/A	Evaluation of Groundwater Flow, Middle Carson River Basin	USGS, USBR, CWSD	2015	TBD

Table 8.4 Current Studies/Projects

Critical Area	Sub-Reach**	Project Title	Project Manager & Partners ****	Estimated Completion Date	Map I.D. Code
Water Supply Projects					
Watershed-wide Projects					
Regional including Truckee River Basin	N/A	Water For the Seasons Project	CWSD, USBR, DRI	2018	NA
Invasive Species Projects					
Watershed-wide Projects					
Regional	N/A	Invasive Species Funding for Counties and CWMAs	Counties, CWMAs, Conservation Districts, CWSD,	Ongoing	NA
Recreation Projects					
Outreach and Education Projects					
Regional	N/A	Watershed-Literacy Action Program Phase II - Watershed On-line map revisions, Watershed Signage	CRC, EE Partners, NDEP, CWSD, NDOT	Dec-18	NA
Regional	N/A	River Wranglers Youth Watershed Education Program	CRC, EE Partners, NDEP, CWSD	ongoing/Dec. 2018	NA
Regional	N/A	Family Stem Nights	CWSD, Sierra NV Journeys, CRC-EWG	2017-2018	N/A
Regional	N/A	Watershed-Literacy Action Program Phase III - Campaign Design/Creation and Kick-off, Spanish on-line map, Geomorphology 101	CRC, EE Partners, NDEP, CWSD	Dec-18	NA

Table 8.5 Completed Studies/Projects since 2006/2007					
Critical Areas	Interfluve Map Sub- Reach**	Project Title	Project Manager & Partners ****	Year Completed	Map I.D. Code
Floodplain Management/Meadow Restoration Projects					
Alpine County					
N/A					
Douglas County					
Smelter Creek Alluvial Fan	N/A	Smelter Creek Flood Control Feasibility Study	Douglas County, CWSD	2015	TBD

Table 8.5 Completed Studies/Projects since 2006/2007

Critical Areas	Interfluve Map Sub-Reach**	Project Title	Project Manager & Partners ****	Year Completed	Map I.D. Code
EF Carson River Stateline to Genoa, WF Carson River Stateline to Muller, Brockliss Slough	E-6, W-2, B-6	River Fork Ranch	The Nature Conservancy, Douglas County, State Lands Q1, Atlantic Richfield SEP, USEPA, NDEP, CWSD, CVCD, BLM, Douglas County School District, Sierra Nevada Journeys, River Wranglers	Dec-13	TBD
Carson City					
Mainstem Carson River to New Empire	C-3	Golden Eagle Open Space / Desormier Acquisition	Carson City Open Space, NDSL Q1	Feb-07	TBD
	C-3	Anderson Ranch Acquisition	Carson City Open Space, NDSL Q1	Jul-07	TBD
	C-3	Mexican Dam Open Space	Carson City Open Space	Mar-08	TBD
	C-3	Jarrard Ranch Acquisition	Carson City Open Space, NDSL Q1	May-10	TBD
	C-3	Un-named property / donation from Vidler Water Company	Carson City Open Space, Vidler Water Company	Nov-10	TBD
	C-3	Morgan Mill Preserve Open Space / Serpa Acquisition	Carson City Open Space, NDSL Q1, Nevada Land Trust	Jan-11	TBD
	C-4	Carson River Canyon Open Space / Serpa Acquisition	Carson City Open Space, NDSL Q1, Nevada Land Trust	Jan-11	TBD
	C-4	Carson River Canyon Open Space / Bently Property Acquisition	Carson City Open Space, Southern Nevada Public Lands Management Act	Jan-12	TBD
Churchill County					
Carson River-Lahontan Dam-Carson Sink	N/A	Sheckler Reservoir Feasibility Study	Churchill County, CWSD, private landowners	Jun-15	TBD
Carson River-Lahontan Dam-Carson Sink	N/A	Bafford Lane Bridge Flood Control/ Sediment Removal/Bank Stabilization	Churchill County, TCID, CWSD	Mar-13	TBD

Table 8.5 Completed Studies/Projects since 2006/2007

Critical Areas	Interfluve Map Sub- Reach**	Project Title	Project Manager & Partners ****	Year Completed	Map I.D. Code
N/A	N/A	Hydraulic Modeling and Floodplain Mapping Guidelines	CWSD, NDEP, HDR	Oct-11	
River Rehabilitation/Bank Stabilization					
Douglas County					
EF and WF Carson River Stateline to Genoa	E-6, W-2, B-6	River Fork Ranch	TNC, Douglas County, State Lands, Atlantic Richfield, US EPA, NDEP, CWSD, CVCD, BLM DCSD, SNJ, River Wranglers	Jul-05	TBD
	E-3	Carson River Stream Restoration Project (at Carson Valley Golf Course)	Douglas County, CVCD, NDEP, CWSD, Carson Valley Golf Course, Carson Truckee Conservancy District	2011	CV-26
	E-5	Martin Slough (CR Tributary) Water Quality Enhancement Project	Douglas County; Douglas County Water Conveyance Advisory Committee, Douglas County School District, landowners, NDEP, State Lands Q1 program	2006	CV-34
Carson City					
Cradlebaugh Bridge to New Empire	C-3	Morgan Mill Road River Access Area	Carson City Parks & Recreation/CWSD, CTWCD, Land & Water Fund; NDSL Q1	Feb-10	TBD
	C-3	Jarrard Ranch Acquisition Riverbank Stabilization	Carson City Open Space, CVCD, CWSD, NDEP	May-15	TBD
	C-3	Carson River Park, Phase 2	Carson City Parks & Recreation/CWSD, NDSL Q1	Mar-12	TBD
Lyon County					
Mainstem Carson River to Weeks					
	C-7	MCR 035 Rolling A Ranch	DVCD, NDEP, Lyon County	Mar-10	DV-118
	C-6	MCR 030 Barnes, Mantz, Taylor Properties	DVCD/CWSD, CTWCD, NDEP, USACOE, NDSL, AB190, Lyon County	Mar-10	DV-119

Table 8.5 Completed Studies/Projects since 2006/2007

Critical Areas	Interfluve Map Sub-Reach**	Project Title	Project Manager & Partners ****	Year Completed	Map I.D. Code
	C-7	MCR 033 Minor, Lous, Ochoa, Early Properties	DVCD/CWSD, CTWCD, NDEP, USACOE, NDSL, AB 190, Lyon County, BLM	2009	DV-120
	C-7	MCR 034 Haddan, Smith, Vidler, Rolling A Ranch Properties	DVCD/CWSD, CTWCD, NDEP, USACOE, NDSL, AB 190, Lyon County, BLM	2010	DV-121
	C-7	MCR 036 Wiggins, Minor Properties	DVCD/CWSD, CTWCD, NDEP, USACOE, NDSL, AB 190, Lyon County, BLM	Dec-11	DV-122
	C-7	MCR 037 Minor and Cox Properties	DVCD/CWSD, CTWCD, NDEP, USACOE, NDSL, AB 190, Lyon County, BLM	Dec-11	DV-123
	C-7	MCR 038 239-249 River Road	DVCD, NDEP 319, CWSD, Lyon County, NDSL	Dec-11	DV-124
	C-7	MCR 039 Along Minor Ranch	DVCD, NDEP 319, CWSD, Lyon County, NDSL	Dec-11	DV-125
	C-7	MCR 040 Page/Borda Property River Road	DVCD, NDEP 319, CWSD, Lyon County, NDSL, CTWCD, USACE	Oct-12	DV-126
	C-7	MCR 041 Gavin/Borda Property River Road	DVCD, NDEP 319, CWSD, Lyon County, NDSL, CTWCD, USACE, AB 190	Nov-12	DV-127
	C-7	MCR 042 Gavin/Lyon County Property	DVCD, NDEP 319, CWSD, Lyon County, NDSL, CTWCD, USACE, River Wranglers	Nov-12	TBD
	C-7	MCR 043 Gavin/Lyon County Property	DVCD, NDEP 319, CWSD, Lyon County, NDSL, CTWCD, USACE, River Wranglers	Dec-12	TBD
	C-6	MCR 045 Morse Family Farms, Eitel Ranch, DEG Properties	CWSD, CTWCD, NDEP, DVCD, Lyon County, State Lands, USACOE, Landowners	Jan-14	TBD
	C-7	MCR 046 Morse Family Farms, Eitel Ranch, DEG Properties	DVCD, NDEP 319, CWSD, Lyon County, NDSL, CTWCD, USACE, AB 190	Jan-14	TBD
	C-7	MCR 047 Morse Family Farms, Minor Ranch	CWSD, CTWCD, NDEP, DVCD, Lyon County, State Lands, USACOE, Landowners	Nov-13	TBD
	C-5	Santa Maria Ranch Park-Bird Habitat Restoration Project	NvIBA Program/Audubon Society, Lyon County, USFWS	Dec-10	TBD

Table 8.5 Completed Studies/Projects since 2006/2007

Critical Areas	Interfluve Map Sub- Reach**	Project Title	Project Manager & Partners ****	Year Completed	Map I.D. Code
	C-7	Walker Property Wildlife Habitat Conservation Project	NvIBA Program/Audubon Society, DVCD, USFWS, Lyon County	Sep-11	TBD
Churchill County					
Carson River- Lahontan Dam-Carson Sink	N/A	Santa Fe Flume -Sediment removal/bank stabilization	Churchill County Planning, Churchill County Emergency Management, Churchill County Road Department, TCID, Churchill County Mosquito, Vector and Weed Control District, LCD, DVCD, and CWSD	Apr-15	TBD
Water Quality					
Alpine County					
Carson River West Fork Headwaters to Paynesville	N/A	Rivers and Ranches - Ace Herford Ranch Meadow rehabilitation/ Water Quality Enhancement	AWG, LWQCB, SBC	Mar-2016	TBD
Upper Carson - East Fork and West Fork	N/A	Alpine County Hazardous Fuels Reduction & Healthy Watershed Project	Alpine Watershed Group, Alpine County, Sierra Nevada Conservancy, Alpine Fire Safe Council, American Rivers, US Forest Service, Carson Water Subconservancy District, Eastern Alpine County Volunteer Fire Department, Washoe Tribe of Nevada and California, Woodfords Washoe Community Council	Jan-17	AWG
Carson City					
Carson River Mainstem-New Empire to Dayton/Dayton to Weeks Bridge/Weeks Bridge-Lahontan Dam-Carson Sink	Includes C-4 to C-10	Mercury in the Carson River	USGS, USEPA	2013	TBD

Table 8.5 Completed Studies/Projects since 2006/2007

Critical Areas	Interfluve Map Sub- Reach**	Project Title	Project Manager & Partners ****	Year Completed	Map I.D. Code
Douglas County					
EF Carson River Stateline to Genoa	E-5	USGS Algae Study	USGS, CWSD, NDEP	2015	TBD
EF Carson River Stateline to Genoa	E-4	Trinity Lutheran Parking Lot Low impact development practices utilized	Jeremy Hutchings, RO Anderson, Trinity Lutheran Church, Town of Gardnerville, Gardnerville Water Company, Minden Gardnerville Sanitation District, Douglas County	end of 2016	TBD
N/A	N/A	Park Overland Hotel/ Restaurant Low Impact Development Project	Robinson Engineering, Ranch Loan Trio LLC, Gardnerville Water Company, Town of Gardnerville, NDOT, Douglas County	August 2015	TBD
Watershed-wide					
Regional	N/A	Low Impact Development in the Carson River Watershed Report	CWSD, RCI, NDEP	Apr-15	N/A
Water Supply					
Invasive Species					
Regional	N/A	American Recovery and Reinvestment Act 2009 Carson River Stream Bank Restoration and Stabilization Project	CWSD, CWMAs, Conservation Districts, Alpine County, Douglas County, Carson City, Lyon County, Churchill County,	2011	N/A
Each County	N/A	Annual Weed Management per County	CWSD, CWMAs, Conservation Districts, Alpine County, Douglas County, Carson City, Lyon County, Churchill County,	Annual	N/A

Table 8.5 Completed Studies/Projects since 2006/2007

Critical Areas	Interfluve Map Sub- Reach**	Project Title	Project Manager & Partners ****	Year Completed	Map I.D. Code
Recreation					
Carson City	N/A	Trails in Carson Valley	CVTA, Douglas County, NV State Parks, NV State Lands, USFS, BLM		
Douglas County	N/A	Trails in Carson City	Muscle Powered, Carson City, USFS, BLM, Eagle Valley Trails Committee		
Watershed-wide					
Education and Outreach					
Regional	N/A	Multiple Youth Watershed Education/NDEP 319 NPS pollution grants (2005-present)	CWSD, River Wranglers, Local Schools, CRC - EWG	Multiple	N/A
Regional	N/A	Watershed-Literacy Action Plan	CWSD, CRC, NDEP	2015	N/A
Regional	N/A	Watershed-wide Survey	CWSD, CRC, NDEP	2015	N/A
Regional	N/A	Marketing and Communications Plan	CWSD, CRC, NDEP	2016	N/A
Regional	N/A	Family Stem Nights	CWSD, Sierra NV Journeys, CRC- EWG	2016	N/A

Table 8.6 Proposed Paiute-Shoshone Tribe Studies/Projects/Programs: Projects are categorized by main project type. Many projects provide benefits in multiple project categories. Map ID codes refer to 2007 maps, new projects have yet to be mapped and assigned map ID codes.

Critical Area*/Tributary Reach/ Project Area	Project Title	Project Manager & Partners	Estimated Completion Date	Estimated Completion Costs	Map I.D. Code***
Floodplain Management Projects/Residential Flooding Projects/Stormwater					
Carson River-Lahontan Dam-Carson Sink, Tribal lands/reservation	Design and install infiltration structures	FPST Tribe: Environmental, Housing Authority, Natural Resources; RT Permaculture	2026	\$135,000	TBD
Carson River-Lahontan Dam-Carson Sink, Tribal lands/reservation	Determine applicability and feasibility of Infiltration Structure (BMP), Sheet Mulching (BMP), and Irrigation (BMP) implementation to reduce NPS pollution from home sites	FPST Tribe: Environmental, Housing Authority; RT Permaculture	2025	\$35,000	TBD

Table 8.6 Proposed Paiute-Shoshone Tribe Studies/Projects/Programs: Projects are categorized by main project type. Many projects provide benefits in multiple project categories. Map ID codes refer to 2007 maps, new projects have yet to be mapped and assigned map ID codes.

Critical Area*/Tributary Reach/ Project Area	Project Title	Project Manager & Partners	Estimated Completion Date	Estimated Completion Costs	Map I.D. Code***
Carson River-Lahontan Dam-Carson Sink, Tribal lands/reservation	Implement Erosion and sediment control structures	FPST Tribe: Environmental, Housing Authority; RT Permaculture	2025	\$150,000	TBD
Carson River-Lahontan Dam-Carson Sink, Tribal lands/reservation	Storm Drain Structures, remove old inoperable French drain and implement new functional drain in residential areas	FPST Tribe: Environmental, Housing Authority; RT Permaculture	2027	\$300,000	TBD
Wetland Bank Rehabilitation/Stabilization/ Habitat enhancement Projects					
Carson River-Lahontan Dam-Carson Sink, Tribal lands/reservation	Bank Stabilization	FPST Tribe: Environmental, Wetlands Dept, Natural Resources, BIA	2020	\$30,000	TBD
Carson River-Lahontan Dam-Carson Sink, Tribal lands/reservation	Planned Grazing System	FPST Tribe: Environmental, Wetlands Dept, Natural Resources	Ongoing	\$130,000	TBD
Water Quality Projects					
Carson River-Lahontan Dam-Carson Sink, Tribal lands/reservation	Mycelium Filter Project	FPST Tribe: Environmental, Wetlands Dept, Natural Resources, RT Permaculture	2020	\$100,000	TBD
Carson River-Lahontan Dam-Carson Sink, Tribal lands/reservation	Development of Irrigated Cropland and Garden Management (BMP)	FPST Tribe: Environmental, Wetlands Dept, Natural Resources, BIA	2025	\$30,000	TBD

Table 8.6 Proposed Paiute-Shoshone Tribe Studies/Projects/Programs: Projects are categorized by main project type. Many projects provide benefits in multiple project categories. Map ID codes refer to 2007 maps, new projects have yet to be mapped and assigned map ID codes.

Critical Area*/Tributary Reach/ Project Area	Project Title	Project Manager & Partners	Estimated Completion Date	Estimated Completion Costs	Map I.D. Code***
Carson River-Lahontan Dam-Carson Sink, Tribal lands/reservation	Control waste disposal on tribal lands, reduce pollution from dumping	FPST Tribe: Environmental, Wetlands Dept, Natural Resources; Tribal Law Enforcement		\$15,000	TBD
Water Supply Projects					
Carson River-Lahontan Dam-Carson Sink, Tribal lands/reservation	Stabilize critical erosion sites	FPST Tribe: Environmental, Wetlands Dept, Natural Resources	2025	\$200,000	TBD
Invasive Species Projects					
Carson River-Lahontan Dam-Carson Sink, Tribal lands/reservation	Tamarisk Eradication	City of Fallon, NV/Churchill County, NV/USBLM/USFWS/CWSD/Private landowners	Ongoing	\$275,000	TBD
Carson River-Lahontan Dam-Carson Sink, Tribal lands/reservation	Integrated Weed Management Plan	FPST Tribe: Environmental, Wetlands Dept, Natural Resources, Churchill County	Ongoing	\$30,000	TBD
Recreation Projects					
Carson River-Lahontan Dam-Carson Sink, Tribal lands/reservation	Implement Bird Overlook in Tribal Wetland	FPST Tribe: Environmental, Wetlands Dept, Natural Resources, Churchill County	2025	\$200,000	TBD
Outreach and Education Projects					

Table 8.6 Proposed Paiute-Shoshone Tribe Studies/Projects/Programs: Projects are categorized by main project type. Many projects provide benefits in multiple project categories. Map ID codes refer to 2007 maps, new projects have yet to be mapped and assigned map ID codes.

Critical Area*/Tributary Reach/ Project Area	Project Title	Project Manager & Partners	Estimated Completion Date	Estimated Completion Costs	Map I.D. Code***
Carson River-Lahontan Dam-Carson Sink, Tribal lands/reservation	Youth Day Camp	FPST Tribe: Environmental, Wetlands Dept	Ongoing	Unknown	N/A
Carson River-Lahontan Dam-Carson Sink, Tribal lands/reservation	Public Workshops	FPST Tribe: Environmental, Wetlands Dept	Ongoing	Unknown	N/A
Carson River-Lahontan Dam-Carson Sink, Tribal lands/reservation	Quarterly Newsletter	FPST Tribe: Environmental, Wetlands Dept	Ongoing	Unknown	N/A

* See Table 8.1: NV-CA Critical Area Management Measures. **1996 Interfluvial Relative Channel Stability Listed by sub-reach if applicable. See Table 5.10-2. ***Map ID codes refer to 2007 maps, new projects will be mapped in the future using Google Earth technology.

Table 8.7 Proposed Washoe Tribe of Nevada and California Studies/Projects/Programs:

Projects are categorized by main project type. Many projects provide benefits in multiple project categories. Map ID codes refer to 2007 maps, new projects have yet to be mapped and assigned map ID codes.

Critical Area*/Tributary Reach/Project Area	Sub-Reach**	Project Title/Description/Location	Project Manager & Partners	Estimated Completion Date	Estimated Completion Costs	Map I.D. Code***
Floodplain Management Projects						

Table 8.7 Proposed Washoe Tribe of Nevada and California Studies/Projects/Programs:

Projects are categorized by main project type. Many projects provide benefits in multiple project categories. Map ID codes refer to 2007 maps, new projects have yet to be mapped and assigned map ID codes.

Critical Area*/Tributary Reach/Project Area	Sub-Reach**	Project Title/Description/Location	Project Manager & Partners	Estimated Completion Date	Estimated Completion Costs	Map I.D. Code***
River Rehabilitation/Stabilization/ Habitat enhancement Projects						
Mainstem Carson River Genoa Lane to Weeks	C-1	Stewart Ranch Bank Protection #3 (Rehabilitation/Stabilization, Habitat Enhancement)	Washoe Tribe of Nevada and California	Contingent upon funding availability	\$200,000	WT-10
Mainstem Carson River Genoa Lane to Weeks	C-1	Stewart Ranch Bank Protection #4 (Rehabilitation/Stabilization, Habitat Enhancement)	Washoe Tribe of Nevada and California	Contingent upon funding availability	\$100,000	WT-11
Mainstem Carson River Genoa Lane to Weeks	C-1	Stewart Ranch Bank Protection #5 (Rehabilitation/Stabilization, Habitat Enhancement)	Washoe Tribe of Nevada and California	Contingent upon funding availability	\$100,000	WT-12
Mainstem Carson River Genoa Lane to Weeks	C-1	Stewart Ranch Bank Protection #6 (Rehabilitation/Stabilization, Habitat Enhancement)	Washoe Tribe of Nevada and California	Contingent upon funding availability	\$100,000	WT-13
Mainstem Carson River Genoa Lane to Weeks	C-1	Stewart Ranch Bank Revegetation (Nr Mallard Bend)	Washoe Tribe of Nevada and California, EPA,	2018	\$20,000	TBD

Table 8.7 Proposed Washoe Tribe of Nevada and California Studies/Projects/Programs:

Projects are categorized by main project type. Many projects provide benefits in multiple project categories. Map ID codes refer to 2007 maps, new projects have yet to be mapped and assigned map ID codes.

Critical Area*/Tributary Reach/Project Area	Sub-Reach**	Project Title/Description/Location	Project Manager & Partners	Estimated Completion Date	Estimated Completion Costs	Map I.D. Code***
East Fork CR Stateline to Country Club Drive	E2	Virginia Rocky/ East Fork Bank Stabilization	Washoe Tribe of Nevada and California, CWSD, EPA, NDEP, CV Golf Course, Cardno	2019	\$300,000	TBD
East Fork CR Stateline to Country Club Drive	E2	Floodwater redirection/limit flows into bank stabilization project	Washoe Tribe of Nevada and California, CWSD, EPA, NDEP, CV Golf Course, Cardno	Contingent on funding	TBD	TBD
Water Quality Projects						
Washoe Tribal Lands		Post Fire Restoration reseeding and stabilization	Washoe Tribe of Nevada and California, EPA,	Contingent upon fire frequency	\$250/acre	TBD
East Fork Stateline to Riverview Bridge	E2	Dresslerville Elder Center LID Projects	Washoe Tribe of NV and CA	2018	\$20,000	TBD
Water Supply Projects						
Invasive Species Projects						
Mainstem Carson River Genoa Lane to Weeks	C-1	Noxious and Nuisance Weed control using goats (300 acres), and reseeding	Washoe Tribe of Nevada and California, EPA, Goat Green, Beyond Pesticides	Ongoing	\$25,000/annually	TBD
Tribal lands including the Carson River Corridor and its tributaries		Noxious and Nuisance Weed control	Alpine County, CA/Douglas County, NV/USFS/USBLM/CWSD/Private landowners	Ongoing		TBD

Table 8.7 Proposed Washoe Tribe of Nevada and California Studies/Projects/Programs:

Projects are categorized by main project type. Many projects provide benefits in multiple project categories. Map ID codes refer to 2007 maps, new projects have yet to be mapped and assigned map ID codes.

Critical Area*/Tributary Reach/Project Area	Sub-Reach**	Project Title/Description/Location	Project Manager & Partners	Estimated Completion Date	Estimated Completion Costs	Map I.D. Code***
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* See Tables 8.1 & 8.2: NV-CA Critical Area Management Measures. ** 1996 Interfluvial Relative Channel Stability Listed by sub-reach if applicable. See Table 5.10-2. ***Map ID codes refer to 2007 maps, new projects will be mapped in the future using Google Earth technology.

Completed Projects						
Critical Area*/Tributary Reach/Project Area	Sub-Reach**	Project Title/Description	Project Manager & Partners	Completion Date	Estimated Completion Costs	Map I.D. Code***
Water Quality Projects						
Lower Clear Creek	C-2	Post Fire Restoration (23 acres) reseeded and continued monitoring	Washoe Tribe of Nevada and California, EPA,	Completed 2016	\$10,000	TBD
Skenadore Allotment - Pine Nut Range	N/A	Dump Cleanup 160 acres	Washoe Tribe of Nevada and California, EPA, BIA	Completed 2016	\$300,000	TBD

8.8 Carson River Adaptive Stewardship Plan Suggested Actions for Future Management and Implementation

The plan provides Suggested Actions (Table 8.8) to implement over the next 5-10 years. These actions summarize studies, programs and projects per critical area and per project category and also capture other types of projects that are in the idea stage or initial planning stages.

An additional project category - Administrative Actions - is included on Table 8.8 to capture broad scale actions such as plan updates. A number of these actions are feasibility studies or investigation ideas that are in their initial stages and costs, partnerships, and time schedules have not been fully analyzed. Therefore, besides summarizing the projects in Tables 8.3-8.7, the Suggested Actions table is a place holder for these less developed projects and have not been included in the proposed project tables at this time.

Table 8.8 is organized by the headings outlined below and then by the project category:

CR Adaptive Stewardship Plan Suggested Actions For Future Management and Implementation Table 8.8				
SA- #	Critical Area	Suggested Action	Responsible or Suggested Responsible Party	Potential Funding Sources

Column 1: This is the Suggested Action number for tracking purposes.

Column 2: Refers to the Critical Area and may be cross referenced with the NV and CA Critical Area Tables 8.1-8.2 and the Project Tables 8.3-8.7 Critical Area Columns to help track actions that are completed based on specific critical area criteria.

Column 3: Provides a description of the suggested action.

Column 4: Identifies the entities likely to be responsible for ensuring the suggested action is completed.

Column 5: Identifies potential funding sources for implementing the suggested action. Specific project costs are available for some projects and are found in Tables 8.3 – 8.7.

Carson River Projects
Map Series: Alpine County
June 2017

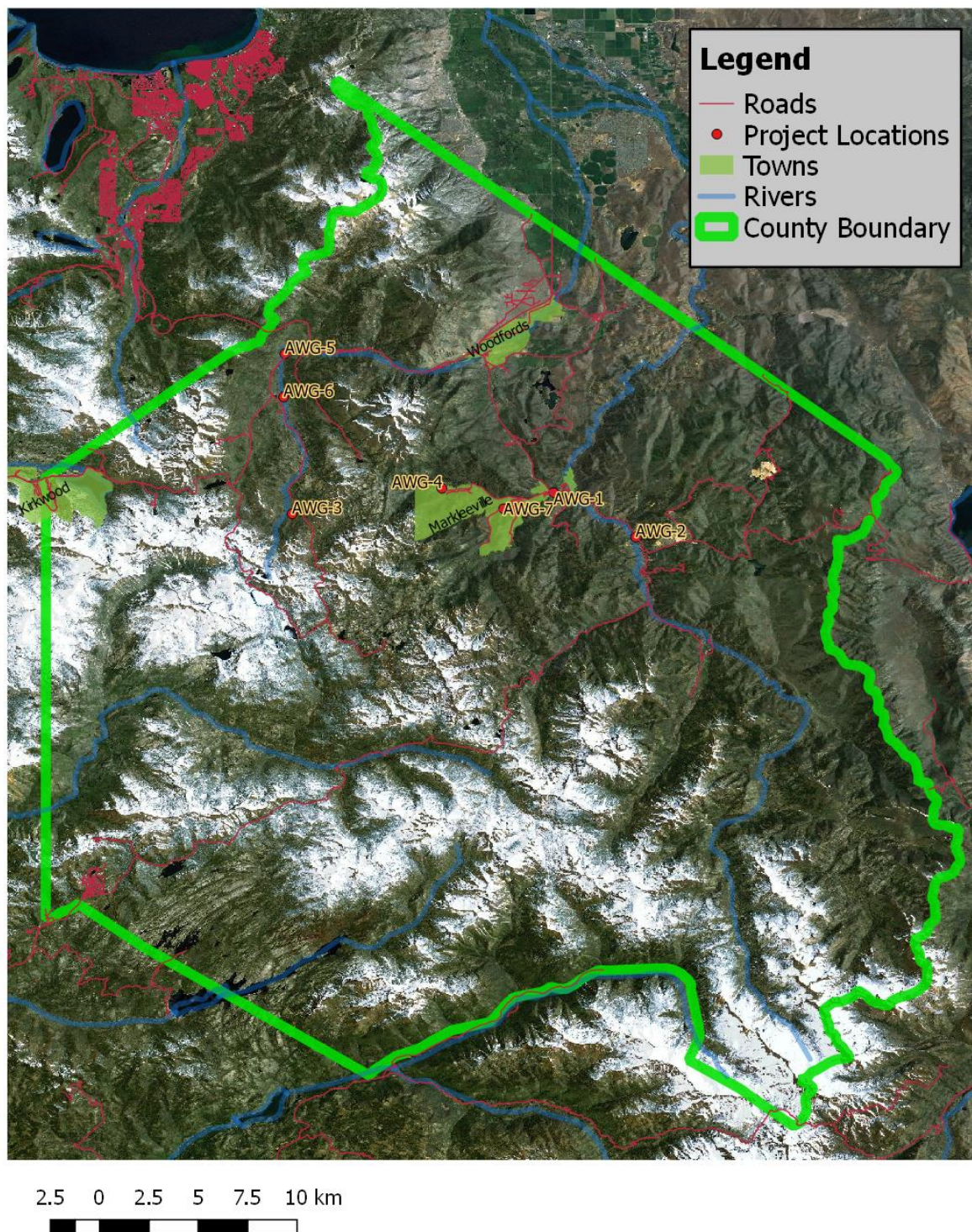


Table 8.8: Carson River Adaptive Stewardship Plan Suggested Actions for Future Management and Implementation

Carson River Adaptive Stewardship Plan Suggested Actions for Future Management and Implementation				
SA- #	Critical Area	Suggested Action	Responsible or Suggested Responsible Party	Potential Funding Sources
Floodplain Conservation				
SA-1	Watershed wide	Continue to implement Carson River Floodplain Management Plan 2008 and supplemental update 2013 Summary of Suggested Actions Table 4.7-1, pages 52-55 and any adopted updates.	CWSD, Counties, Other agencies	FEMA, CWSD, Counties, other relevant entities
SA-2	Watershed wide	Continue to implement Carson River Discovery Report 2012 Recommended Watershed Projects Table and any adopted updates.	CWSD, Counties, Other agencies	FEMA, CWSD, Counties, other relevant entities
SA-3	Watershed wide	Complete projects outlined in Current and Proposed Project Tables 8.3-8.7 relating to Floodplain/ Meadow Conservation	Relevant entities	Relevant entities
River Rehabilitation/Stabilization				
SA-4	Watershed Wide	Evaluate Carson River diversion structures to determine the feasibility and priority of replacement/retrofitting with permanent structures that transport sediment, allow fish passage, and provide recreational boat passage.	CWSD, NDOW, NDEP	NRCS, NDOW, CWSD, NDEP
SA-5	Watershed Wide	Investigate what type or level of sediment transport study would be feasible for the Carson River.	CWSD, NDEP, USACE	CWSD, NDEP
SA-6	Watershed Wide	Identify priority areas requiring bank stabilization/rehabilitation within each County's river and tributary reaches.	CWSD, Counties, Conservation Districts, NGO, Ag Community	CWSD, NDEP, NRCS, NDOW, FEMA, EPA
SA-7	Alpine County	Alpine Watershed Group and others to continue to seek funding through California Department of Fish and Wildlife Prop 1. American Rivers plans to submit a planning (assessment, design, permitting) project for a set of priority sites for meadow restoration in the Carson Watershed in June 2017.	AWG, American Rivers	CA Prop 1, CDFW

SA- #	Critical Area	Suggested Action	Responsible or Suggested Responsible Party	Potential Funding Sources
SA-8	EF Carson River- Stateline to Genoa Lane	Evaluate feasibility of removing Ruenstroth Dam ruins from East Fork	USFS, USEPA, BLM, Planet Savvy, USFWS, NDOW	USEPA, CWA Section 319(h), CWSD, USFWS, NDOW, Washoe Tribe, Leviathan Funds
SA-9	Mainstem Carson River Genoa Lane to Lahontan	Given the multiple land owners in this area, assess and evaluate creation of a interlocal land and weed management agreement in the Ft. Churchill area between CWSD, Lyon County, DVCD, Lahontan CD, Churchill County, State Parks, State Lands, USBR, USBLM, USEPA, NDEP, and USFWS.	CWSD, DVCD, LVCD, Lyon and Churchill Counties, BLM, USBR, NV State Parks and State Lands, NDEP, USEPA	CWSD, DVCD, LVCD, Lyon and Churchill Counties, BLM, USBR, NV State Parks and State Lands, NDEP, USEPA
SA-10	Mainstem Carson River Genoa Lane to Lahontan	Complete projects outlined in Current and Proposed Project Tables 8.3-8.7 relating to River Rehabilitation/Bank Stabilization.	Relevant entities	Relevant entities
Water Quantity -From Comprehensive Regional Water System Plan 2013				
SA-11	Watershed-Wide	<i>High Water Use Period Analysis and Future Supply Plan:</i> Evaluate actual source water supply during high use including treatment and emergency backup water to assess existing capacity and plan for future capacity. Once the source of supply is determined a plan can be developed to transport, store, and use that supply.	CWSD, Water Purveyors, NV State Engineer and Source Water Protection	CWSD, Water Purveyors
SA-12	Watershed-Wide	<i>Watershed- Water Balance Report:</i> As part of the management of the Watershed, determine the need to develop a water balance for the Watershed. This would include the annual groundwater recharge of the various basins, the current groundwater pumping, decreed surface water and averaged actual river/stream flows, effluent return, etc. These inputs would be utilized to determine the available water in specific areas of the Watershed, which areas need water, and which areas have excess water on a Watershed basis.	CWSD, Water Purveyors, Federal Water Master, NV State Engineer and Source Water Protection	CWSD, Water Purveyors, State of Nevada - NDWR, Federal entities

SA- #	Critical Area	Suggested Action	Responsible or Suggested Responsible Party	Potential Funding Sources
SA-13	Watershed-Wide	<i>Carson River Segment Evaluation and Management Plan:</i> Further research and development of a viable plan to manage water between segments of the Carson River is a significant task that will need to be evaluated and undertaken as part of an overall Watershed management system/plan.	CWSD, Water Purveyors, Federal Water Master, NV State Engineer and Source Water Protection	CWSD, Water Purveyors, State of Nevada - NDWR, Federal entities
SA-14	Watershed-Wide	<i>Water Banking and Leasing Programs:</i> Further research and development of viable Water Banking and Water Leasing programs along the Carson River as part of the overall Watershed management.	CWSD, Water Purveyors, Federal Water Master, TCID, NV State Engineer and Source Water Protection	CWSD, Water Purveyors
SA-15	Watershed-Wide	Complete projects outlined in Current and Proposed Project Tables 8.3-8.7 relating to Water Supply.	Relevant entities	Relevant entities
Water Quality				
SA-16	Watershed-Wide	Continue to work with each jurisdiction to implement Low Impact Development Practices throughout the Carson River Watershed on new and retrofit projects in urban areas.	CWSD, Counties, landowners, NRCS, Conservation Districts	CWSD, NDEP, Counties
SA-17	Watershed-Wide	Access the feasibility of creating a Carson River Watershed Incentive Fund to work with our agricultural and river landowners to implement agricultural best management practices to improve water quality, reduce NPSP, and provide other benefits to the health of the watershed. The assessment would also consider ecosystem services provided by agriculture and the compensation/restitution of damaged infrastructure located in agricultural areas when flooding occurs.	CWSD, CRC Stakeholders, NDEP, Counties, NRCS, Conservation Districts	CWSD, NDEP, Counties

SA- #	Critical Area	Suggested Action	Responsible or Suggested Responsible Party	Potential Funding Sources
SA-18	Watershed-Wide	Complete projects outlined in Current and Proposed Project Tables 8.3-8.7 relating to Water Quality.	Relevant entities	Relevant entities
SA-19	Carson River Mainstem Mexican Dam/New Empire to Carson Sink	After flooding damage to river banks, GPS and photograph locations of mercury slickens in cut banks along the length of the Carson River Superfund Investigation site.	EPA, NDEP, USGS, CWSD, Other relevant agencies	EPA, NDEP, CWSD, other relevant sources
Invasive Species				
SA-20	Watershed-Wide	Continue to work with and fund CWMA's to implement invasive species programs including strategic planning, work programs, and integrated pest management.	CWMAs, CWSD, Counties, Conservation Districts, NDA	CWSD, Counties, NDA
SA-21	Watershed-Wide	Continue to apply for regional level grants to assist with funding invasive species programs.	CWSD, CWMA, NDA	CWSD, BLM, NFWF, NDA
SA-22	Watershed-Wide	Encourage the Counties to fund and implement invasive species management programs.	Counties	Counties
SA-23	Watershed-Wide	Work with our partners on new and innovative solutions for invasive species and funding the programs.	CWSD, CWMAs, Counties, Conservation Districts, NDA	Counties, NDA, CWSD, Federal Agencies
SA-24	Watershed-Wide	Continue to work with NDOW to limit the threat of aquatic invasive species in the Carson River Watershed	CWSD, NDOW, Counties, NSP	NDOW, CWSD,
SA-25	Watershed-Wide	Complete projects outlined in Current and Proposed Project Tables 8.3-8.7 relating to Invasive Species.	Relevant entities	Relevant entities
Outreach and Education - See Watershed-Literacy Action Plan				
SA-26	Watershed-Wide	Implement Watershed-Literacy Action Plan 2015 and any updated Suggested Actions (Table 7)	CWSD, CRC Partners	CWSD, NDEP

SA- #	Critical Area	Suggested Action	Responsible or Suggested Responsible Party	Potential Funding Sources
SA-27	Watershed-Wide	Implement Recommendations from the Watershed-Literacy Marketing and Communications Plan 2016	CWSD, CRC Partners	CWSD, NDEP
SA-28	Watershed-Wide	Continue ongoing work to educate water users and water purveyors of the need to expand to water conservation method as a means to manage our water resources.	CWSD, Water Purveyors, NDEP	CWSD, NDEP
SA-29	Watershed-Wide	Continue ongoing work to educate the surface and ground water users in the Watershed on the impacts of climate change on water use patterns and work to develop a plan for dealing with those impacts before they occur.	CWSD, Water Purveyors, Counties, NDWR, NDEP	CWSD, NDEP
SA-30	Watershed wide	Complete projects outlined in Current and Proposed Project Tables 8.3-8.7 relating to Outreach and Education.	Relevant entities	Relevant entities
Recreation Use and Management				
SA-31	Mainstem Lahontan to Carson Sink	Investigate feasibility to implement a Carson River Water Trail in Churchill County between County owned properties along the Carson River from Sheckler Cutoff to the Reno Highway Bridge/Fallon Golf Course.	Churchill County, CWSD, NV State Parks	NV State Trails Grants, CWSD, Churchill County
SA-32	Watershed wide	Complete projects outlined in Current and Proposed Project Tables 8.3 - 8.4 relating to Recreation Use and Management.	Relevant entities	Relevant entities
SA-33	Watershed wide	Investigate locations and create map of publicly owned river access points.	CWSD, Counties, Tourism Commissions	CWSD, Counties, Tourism Boards
Administrative Actions				
SA-34	Watershed-Wide	Update the Carson River Adaptive Stewardship Plan, the suggested actions, maps and other information as needed, but a minimum of every 10 years.	CWSD, NDEP	CWSD, NDEP
SA-35	Watershed-Wide	Incorporate recommendations from studies in progress when completed into project tracking and implementation when feasible.	CWSD, NDEP	CWSD, NDEP, TBD

SA- #	Critical Area	Suggested Action	Responsible or Suggested Responsible Party	Potential Funding Sources
SA-36	Watershed-Wide	Seek/find funding to design, develop, house, coordinate and manage an on-line tracking system database that will allow stakeholders who implement programs and projects that improve water quality and watershed health, and efficiently meet Watershed Plan <i>elements g and i</i> .	CWSD, NDEP, CRC, EPA	CWSD, NDEP, TBD
SA-37	Watershed-Wide	Work with Counties to include policies and programs in Master Plans and other planning documents to benefit water quality and contain other watershed health benefits.	CWSD, Counties	CWSD, NDEP, Counties

8.0.1 Project Tracking and Measurable Milestones Update (*Revised Section 8.1.1*)

We have revised the project tables (Tables 8.3-8.7) to include multiple project categories including River Rehabilitation/Bank Stabilization. The previous plan focused on these as the main projects CWSD would track to see improvements in the management of NPS pollution. The plan is updated to track other types of projects as all project categories have the potential to provide multiple NPS pollution management benefits. The existing project maps will be used, as will updated maps of projects either completed, currently in progress, or proposed. The mapping of these projects is a work in progress and is listed as a continued suggested action in the administration section of Table 8.8. Updated maps with new information to date are in the revised section of Appendix F.

Many projects identified on the old and revised project maps have corresponding updated Project Summary Sheets available in the revised section of Appendix G. These sheets provide more project details than the tables, but are expressly more difficult to receive updated information as we rely on our partners to provide this information and due to limited time and resources on their parts, we are working toward other solutions. Table 8.8, SA- 36, suggests the need to provide an easy, on-line tracking database that will allow our partners to input data quickly and allow real time tracking of projects and their NPS benefits. Completion of the suggested action will be dependent on funding and staff resources.

The project maps and summary sheets assist with tracking of NPS projects, measurable milestones, and management measures (*element c and g*).

8.1 River Restoration/Stabilization Project Update:

See updated Tables 8.3-8.8, Appendix J, that provide information on projects completed since 2007 (Table 8.3, which is an update of 2007 CRASP Table 8.1.2-1), current projects (Table 8.4, which is an update of 2007 CRASP Table 8.1.3), and proposed projects for the counties and Tribal Nations in the Watershed (Tables 8.5-8.7)

8.1.1 Completed River Rehabilitation Projects

A description of some of the completed work since 2007 is located in Table 8.5 and 8.7.

LiDAR Flights

LiDAR from the Carson Valley portion of Alpine County to Lahontan Reservoir was flown in 2012. The water was very low, providing very good imaging results.

8.1.2 Current River Rehabilitation Projects

See Current Project Table 8.4, and Tribal Entity Tables 8.6 & 8.7, Appendix J.

8.1.4 Recommendations for Future Management Measures Update

See Proposed Project Tables by County 8.3, Washoe Tribe 8.6, Fallon Paiute-Shoshone Tribe 8.7 and Suggested Actions Table 8.8.

8.2 Floodplain Conservation

See Project Tables 8.3 – 8.8, Appendix J.

8.2.1 Completed Floodplain Conservation Projects

Carson River Coalition Main Message Reconfirmed

After the Carson River Watershed Forum in 2012, a survey of CRC members reconfirmed the main message is to continue to protect the floodplains from development as determined previously.

Carson River Watershed Regional Floodplain Management Plan 2008

This regional floodplain management plan was completed in 2008 and was formally adopted by the elected boards of Alpine County, California; Carson City; and Douglas, Lyon, and Churchill counties, in addition to the CWSD Board of Directors. The plan was also approved by FEMA and the Nevada Division of Water Resources Floodplain Management.

The purpose of this plan was to create a long-term vision and strategies for floodplain management to reduce flood damage impacts. The plan objectives include the following:

- Manage economic development without sacrificing floodplain and river form and function;
- Ensure public safety upstream and downstream;
- Protect property rights while conserving our natural resources;
- Protect and improve wildlife habitat and water quality,
- Provide river continuity (un-impeded flow conditions) and connectivity (connection of river to its floodplain; and
- Promote conservation of lands within the river corridor.

The floodplain management strategies were developed through input from floodplain administrators from each county, county staff, planning commissions, advisory boards, a rapid evaluation of the river system, and input received from the general public during the public process.

Visit CWSD's website to download a PDF of this plan.

<http://www.cwsd.org/library/Final%20floodplain%20plan%2009-08.pdf>

Carson River Watershed Regional Floodplain Management Plan-Supplemental Update 2013:

The plan calls for an update/progress report to be completed at a minimum of five years. The revisions and updates follow the Table of Contents of the original document. The update assists those counties that participate in FEMA's Community Rating System (CRS) program. The general content of the document remains largely unchanged. The main are related progress on the Suggested Actions section in Appendix H. Other updates and revisions provide current information relating to emergency contacts, CRS information, and consistency with existing plans. Additional appendices were added to provide additional detail/progress on suggested actions. The CWSD Board adopted the *Carson River Watershed Regional Floodplain Management Plan Supplemental Update 2013* on August 21, 2013. Each of the five counties that

previously adopted the Regional Floodplain Management Plan also adopted the supplemental update document during 2013. This report is available at www.cwsd.org.

Floodplain Ecosystem Services Valuation for Carson Valley

Suggested action nine in the Regional Floodplain Management Plan states “Identify and promote options for landowner incentive programs, such as floodplain leasing program and conservation easements that provide compensation to landowners providing ecosystem services.” Protecting the floodplain’s natural functions and processes is a key flood protection strategy. Agricultural and other open space uses are a good fit in our floodplains as damage costs can skyrocket if these areas become developed with residential and commercial uses. CWSD retained Entrix to look at possible compensation to river corridor landowners for the ecological services provided to the public by their private lands in the floodplain. The “Floodplain Ecosystem Services Valuation for Carson Valley” was completed in June 2010 and provides background economic information on developing a reasonable range of dollar values to assess this as an option. The report is available at www.cwsd.org.

Selection of Hydrologic Method and Hydraulic Model for the Carson River Watershed

CWSD, NDEP and all of the counties in the watershed, selected the HEC-RAS model (steady and unsteady state) for the hydrologic method and hydraulic model for the Carson River Watershed. The primary goals of this project are to:

- Establish hydrologic method to estimate rainfall, calculated peak flows, discharge volume and timing for region
- Establish what type of hydraulic model would be most appropriate
- Validate LiDAR dataset (Completed May 2010, see Section 7.3.5 of this report.)
- Prepare a report documenting the committee findings

In October 2011 HDR Engineering developed the *Hydraulic Modeling and Floodplain Mapping Guidelines for the Carson River*, a report and guidance document for the preferred modeling process. Funding and support was provided by NDEP and CWSD.

LiDAR Imaging of Churchill County, NV

LIDAR was flown during the fall of 2011 and winter of 2012, when the canals were empty. The project covered the Irrigation District from Lahontan Dam to the Stillwater Refuge and down to Carson Lake Pasture. The data was used to model various scenarios where a canal breach occurred, and the area impacted. The modeling was conducted by USACE (United States Army Corp of Engineers). The data was collected at a resolution that allowed for creation of 1 Foot contours. The project is considered completed, and there are no further use of the data is planned at this time; however, that could change as other ideas for the data’s use are brought forward. The data is available by contacting Churchill County Planning Department. It may also be downloaded from a Federal Government web site, just not sure which one (Preston Denney 2014, personal comments).

LiDAR Imaging of Carson Valley, Douglas County, NV and Alpine County, CA

In order to more accurately model the Douglas County portion of the FEMA MAS project, it was necessary to obtain updated topographic data for the entire river corridor throughout the County.

With NDEP funding through Section 106 of the Clean Water Act, CWSD procured LiDAR imaging for the Carson Valley in September 2012. This project is part of an overall effort to manage and protect the Carson River floodplain from Alpine County, CA to Lyon County, NV. CWSD contracted HDR Engineering (HDR) and GeoDigital International (GeoDigital) to collect and process aerial based LiDAR information.

The primary goals of the LiDAR Collection Project for the Carson Valley were as follows:

1. Collection of topographic data of the floodplain to support ongoing modeling and mapping of the Carson River Watershed.
2. Provision of sound, up-to-date data for any future floodplain projects in the study area.
3. Provision for “all returns” information on vegetation and structures, which may also prove useful for a multitude of other studies.
4. Utilization of this information to assist in the creation of appropriate policies that provide for the protection and maintenance of the Carson River floodplain and align with the goals espoused in the Floodplain Management Plan that each county in the Watershed adopted. This data is being used to inform the model and mapping for MAS 3 and 4 discussed below.

Floodplain Protection Inventory for the Carson River (Cobourn and Lewis 2015)

UNCE in conjunction with Carson City and Douglas and Lyon Counties created a baseline floodplain protection map documenting areas protected within the mapped floodplain located in their respective areas.

Study Objectives were to:

- Calculate the 100-year floodplain acres in each county and collectively
- Calculate the “protected” 100-year floodplain acres in each county and collectively
- Determine the percentage of “protected” floodplain compared to total floodplain acres
- Establish these data as benchmarks to be used to compare with future research and land use changes on the Carson River floodplains

For the purpose of this inventory, “protected floodplain” refers to land that is either publically owned or privately owned and not likely to be developed. The “protected” parcels include:

- Publically owned open space and parks — by federal, state, county, city, or general improvement district agencies
- Privately owned lands — with a conservation easement and/or development restrictions (including those small parcels in Douglas County’s Transfer of Development Rights Program)
- Privately owned open space — by homeowner associations (common areas)

The map will be used to inform both policy makers and watershed citizens of the floodplain protection status and will be updated approximately every 5 years. The table below provides the baseline results.

Table 8.9 Acres and percent of protected and unprotected riverine floodplain in Douglas County, Carson City and Lyon County within the Carson River Watershed as of 2015

County	Protected Floodplain Acreage	% Protected Floodplain	Unprotected Floodplain Acreage	% Unprotected Floodplain	Total Riverine Floodplain Acreage
Douglas	6,009	23%	20,182	77%	26,191
Carson	903	36%	1,588	64%	2,491
Lyon	5,403	48%	5,794	52%	11,197
Total	12,315	31%	27,564	69%	39,879

The full publication including maps is available at the following link:
<https://www.unce.unr.edu/publications/files/nr/2015/sp1505.pdf>

The Nature Conservancy's River Fork Ranch/Whit Hall

In 2000, the Conservancy secured the long-term protection of key wetland, meadow and riparian habitats along a two-mile section of the by purchasing the River Fork Ranch (RFR). RFR permanently protects more than 800 acres of floodplain at the confluence of the East and West Forks of the Carson River near Genoa, NV. The Ranch is both a nature preserve and a working cattle operation. The ranch's riparian corridor and patchwork of pastures, meadows and wetlands support a robust and diverse wildlife population including bald eagles, sandhill cranes, leopard frogs, monarch butterflies and mule deer. The Whit Hall Interpretive Center located on RFR is the hub of the Nature Conservancy's community outreach and education efforts along the Carson River. The Whit Hall Interpretive Center is open for school visits and other scheduled events and activities throughout the year. For its holistic approach to design, construction and operations, The Nature Conservancy's Whit Hall Interpretive Center was awarded Platinum certification in *Leadership in Energy and Environmental Design* (LEED®) by the U.S. Green Building Council. Follow this link to learn more about The Nature Conservancy's RFR:
<http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/nevada/placesweprotect/river-fork-ranch.xml>

8.2.2 Current Floodplain Conservation Projects

Floodplain Outreach Campaign

The CRC River Corridor working group is participating in Northern NV flood awareness and floodplain protection outreach campaign. A variety of methods are being employed ranging from a website (www.NevadaFloods.org) to brochures, posters, school flyers, newspaper and newsletter articles, library displays and fact sheets. Funding is also being used to provide television public service announcements, billboards, bus billboards, reader boards, etc. The first Flood Awareness Week was November 10-15, 2014 and the second November 1-7, 2015. Funders include NDWR, USACE, CWSD, FEMA and NDEM, and in-kind staff time for planning meetings and events from federal, state, and local governments and other local entities, including Truckee River Flood Project, Truckee Meadows Water Authority, and local general improvement districts.

***Lyon County, Carson City, Douglas County, NV and a portion of Alpine County, CA
Floodplain Modeling and Physical Map Revision Projects through FEMA Mapping Activity
Statements***

The current flood insurance rate maps (FIRMs) are based on data collected in the 1980's and do not reflect the current condition. CWSD has obtained funding from FEMA to complete Mapping Activity Statement Projects (MAS) 1, 2, 3, and 4. These MAS projects will complete a comprehensive, multi-phase, Physical Map Revision (PMR) for the 1-percent-annual-chance (1-percent) and 0.2-percent-annual-chance (0.2-percent) floodplains. This effort is following FEMA guidelines and specifications and includes an unsteady state HEC- RAS hydraulics model of the river corridor to map floodplains and assess cumulative impacts due to land use changes or floodplain development. HDR Engineering Inc. and R.O. Anderson have been contracted to support this effort. Detailed hydrology and a hydraulic model will be developed for approximately 87 miles of the Carson River beginning at Lahontan Reservoir and extending to just beyond the NV Stateline into Alpine County, CA including 9 miles for the Cottonwood and Martin Sloughs. Lyon County and Carson City (MAS 1 and 2 respectively) project maps are finalized and submitted to FEMA and will be used to update the FIRM. FEMA provided funding to the CWSD for the Douglas and Alpine County portions of the FEMA MAS Project (MAS 3 & 4). MAS 3 funding is for the surveying of structures and the modeling of the area. Actually mapping will be completed during the fourth phase (MAS 4). These flood modeling and mapping projects will ultimately assist in the watershed wide planning and mitigation of the cumulative impacts of urban development in our riverine flood zones. The entire project MAS 1-4 is expected to be completed in 2017.

Ducks Unlimited, Inc.'s Lahontan Valley-Western Nevada Program

In March 2014, Ducks Unlimited, Inc.'s (DU) Western Regional Office in Rancho Cordova, California was awarded its first North American Wetlands Conservation Act (NAWCA) grant to conduct wetland conservation work in its Lahontan Valley – Western Nevada focus area. Much of the landscape in this DU focus area is within the Carson River watershed which drains to the Carson Sink in Lahontan Valley. Waterfowl biologists have long known that this area is important to North America's waterfowl, with the 2012 *North American Waterfowl Management Plan* update identifying it as one of 43 areas of greatest continental significance to North American ducks, geese, and swan. Lahontan Valley is also designated a Western Hemisphere Shorebird Reserve Network site due to the abundance of migrating shorebirds it supports; the region also supports large numbers of waterbirds.

DU's work here focuses on assisting agency and private landowners with wetland restoration and enhancement work including engineering design and construction of projects to construct new or rebuild existing wetlands management-related infrastructure. This can include improving existing water delivery and wetland management facilities, replacing existing and installing new water control structures, and developing other water conservation facilities to assist project partners in making more efficient use their limited water resources to achieve higher functional wetland habitat conditions in this continentally important region. Since 2014, DU has assisted Stillwater National Wildlife Refuge with projects at the Refuge, Nevada Department of Wildlife with work at Carson Lake and Pasture, Fallon Paiute-Shoshone Tribe with work at the Tribal Wetlands, Carson City Department of Parks, Recreation, and Open Space with work at its Buzzy's Ranch property, and The Nature Conservancy with work at its River Fork Ranch. DU

plans to submit a second NAWCA grant application in 2018 to obtain additional funding to continue its wetland conservation work in the region. To learn more about DU's work in Nevada, follow this link: <http://www.ducks.org/nevada/nevada-conservation-projects/nevada-conservation-projects>.

8.2.3 Recommendations for Future Management Measures Update

See Proposed Project Tables by County 8.3, Washoe Tribe 8.6, Fallon Paiute-Shoshone Tribe 8.7 and Suggested Actions Table 8.8.

8.3 Water Quantity

See Project Tables 8.3 – 8.8.

8.3.2 Completed Water Quantity Projects since 2007.

See Completed Project Table 8.5.

We have provided a description of some of the completed work since 2007. Also See Tables 8.5 and 8.7.

Regional Water System Updates

Since 2007, Vidler Water Company has installed several water lines in the Mound House and Dayton areas. These water lines will transport water through the Mound House and Dayton to meet future growth in the areas.

In 2009, Douglas County, Town of Minden, Indian Hills GID, Carson City, and CWSD enter into agreements to construct a pipeline that will move water from the Town of Minden north to meet Douglas County, Indian Hills GID, and Carson City water needs. Carson City also installed several water lines that enhance the movement of its water through the service area and water to the Lyon County.

Newlands Water Rights Purchase Program – AB 380

CWSD's AB 380 program was completed in 2007. Approximately 4500 acres of water rights were purchased and retired. The program did not achieve the goal of retiring 6500 acres of water rights; and the program was transferred to Great Basin Land and Water as the Newlands Project Water Rights Compensation Program. This program ended on June 30, 2014 and was able to secure approximately 200 acres of water rights (Rob Scanland pers. coms. 2014).

Marlette Hobart Water System Improvement Project

In 2009, the upgrades to the Marlette Lake water system were completed. Carson City and the State of Nevada are currently evaluating other improvements that can be done to the system that will enhance the amount of that can be diverted from the Marlette/Hobart system into Carson City.

Carson Clear Water Revival

The Carson River's water quality is threatened by continued inputs of sediment and nutrients resulting from human activities. This project proposed to aid in the reduction of NPS pollution through the implementation of community based education, hands-on training, and implementation of best management practices (BMPs) on private and commercial properties in Carson City. The integrated components of the program included: a) community outreach campaign utilizing local media sources and businesses; b) technical assistance and hands-on training for permanent BMPs for property owners; c) training for county staff, conservation districts and other interested stakeholders on the design and implementation of BMPs; d) development of educational material and workshop handbook with useful information on such topics as NPS pollution, floodplains, and tips on how to build on and/or landscape properties in ways that save water, reduce run-off and help protect from fire and flooding; e) monitoring of implemented projects; and f) evaluation of program effectiveness for possible expansion into other areas of the watershed. A grant was provided by the Nevada Nonpoint Source 319(h) management program to CWSD. Partners included Carson City Stormwater/Floodplain Program, CWSD, Nevada Tahoe Conservation District, UNCE, and the Nevada Fire Safe Council. The project began May 1, 2009. A final report, completed September 27, 2013, is available on www.cwsd.org.

Comprehensive Regional Water System Plan

In 2010, CWSD received a grant from the Bureau of Reclamation to develop a regional water system plan. RCI, Inc. was hired and completed the plan in August 2013. The plan evaluates future water demands and how these new demands can be met by minimizing the impact on the environment and agriculture. Changes to the runoff patterns and flows in the Carson River caused by climate change were evaluated and how these changes impact the current water supply now and in the future were shown. The plan reviewed some basic data related to available water rights in the hydrologic basins as determined by the State Engineer. This information was used to determine how much reliable water is available on a long-term basis in different areas of the Watershed. The feasibility of developing water markets and leasing programs that could enhance stream flows was also assessed. The plan is available at www.cwsd.org.

Regional Water Conservation Plan Carson River Watershed Report 2013

Effective use of our limited water resources is imperative for maintaining a healthy Watershed and the 2013 report focuses on municipal water conservation programs as a way of enhancing our water resources. The report is available at www.cwsd.org.

Carson Basin Reuse Management Plan Update

The Carson Basin Reuse Management Plan was completed in 2009. The plan identified where reuse water occurs and how future supplies may be used. The plan identified that reuse water could be and option to enhance the stream flows throughout the watershed, but the expense to treat the reuse to the level to meet the river water quality standards is not economically feasible at this time.

Carson River Basin Planning Tool Update

This project morphed into the FEMA Flood Modeling and Mapping Projects. See Section 8.2.2 above.

Alpine County Groundwater Management Plan Update

Alpine County hired Brown and Caldwell by to complete the Alpine County Groundwater Management Plan, their first comprehensive water resource planning tool in 2007. This GWMP: 1) documents existing groundwater conditions, management policies and procedures; 2) provides a framework for the County and other water users to implement effective water resource management programs, including related surface water resources; 3) presents a number of recommended actions that would result in achieving sustainable groundwater supplies (the first action under the GWMP would be the development of a groundwater monitoring program); and 4) is consistent with the water resource elements provided in the County's General Plan (Appendix A). Go to http://www.water.ca.gov/groundwater/docs/GWMP/NL-1_AlpineCounty_GWMP_2007.pdf.

8.3.2 Current Water Quantity Projects

USBR Plan of Study and Carson River Basin Study

The Carson River Basin is particularly vulnerable to potential climate change due to several factors. Projected climate changes are anticipated to result in reduced precipitation, warmer conditions, and earlier snowpack melt. With virtually no reservoir capacity in the upper Carson River Basin, nearly all “storage” is in the form of snow pack. With high variations in snow pack from year to year, there is a high degree of uncertainty in water supply reliability. In addition, groundwater is an important water supply source in some areas of the Carson Basin. Like the Carson River itself, all of the groundwater basins adjacent to the Carson River are fully appropriated or in some cases over-appropriated. Groundwater accretions and depletions to and from the Carson River are thought to be highly dependent on the Carson River and reduced flows in the Carson River may negatively impact groundwater basins. During preparation of the Plan of Study, CWSD and Reclamation will collaborate to develop a detailed work program which will address the legislative requirements for basin studies as well as the additional Study elements desired by the CWSD which can reasonably be developed with the Basin Study. The Plan of Study will provide a detailed roadmap for developing the various chapters of the Basin Study investigation as well as a detailed budget and schedule for completing the Basin Study within the required timeframe. The Basin Study was placed on hold to wait for the completion of the DRI/UNR Water for the Seasons study. The Water for the Seasons will provide background information that will be incorporated into the Basin Study. The Basin Study will start sometime in 2018 and completed in 2020.

Water for the Seasons – Sustaining Water and Climate Resiliency in the Truckee-Carson River System

Water for the Seasons is a program that partners scientists with community water managers and water right holders in the Truckee-Carson River System (TCRS), to explore new strategies and solutions for dealing with extreme climate events such as droughts and floods. This for year study is funded by the National Science Foundation and the U.S. Department of Agriculture, and uses TCRS in a pilot study to learn how to best link science with decision-making in snow-fed arid-land river systems. By working collaboratively with stakeholders, Water for the Seasons aims to create a model for improving community climate resiliency, or ability to adapt to extreme climate conditions. Partners include University of Nevada, Reno, CWSD, USGS, TNC,

USFWS, CVCD, Washoe Tribe of NV and CA, and FPST. For more information go to: <http://waterfortheseasons.com/> or contact Loretta Singletary, University of Nevada, Reno – singletaryl@unce.unr.edu.

8.3.3 Recommendations for Future Management Actions and Corresponding Measures

High Water Use Period Analysis and Future Supply Plan

In order to fully develop a solid basis for the needs of the region for water, each system needs to be fully evaluated to determine realistic actual available supply during high use periods, including an analysis of supplies that require treatment or are kept solely for emergency backup. The determination of realistic existing supply capacity and limitations in supply capacity in areas of the Watershed will help to focus the discussion on where the supply for future needs can realistically come from. Once the source of supply is determined a plan can be developed to transport, store, and use that supply.

Watershed Water Balance Report

As part of the management of the Watershed a water balance for the Watershed will need to be developed. This would include the annual groundwater recharge of the various basins, the current groundwater pumping, decreed surface water and averaged actual river/stream flows, effluent return, etc. These inputs would be utilized to determine the available water in specific areas of the Watershed, which areas need water, and which areas have excess water on a Watershed basis.

Water Supply Outreach and Education Program:

Need to continue ongoing work to educate water users and water purveyors of the need to expand to water conservation method as a means to manage our water resources. Additional outreach to continue to educate the surface and ground water users in the Watershed on the impacts of climate change on water use patterns and work to develop a plan for dealing with those impacts before they occur.

Carson River Segment Evaluation and Management Plan

Further research and development of a viable plan to manage water between segments of the Carson River is a significant task that will need to be evaluated and undertaken as part of an overall Watershed management system/plan.

Water Banking and Leasing Programs

Conduct further research and develop a viable Water Banking and Water Leasing program along the Carson River as part of the overall Watershed management.

See Proposed Project Tables by County 8.3, Washoe Tribe 8.6, Fallon Paiute-Shoshone Tribe 8.7 and Suggested Actions Table 8.8 for additional recommended future management measures.

8.4 Outreach and Education

See Project Tables 8.3 – 8.8.

During 2012 the CRC Education Working Group revised the vision to:

Vision:

A Carson River Watershed community that believes their behavior impacts watershed-wellness and applies their knowledge to act in ways that benefit the Watershed as a whole.

8.4.1 Completed Outreach and Education Projects

Carson River Report

This monthly public access television program was concluded in January of 2009. CWSD has done sporadic shows, recording two in 2012.

Clear Creek Watershed Signs at Fuji Park



In cooperation with Carson City Parks and Recreation, NRCS, NDEP, the Clear Creek Watershed Council has developed eight educational signs to place along the creek path in Carson City's Fuji Park and Baily Pond. The signs provide information regarding NPS pollution and the importance of protecting the creek's riparian zone. Installation of the first four signs was completed in 2010, with the last four signs installed in the early 2014.

NEMO Nevada - Nonpoint Education for Municipal Officials -Protecting water quality through community planning.

NEMO Nevada is an educational program for land use decision-makers addressing the relationship between land-use and water resource protection. As our community continues to grow, the rapid rate of construction and development can have negative impacts on our natural resources, including water quality and quantity.

The NEMO Nevada program was designed to provide education and technical assistance to land use decision-makers, including planning commissioners and staff, citizen and neighborhood advisory board members, and other advisory groups. With appropriate planning, we can effectively decrease the need for best management practices to mitigate development impacts. This saves the community from expensive retrofits and maintenance projects.

This program is a collaborative effort of several agencies, led by University of Nevada Cooperative Extension. It is modeled after the highly successful NEMO program of the University of Connecticut Cooperative Extension. The NEMO network includes 33 states across the United States. UNCE brought the program to the Truckee Meadows and expanded it into the Carson River Watershed. This program ended in December 2013 due to UNCE's downsizing. The Carson Water Subconservancy District is looking at alternative options for continuing this type of programing as it was very successful.

Keep Streamsides Greener, Keep Water Cleaner Video Contest & Carson River Film Festival

From 2009 to 2012, the Carson River video contest for local high school students was held with the goal of increasing awareness of protecting riparian areas. Students were asked to create a short video or slideshow using the themed/specified criteria. The videos were available for viewing on YouTube.com. The winners were selected by a panel of expert judges using various categories and prizes for the most viewed on Youtube.com and popular vote were awarded. These awards were presented at a Carson River Film Festival typically held in January or February, where friends and family gathered to view the videos. Cash prizes were possible due to a generous contribution by a private donor to the Carson River Coalition to promote education about the Carson River Watershed. The program film festival was part of the NEMO Nevada program coordinated by the University of Nevada, Cooperative Extension in conjunction with the CRC Education Working Group. Due to changes in local school art budgets and low entries, the video contest was discontinued after 2012.



Watershed Education at Various Events

CWSD staff and our contractors often attend and create displays at a variety of outreach events throughout the watershed. Our aim is to promote watershed awareness and stimulate stewardship action. Events such as The Green Living Festival, Eagles and Ag, Earth Day, NV Day Parade, and other local community festivals help us get the word out about NPS, and integrated watershed management processes. Library display cases are used annually to promote flood awareness, floodplain protection, and invasive species issues.



2010 High Sierra Carson River Workshop

The Nature Conservancy (TNC) resurrected a workshop that had been conducted by the USFS and local educators for many years. The first of the revitalized workshop was held in June 2010. During the eight-day workshop, students are provided the opportunity to connect with nature through hands-on learning. The workshop begins with four days in Carson Valley in the TNC Whit Hall Interpretive Center at River Fork Ranch and then for four days in the high reaches of the Carson-Iceberg Wilderness area. The workshop is for high school students. A variety of organizations provided learning and facilitation including UNCE, NDEP, USFS and Great Basin Sports.

Carson River Conservation Tours



The CRC Education Working Group received a grant from NDEP for the development of conservation tours (administrated by the CWSD). This project is part of the existing “Explore Your Watershed” program and will include a variety of environmental conservation tours (rafting/kayaking/streamside) that advocate pollution prevention, best management practices, and low impact development. The target audiences for the tours are our leaders and future leaders, including policy makers, youth, environmental clubs, and under-served minorities. The main goal of the project is to foster awareness of sustainable practices and facilitate a change in behavior by providing an opportunity for hands-on experiencing of the river. This program conducted tours between April 1, 2010 and December 31, 2014 and includes the Stillwater Wonders of Wetland Workshop, Carson River kayaks and raft tours, streamside learning, and tribal tours. Due to drought conditions and the closure of Great Basin Sports (our contractor), CWSD ended this program in 2014 and rolled some elements into the current Watershed-Literacy Program and Watershed Coordination Program.

8.4.1 Current Outreach and Education Programs/Projects – Update

Carson River Watershed/CRC Coordination Program:

CWSD is responsible for administering and implementing the ongoing Carson River Watershed and Carson River Coalition Coordination Program. The primary goal of the Carson River Watershed Coordination Program is to oversee and coordinate the Integrated Watershed Planning Process (IWPP) to improve water quality within the Carson River Watershed. The Program coordinates with public and private entities' and their efforts to restore, conserve, plan, and manage the natural and water resources within the Carson River Watershed. Program responsibilities include: 1) establishing and maintaining effective communication among stakeholder groups involved in the IWPP; 2) coordinating and facilitating Carson River Coalition (CRC) and associated working group activities; 3) working with stakeholders to implement the Carson River Watershed Stewardship and the Regional Floodplain Management Plans; 4) implementing projects and programs that develop a higher level of watershed awareness within the general public (including the Youth Environmental Education and Watershed-Literacy Programs); and 5) working with conservation districts and watershed groups to secure and administer funding for projects and programs (All program categories including Water Quality, Water Supply, River Rehabilitation and habitat restoration, Floodplain Management, Invasive Species Management, Recreation enhancement, Outreach and Education and other regional level administration and coordination.

The Carson River Coalition (CRC) serves as the steering committee for the integrated watershed planning process (IWPP). Participants in the CRC include private individuals; local, state and federal agencies; tribal governments; and citizen-driven groups. These coordination efforts bring together these diverse interests and considers the watershed as a whole when making decisions. The focus is to improve management of watershed resources long-term while addressing the diverse needs and concerns of all stakeholders. The CRC's initial steps developed a Carson River Watershed vision statement and guiding principles. The vision and guiding principles were adopted by five counties and approximately 20 agencies and organizations within the watershed. They are the back bone of the [Carson River Watershed Adaptive Stewardship Plan](#) completed by the CRC in 2007 and are actively championed by the CRC today. CRC working groups are established to address specific programs. The [CRC's Education Working Group](#) and the [River Corridor Working Group](#) meet regularly, where other working groups meet less frequently. The CRC holds bi-annual public meetings and forum events where stakeholders can exchange information about projects and programs being conducted throughout the watershed. These events provide stakeholders an opportunity to highlight their projects, and discuss watershed-wide benefits. Past forum power points and CRC Working Group meeting notes are available [here](#).

Carson River Snap Shot Day

Snap Shot Day continues to be a successful annual outreach event on the Carson River. October 2016 marked the 11th year that the CRC Education working group has organized the event. Data and other information are being compiled into a report that will be available at www.cwsd.org.

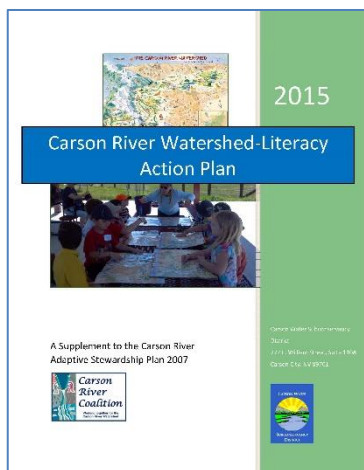


Get on the Bus Watershed Tours

“Get on the Bus Carson River Watershed Tours” were instituted by CWSD as another way to experience and learn about the hydrology, history, ecology, and conservation of the Carson River. The tour consists of two segments; the Upper Watershed tour covers Alpine County, California and Douglas County, Nevada, while the Middle and Lower Watershed tour includes Carson City, Lyon and Churchill Counties in Nevada. Each segment includes a day trip to explore the area. In the course of a day, each participant learns about various aspects of the watershed through speakers, videos, and on-the-ground experience. Conducted annually, these ongoing tours serve as a popular and positive outreach tool.

CRC Forums and Meetings

CWSD hosts semi-annual CRC forums and meetings where members of the CRC have an opportunity to present the work they are doing in a one-day conference setting. Topics include Water Quality, Floodplain Management, Environmental Education, Invasive Species, Water Supply, and riparian restoration and habitat issues. These events highlight the integrative watershed planning and management process and offer participants a means to share their work with the watershed community.



Watershed-Literacy Action Plan

In 2014, CWSD has received partial funding from NDEP 319 Grant Program to develop an Education and Outreach Action Plan for the Carson River Watershed. The action plan integrates the work conducted by the CRC Education Working Group workshops in 2012-2013, the EPA's Getting In Step Guide, and the Social Indicators Planning and Evaluation System (SIPES) developed in the EPA's Midwest region. The plan outlines our target audiences, provide consistent messaging to specific audiences, determine key actions, and monitor for effectiveness on a watershed scale. This plan is a supplemental document to the Adaptive Stewardship Plan and was completed and approved April 2015.

Watershed-Literacy Survey

In 2014, CWSD received partial funding from NDEP 319 Grant Program to develop and conduct a baseline survey of watershed residents to determine the general knowledge of watershed issues specifically related to NPS pollution. The study was conducted in June 2015 and determined 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, ages 18 and older. Responsive Management, CWSD and the CRC Education Working Group cooperatively developed the telephone survey questionnaire. Responsive Management obtained a total of 846 completed interviews with Carson River Watershed residents, ages 18 years old and older. The sample was representative of residents from six counties which fall within the Carson River Watershed:

- Alpine County, California
- Carson City, Nevada (independent city)
- Churchill County, Nevada
- Douglas County, Nevada
- Lyon County, Nevada
- Storey County, Nevada

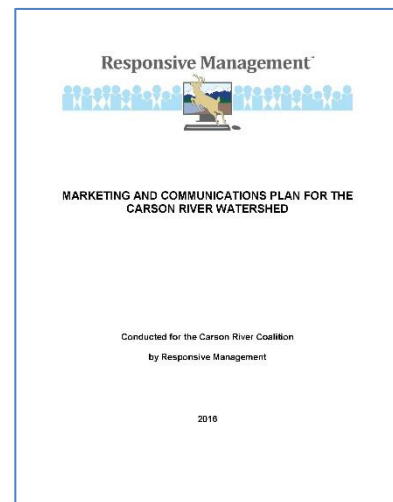
For the survey, telephones were selected as the preferred sampling medium because of the almost universal ownership of telephones among Carson River Watershed residents (both landlines and cell phones were called). The software used for data collection was Questionnaire Programming Language. The analysis of data was performed using Statistical Package for the Social Sciences as well as proprietary software developed by Responsive Management. A copy of the survey results can be found here <http://www.cwsd.org/wp-content/uploads/2016/07/2015-Watershed-Report-and-additional-Graphs.pdf>.

Watershed-Literacy Marketing and Communications Plan

In 2016, CWSD received partial funding from NDEP to further analyze the Watershed-Literacy Survey to synthesize the Watershed-Literacy survey results into a marketing/communications strategy that

- further identified, defined and prioritized audiences;
- Identified omissions/gaps in knowledge;
- Developed key messages for desired behaviors per topic/audience;
- Identified effective message delivery methods per audience and topic; and provided
- Strategically focused, communication recommendations for future outreach and programing.

The marketing and communications plan is intended as a planning strategy that CRC will use to inform planning and campaigns to develop more effective means of outreach. The level of implementation will be dictated by funding, priorities, and encumbrances.



Youth Environmental Education Program



The Carson River Watershed Environmental Education program provides educational workshops, classroom sessions, and field trips to the river to local school and youth organizations in Alpine County, CA and Douglas, Carson City, Lyon, Storey and Churchill Counties. The contractor, River Wranglers, works closely with the Carson River Coalition's (CRC) Education Working Group and member organizations/entities to implement a comprehensive environmental education program that engages students and educators. This is an on-going program

(since 2004) that has reached over 1000 youths annually. It is partially funded by a NDEP 319 Grant and matched with CWSD's Conserve Carson River Workdays funding.

8.4.3 Recommendations for Future Management Measures Update

See Proposed Project Tables by County 8.3, Washoe Tribe 8.6, Fallon Paiute-Shoshone Tribe 8.7 and Suggested Actions Table 8.8.

8.5 Invasive Species Management and Prevention

See Project Tables 8.3 – 8.8.

The 2007 plan addresses noxious weed management and abatement only. This update considers nuisance weeds (invasive terrestrial weeds not listed as noxious), aquatic invasive species

(quagga mussels, Eurasian milfoil, etc.) and forest pests (e.g. bark beetles, root and needle diseases, etc.). The CRC coordinates and meets regularly with invasive species stakeholders to address existing and proposed threats from noxious weeds, nuisance weeds, and aquatic invasive species. Coordination efforts include attending watershed CWMA meetings, hosting forums and watershed wide meetings, and administering CWSD funding for Noxious weeds and invasive species in general. Details on some programs are outlined below:

8.5.1 Completed Invasive Species Projects Update

Carson River Watershed Noxious Weed Forum

The CRC organized and hosted this event in 2008. The forum brought the groups throughout the watershed together in one room to share ideas and challenges. In 2012 and 2014, CWSD included invasive species issues into its overall Watershed Forum. Providing the opportunity for invasive species issues to be discussed on a watershed basis has been invaluable.

Aquatic Invasive Species

Aquatic invasive species (AIS) threaten the diversity and abundance of native species and natural communities, water quality, ecological stability, and municipal,



agricultural and recreational opportunities. Once waters are infested with these species it is extremely difficult and expensive to alleviate, making prevention the main goal for the Carson River system. On CRC held the first aquatic invasive species forum in June 2010 aimed at developing a proactive approach to this issue. Participants on the forum panel include BOR, USFWS, CA Fish and Game, Nevada Department of Wildlife and Tahoe Resource Conservation District. Lahontan Reservoir is

currently on the watch list for Quagga mussels and active boat inspections started in 2013. Quagga veligers (microscopic larvae) were detected in Lahontan Reservoir in April 2011; however, no veliger, juvenile or adult quagga mussels have been detected during annual testing to date. It may be 4-5 years from detection before suspect results status is removed from Lahontan Reservoir. Other aquatic invasive species of concern include **Eurasian Milfoil, New Zealand mud snails, and Zebra mussels**. For a full list of species see [NAC 503.072 Injurious Aquatic Species and NAC 503.074](#)). Additionally, New Zealand mud snails have been found in the Truckee River in Reno. Preventing this species from entering the Carson River through the Truckee/Carson Canal may not be possible (Karen Vargas, pers. coms 2014); however, the focus will be to limit the spread upstream of Lahontan and through other means such as fishing gear. Public service messages are

AB 167: Nevada's Aquatic Invasive Species Bill

Passed Legislature and Signed by Governor in 2011

Bill Included

- Penalties for Introducing AIS into Nevada's Waters
- Provides for an Annual AIS "Decal" for Motorized & Non-Motorized Watercraft
- Authority for Watercraft Inspection and Decontaminations

NAC 503.110

- Illegal to import, transport or possess live quagga/zebra mussels

NRS 503.597(1)

- "...It is unlawful...for any person at anytime to receive, bring or have brought or shipped into this State, or remove from one stream or body of water...to any other, or from one portion of the State or any other, or to any other state, any aquatic life of wildlife, or any spawn, eggs or young of such species."

slated to occur; however, a method for limiting the spread to the Carson River or if not possible, upstream of the Carson River, has yet to be determined.

Forest Pest Conditions in Nevada 2013

The Nevada Division of Forestry released a report that documents the status of forest pest conditions throughout Nevada. The report focuses on the impacts of insects, diseases, and weather on various tree species. See link at: <http://forestry.nv.gov>.

American Recovery and Reinvestment Act of 2009 – Carson River Stream Bank Restoration and Stabilization Project

The project was awarded \$627,660 in 2009 by the US Forest Service's State and Private Forestry Program through a grant by the NDOA for Fuels Reduction and Habitat Restoration projects. One of the main goals of the program is to put people to work. Work was completed from 2009 to 2011. This program made a significant impact on noxious weed infestations throughout the watershed. Having crews available to do the on-the-ground work was essential. Table 8.5-1 outlines the accomplishments of this grant to on-the-ground efforts. Partners include: USFS, NDOA, CWSD, CRC, Carson Valley Conservation District, Douglas County Weed Control District, Carson City Weed Coalition, Dayton Valley Conservation District, Churchill County Mosquito and Weed Abatement District, Lahontan Conservation District and Western Nevada RC&D.

Table 8.10: ARRA Noxious Weed Management Activities per County

Location	Acres Treated/Fuels Reduced	Acres Cleared	Acres reseeded or planted	# Seasonal Positions Created	Number of Permanent Positions Created
Carson City Area *	900	0	0	4	0
Churchill County	435	350	10	13	1
Lyon County/Storey County	7500	60	60	12	0
Douglas County**	300	100	10	28	2
Total for ARRA 2012	9135	510	80	57	3

*900 acres indicate more than one treatment action on some sites (one or two visits to mechanically cut and then return to treat chemically). This number represents the total acres on which work was completed. The actual number of acres if you count each site only once is about 280.

**Additionally, seven seasonal positions have been retained.

Noxious Weed Mapping

The Nevada Natural Heritage Program had been responsible for obtaining data from the Cooperative Weed Management Area (CWMAs) groups and developing GIS maps. However, due to lack of funding, this has been discontinued. The Nevada Department of Agriculture is currently in the process of taking over this aspect of weed management and is working with a group of stakeholders to develop mapping protocols and criteria that CWMAs can use. The Carson River watershed will be the pilot program for the new program. It is the desire of the NDOA and partners to have a mapping program that is easy and inexpensive for the CWMA's to use. Hands-on training for the CWMAs will be provided. The program development team

includes partners from NDOA, BLM, Nevada Division of Forestry, Audubon Important Bird Areas Program, CWSD/CRC, Washoe-Storey Conservation District, Smith and Walker Conservation District and Storey County.

Additionally, NDOA is currently promoting the use of EDDMaps. This on-line application is a useful tool for all Nevadan's to use as it can be downloaded to your smartphone. More information on EDDMaps can be found at www.eddmaps.org/.

Carson City Weed Track and Attack

Held in 2009 this event was organized by the Carson City Weed Coalition. The goal of the event was to learn orienteering, GPSing, and noxious weed identification. Partners include UNCE, NDEP, CWSD, and Audubon Nevada Important Bird Areas Program.

Churchill County “Weeding Through the Invasive Plant Issue” Mass Mailing

Due to a concern by local leaders about the effect invasive weed infestations are having in Fallon and Churchill County a fact sheet was developed by the Churchill County Cooperative Weed Management Area. The fact sheet was mass mailed to residents throughout Fallon and Churchill County in 2010. Residents were asked to report infestations to the weed hotline and were provided information on how to gain assistance or find out more information.



Aquatic Invasive Species Brochure and Signage

CWSD helped fund a statewide “Don’t Move A Mussel” educational brochure to help increase the awareness of aquatic invasive species and what the public can do to stop their spread. These brochures are used at events throughout the watershed.

Nevada State Parks Motorized Trail Grant – Invasive Species Signage

The Carson Water Subconservancy District (CWSD), in partnership with Carson City, Churchill County, and the Nevada Department of Agriculture (NDA) initiated a pilot project to conduct outreach and implement a mitigation-measures to reduce the impacts of invasive species on motorized trails in selected areas in the Carson River Watershed. This project targeted the vehicles of motorized trail users as a weed vector. Prevention is the most cost-effective form of weed control, also the first step toward behavioral change is awareness. CWSD in partnership with Churchill County and Carson City, designed and installed educational signs to instill knowledge of the spread of invasive species, and raise the awareness of motorized recreational users in the watershed. These signs show how weeds spread and provides steps that motorist can use to limit their impact.



8.5.2 Current Invasive Species Projects Update

BLM Cost Share Grant

CWSD has partnered with the BLM on a BLM Cost Share Grant. The Carson River Watershed encompasses roughly 3,966 square miles, or **2,500,000 + acres**, of which, 977, 548 acres

comprise BLM land. The management of these lands is critically important to keep noxious weed vectors from affecting agricultural and other lands within the five counties that comprise Nevada's and California's portions of the Carson River Watershed. Funding from this proposal will assist BLM's Carson City District with additional resources from the CWSD and participating CWMAs to treat weeds in and around BLM lands to reduce the spread of noxious weeds from BLM lands to public, state and private lands within the watershed. This grant agreement is for \$37,500 with a one to one match from CWSD and our partners. The current agreement ends in 2021, but can be renewed.

National Fish and Wildlife Foundation Grant (NFWF)

CWSD obtained funding from NFWF. The project joins local governments, conservation districts, cooperative weed management areas, local non-profits, federal and state agencies, tribal members, and private landowners to provide critical invasive species management across jurisdictional boundaries, coupled with a variety of education and outreach efforts to inform watershed residents on the importance of controlling invasive species. The grant period ends ?.

8.5.3 Recommendations for Future Management Measures Update

See Proposed Project Tables by County 8.3, Washoe Tribe 8.6, Fallon Paiute-Shoshone Tribe 8.7 and Suggested Actions Table 8.8.

8.6 Recreational Use and Management Update

See Project Tables 8.3 – 8.8.

8.6.1 Completed Recreational Use and Management Projects Update

Carson City Urban Fishing Pond at Fuji Park

This project includes a one-acre pond, boulders, and shoreline fishery habitat, wetlands, water quality detention basin, split-rail and livestock fencing, decomposed granite trails around the pond, a concrete sidewalk and a disabled floating pier for fishing. The project was completed in May 2010 and is open for public use. NDEP and CWSD provided funding for the design and implementation of best management practices (BMPs) and water quality treatment improvements.

Carson River Aquatic Trail

Boating facilities for whitewater rafting and kayaking are now available on the Carson River Aquatic Trail between Carson City and Dayton. Boating access areas have been developed to put in at Morgan Mill Road in Carson City and take out at Santa Maria Ranch in Dayton. These areas offer a concrete launching ramp, paved parking, picnic tables and a restroom. The Carson River Aquatic now has two segments in Carson City:

- The 3.3 –mile Upper River Class I float is a peaceful 1.5 to 2 – hour ride from Carson River Park through cottonwood and willow-lined riverbanks, concluding at Morgan Mill. It is suitable for beginners.
- The 9.3-mile, 2.5 to 3-hour Lower River Class III ride for experienced floaters puts in at Morgan Mill and offers exciting, challenging rapids in scenic Carson River Canyon with

wildflowers, historic rock walls, mill sites and other relics from the old V & T railroad and Comstock mining era. It terminates at Lyon County's newly redesigned Santa Maria River Park in Dayton.

Many agencies contributed to this project: Carson City Quality of Life Initiative, Carson Truckee Conservancy District, Carson Water Subconservancy District, Nevada State Parks, Land and Water Conservation Fund, and Nevada State Lands Conservation and Resource Protection Programs (Question 1).

The Carson River Aquatic Trail Map and Safe Boating Guide is available in hard copy or online at <http://www.carson.org/home/showdocument?id=13983>. The map was made possible by Carson City Convention and Visitors Bureau, Carson City Parks and Recreation Department, Nevada Commission on Tourism and Lyon County.

Boat Ramp River Access Points

Developed Boating Access Points:

- Morgan Mill Road River Access Area
- Carson River Park
- Lahontan State Park

Informal/undeveloped Access Points:

- East Silver Saddle Ranch – accessed from Sierra Vista Road and identified as Mile 0 on the Carson River Aquatic Trail
- Riverview Park
- Ambrose Carson River Natural Area
- Morgan Mill Preserve Open Space – the area located behind the BLM office, and accessed via the Morgan Mill Road River Access Area
- Carson River Canyon Open Space
- Santa Maria Ranch
- Dayton State Park
- Rolling A Ranch
- Fort Churchill Historic State Park

(2014 Bollinger and 2014 Wilkinson, pers coms via email)

Carson River Park and other Carson City Open Space Projects:

This 40-acre park site is directly adjacent to the Carson River and Silver Saddle Ranch in Carson City. Learn more here <http://carson.org/government/departments-g-z/parks-recreation-open-space/parks-and-open-space/neighborhood-parks/carson-river-park>.

To learn more about Carson City Open Space, click here

<http://carson.org/government/departments-g-z/parks-recreation-open-space/parks-and-open-space>.

Carson Valley Trails Association (CVTA)

CVTA has been working with federal, state, local and private land managers including The Nature Conservancy to ensure that the public has trail access our public lands. CVTA helps build, manage, and maintain an extensive trail system consisting of 43 miles of trails. Although many trails have been completed, more are planned in the Carson Valley including the Pinyon Loop on the East side of the valley. CVTA's mission is to connect communities with nature through trails. In 2010 the Carson Valley Trails Association developed a brochure showing existing and planned trails throughout the valley. Listed trails include the Bently Heritage Trail, Fay-Luther/Jobs Peak Ranch, and the Fay-Luther Trail system. This brochure was updated in 2015 to include the Genoa Foothill Trail, the Clear Creek Trail and the Pinyon Trail. Trail locations and maps can be found at www.carsonvalleytrails.org.



➤ ***Bently Heritage Trail***

The Nature Conservancy and Bently Agrowdynamics have completed 3.8 miles of the planned 5.1 mile trail that follows the Carson River in Carson Valley. The trail is on a conservation easement managed by The Nature Conservancy within private land and is managed by the Carson Valley Trails Association. The trail winds through floodplain lands and provides pedestrian access to the Carson River. CVTA and The Nature Conservancy partnered with local Eagle Scouts and community volunteers to construct the 4.8 mile Bently Heritage Trail along the mainstem of the Carson River in the Carson Valley. The public access trail is maintained by the CVTA and is on private property protected by a conservation easement held by The Nature Conservancy. Learn more here <http://carsonvalleytrails.org/Trails-BentlyHeritage.html>.

➤ ***Genoa Foothill Multi-Use Trail System***

Funded in part by a Nevada Question 1 grant, the Genoa Trail System is 16 miles of trails in the Genoa area open to hikers, equestrians, mountain bikes and dogs. Trail names include the Genoa Loop, Eagle Ridge Loop, Sierra Canyon Trail and Discovery Trail. Learn more here <http://carsonvalleytrails.org/Trails-Genoa.html>.

➤ ***Clear Creek Multi-Use Trail***

The Clear Creek Trail is a 10.5-mile trail starting at Jacks Valley Trailhead next to Jacks Valley Elementary School. This trail is a partnership that traverses through U.S. Forest Service land, private lands, Douglas County trail easements and a Nature Conservancy Conservation Easement. Learn more here <http://carsonvalleytrails.org/Trails-ClearCreek.html>.

➤ ***Pinyon Multi-Use Trail***

This trail project was funded and built by the Carson Valley Trails Association in partnership with the Bureau of Land Management and Douglas County. The Pinyon Trail is a 5-mile round-trip hike located about 7 miles east of Gardnerville. This trail is open to hikers, equestrians, mountain bikers and dogs. Learn more here <http://carsonvalleytrails.org/Trails-PinyonTrail.html>.

Carson City Trails

Carson City and Muscle Powered <http://musclepowered.org/> (a non-profit organization based in Carson City dedicated to providing better opportunities for walking and biking) worked with the USFS to construct 7 miles of trail designed for non-motorized uses including mountain biking, hiking and equestrian between Ash Canyon and Kings Canyon, West of Carson City. Trail access points are at Kings Canyon road, Waterfall road, and Ash Canyon road. Carson City and Muscle Powered have been working with the U.S. Forest Service and public for many years to develop a trail system along the foothills of the Carson Range with connectivity to Carson City. The Carson City Unified Pathways Master Plan (2006) identified this trail to provide a non-motorized trail opportunity and connect Kings and Ash Canyons. While USFS has many trails in backcountry and wilderness settings there are very limited opportunities along the urban interface, where we are seeing increased demand for trail opportunities. The project provides a longer trail system with loop opportunities and connection to Carson City trail systems. The project helps meet the demand of a growing population and reduces impacts from user created routes and unmanaged recreation. The project was identified in the Toiyabe National Forest Management Plan and the Carson City Unified Pathways Master Plan.

8.6.2 Current Recreational Use and Management Projects Update

Alpine Trails Association

The Alpine Trails Association is a new non-profit working on creating and maintaining trails on public lands in the Alpine County area. Visit their Facebook page and website for more information on the recreation projects they are currently working on and plan to complete. <https://www.facebook.com/Alpinetrails.org/> and www.alpinetrails.org.

8.6.3 Future Recreational Use and Management Projects Update

See Proposed Project Tables by County 8.3, Washoe Tribe 8.6, Fallon Paiute-Shoshone Tribe 8.7 and Suggested Actions Table 8.8.

In addition to the above proposed projects and suggested actions, each County has a Comprehensive Master Plan that often includes policies and plans relating to recreation. These may include the purchase or protection of open spaces for passive recreation and/or creation of more formal local parks with play equipment, etc. These policies and plans should be looked at as opportunities to implement recreation projects with water quality measures such as low impact development features, enhancement of riparian habitat, watershed and floodplain management measures and educational signage.

Douglas County

Douglas County is currently updating their Master Plan. The Parks and Recreation Element of their existing 2011 plan can be found here:

<http://www.douglascountynv.gov/DocumentCenter/Home/View/960>

They also have a Comprehensive Trails Plan which can be found here:

<http://www.douglascountynv.gov/DocumentCenter/View/93>

Carson City

Carson City has protected open space along the Carson River including floodplain lands, wetlands and agricultural lands. Water quality, floodplain management, habitat protection are intertwined in their recreation goals.

Carson City Master Plan Recreation Objectives can be found here:

<http://www.carson.org/home/showdocument?id=892>.

Carson City Open Space Master Plan can be found here:

<http://www.carson.org/government/departments-g-z/parks-recreation-open-space/brochures-maps-master-plans-and-reports/open-space-plan>.

Carson City Open Space Management Plan can be found here:

<http://www.carson.org/government/departments-g-z/parks-recreation-open-space/brochures-maps-master-plans-and-reports/management-plan-for-carson-city-open-space-and-parks-in>.

Lyon County

Lyon County Parks, Recreation and Open Space-Chapter 7 of the Comprehensive Master Plan indicates provides for core Goals and indicates a desire to provide trails and aquatic trails along the Carson River. Learn more here <http://www.lyon-county.org/DocumentCenter/View/1519>.

Churchill County

The Churchill County Master Plan was updated in 2015. The plan can be found here:

<http://churchillcounty.org/DocumentCenter/View/8884>

Goal 2 within Chapter 7: Recreation states: *GOAL R 2: Finalize a plan outlining improvements to River Park System. Policy R 2.1 Begin implementing improvements as funding becomes available.*

Alpine County, CA

The Alpine County General Plan revised in 2009 is available for review here:

<http://www.alpinecountyca.gov/DocumentCenter/View/51>.

8.6.3 Recommendations for Future Management Measures Update

See Proposed Project Tables by County 8.3, Washoe Tribe 8.6, Fallon Paiute-Shoshone Tribe 8.7 and Suggested Actions Table 8.8.

8.7 Plan Implementation and Monitoring for Effectiveness (Update of Original Chapter 9).

8.7.1 Plan Timelines and Funding Needs

Detailed implementation timing and funding needs for current and proposed studies, programs and projects are listed on the tables in Chapters 7 and 8. Table 8.9 below provides a summary of plan implementation over the next 10 years.

Table 8.11 Ten Year Implementation Monitoring Timeline

Table 8.11 Implementation Monitoring Timeline for the next 10 years (Element i)	
2022	Support projects that restore or stabilize at least 1250 feet of riverbank (250 ft/yr 2017-2022). This is consistent with NDEP's NPS State Management Plan.
2022	Support the implementation of at least one Low Impact Development/Urban Runoff Infrastructure project.
2022	Support at least one project that provides Floodplain Protection or Preservation.
2022	Support the implementation of at least one Agricultural BMP project to mitigate NPS pollution.
2022	Evaluate Performance Indicators and WQ Objectives identified in Table 6: NV Critical Area Management Measures.
2022	Conduct follow up Education Survey to reassess improvements in Watershed Literacy.
2027	Conduct third LIDAR survey if resources allow.
2027	Support projects that restore or stabilize an additional 1250 feet of riverbank (250 ft/yr 2022-2027).
2027	Support implementation of at least one additional LID, Floodplain Protection <i>and</i> Agricultural BMP Project.
2027	Develop Online Data Entry process for Watershed Projects if resources allow.
2027	2nd evaluation of Performance Indicators and WQ Objectives identified in Table 6: NV Critical Area Management Measures.
2027	Update Carson River Watershed Stewardship Plan.

8.7.2 Plan Implementation

The CWSD, DVCD, CVCD, WNRC&D, NDEP and other entities working in the watershed will continue to support, fund and carry out watershed projects and programs that work toward the ultimate goal of improving water quality and overall watershed conditions.

CWSD has a Watershed Coordination Program that is partially funded through NDEP's Clean Water Act Section 319 NPS pollution funds received from the US EPA. This coordination program currently employs two staff members that are responsible for implementing the program in conjunction with our CRC partners discussed in the original 2007 plan. Three other CWSD staff provide support on an as needed basis.

The CRC/CWSD Watershed Program Manager, and the Watershed Program Specialist oversee the management, planning, and coordination of the Integrated Watershed Planning Process (IWPP), including the implementation of the Carson River Watershed Stewardship Plan and associated Regional Floodplain Management Plan and Watershed-Literacy Action Plan. The following tasks and activities support the implementation of the Stewardship Plan including tracking and monitoring effectiveness to assist with water quality and watershed health.

The Watershed Program:

- Maintains and coordinates cooperative processes for watershed management involving local, state, tribal, and federal agencies, private agencies, and interested individuals,
- Coordinates and facilitates the Carson River Coalition (CRC) process, and the various Working Groups, including meeting dates and locations, agendas, and meeting notes,
- Oversees, manages, and develops projects, programs and documents for CWSD, CRC, and Working groups,
- Oversees administration and coordinates Integrated Watershed Planning and Management programs and activities, such as noxious weed abatement, invasive species, water quality, environmental education, and floodplain management,
- Prepares, coordinates, and oversees the development, update, and implementation of new and existing regional planning documents and reports for CWSD, CRC, and Working Groups,
- Pursues and prepares grant applications to assist with funding of projects and programs both for CWSD and other entities in the watershed,
- Coordinates, prepares, and reviews quarterly and annual reports required for various grants administered by CWSD,
- Oversees, coordinates, and implements tasks/actions to meet grant deliverables and objectives,
- Oversees the preparation of plans and prepares content for the quarterly watershed newsletter, CWSD website, social media, CWSD blog, and CRC emails,
- Develops marketing materials and presentations for CRC and CWSD,
- Provides community outreach and education,
- Keeps General Manager abreast of activities within the Watershed Program,
- Prepares and delivers oral and/or written presentations to CWSD Board, local jurisdictions' boards, schools, and other entities,
- Plans, develops, and organizes conferences, workshops, education, outreach projects, and materials,
- Participates in various evening and weekend meetings/activities throughout the Carson River Watershed,
- Represents CWSD and CRC at conferences, special events, and board meetings,

- Provides assistance to local conservation districts, weed districts, and watershed councils.
- Performs work in field, including water quality monitoring and streamflow measurements, restoration activities, and education work days.

Through these activities CWSD monitors and tracks activities associated with programs and projects being completed by those in the CRC to improve and meet water quality objectives. CWSD also provides funding to entities, often providing the non-federal match needed to fund the various studies, programs and projects listed in Tables 7.2.12-2, and 8.3-8.8. Invoicing requirements will include providing the initial project summary form information and tracking information per invoice quarter (See Project Summary Form photo). That was, CWSD will be able to track how our funding is helping achieve our Stewardship Plan goals and objectives. Starting in 2018-2019 funding year, CWSD will require with each funding agreement/contract the need to provide a project tracking summary sheet and/or, when an on-line database is created and available for use, will require the funding recipients to enter all information to properly track projects and programs. The summary sheets and database will track project completeness and monitor effectiveness using criteria described in Chapter 6 (element h) and the management measures and milestones outlined in Tables 8.1 & 8.2. Summary sheets will be provided to NDEP for review and/or once the data is entered into the new database, a summary report of progress will be available through data queries and outputs.

Project Summary Form				
Project name				
Type of Project				
Map ID#				
Date started				
Date completed				
Location Data/Address				
Add Project #	Latitude	Longitude		
Add Project #	Latitude	Longitude		
Add Project #	Latitude	Longitude		
HUC				
Contact Person				
Primary Objective				
What will the project achieve? Was the objective achieved?				
Area restored/stabilized				
Add lines of project description applicable measurable and material used (rock, plants, etc.)				
Estimated Total Resources				
Only if applicable				
Total Project Cost				
Project Partners				
List all partners				

Tracking Updates and Milestones	
Date	Activity
Add date and expand table/invent rows as required	Add data and expand table/invent rows as required

Project Photos:

Before construction: After construction:

Title: Example Photos (replace with specific project)

Contract Template Language will be prepared and will be subject to changes based on legal requirements and changes in tracking and monitoring progress.

Effective implementation of the Stewardship Plan also requires CRC participants to support the integrated watershed process by:

- Participating in CRC meetings, activities, and projects,
- Providing integrated watershed management project and program data to CWSD to assist with progress tracking and effective implantation monitoring,
- Providing their organization with updates and progress reports on CRC activities and plan implementation progress,
- Providing specific expertise to discussions and projects,
- Assisting in obtaining funding (including in-kind match) for support of the CRC and its member's projects and programs,
- Helping raise awareness of watershed challenges and the integrated watershed process through presentations at conferences, community workshops, etc.
- Working with officials to utilize and potentially adopt the CRASP and its associated plans (Re: Floodplain Management Plan, Watershed-Literacy Action Plan). Adoption, although

not required, can formalize an entities desire to work toward integrated Watershed Management goals and objectives, and assist with the Suggested Actions outlined in Table 8.8.

Prior to and since the original 2007 CRASP was approved by the US EPA, CWSD and the CRC successfully completed a variety of programs and projects to improve water quality and watershed health. Some of the completed projects are listed in Table 8.5 lists a variety of these projects that have been completed in the past 10 years. We will continue to use the CRC as a steering committee for our integrated watershed management process.

8.7.3 Plan Updates

The CRASP will be updated on an as needed basis, not to exceed 10 years. CWSD will coordinate with the CRC to distribute the plan and will make the plan available on our website.

9.0 References Updated

Formerly Section 10 in original 2007 Carson River Adaptive Stewardship Plan.

Alpine County General Plan, 2009 revisions

<http://www.alpinecountyca.gov/DocumentCenter/View/51>

Alpine Trails Association: <https://www.facebook.com/Alpinetrails.org/> and www.alpinetrails.org.

Atlantic Richfield. 2010. *Leviathan Mine Supplemental Environmental Project 2010 Annual Report*. March 23, 2010. Prepared by E.R. Mancini & Associates.

Azad 2007, *Carson River Aquatic Life Status Report*, Genie Azad, Carson Water Subconservancy District for Nevada Division of Environmental Protection, December 2007. <http://www.cwsd.org/newcms/admin/Uploads/final%20aquatic%20life%20rpt.pdf>.

Bollinger 2014, Personal email communication October 20, 2014 with Ann Bollinger, Open Space Administrator, Carson City.

Brown and Caldwell, Alpine County Groundwater Management Plan, February 2007, http://www.water.ca.gov/groundwater/docs/GWMP/NL-1_AlpineCounty_GWMP_2007.pdf

CA EPA ,California Environmental Protection Agency, State Water Control Boards, 303(d) listing and 2012 Integrated Report found at: http://www.waterboards.ca.gov/water_issues/

California Fish and Game website: <http://www.dfg.ca.gov>.

Carson City 2007. Carson City Aquatic Trail Map and Safe Boating Guide, March 7, 2007, <http://www.carson.org/home/showdocument?id=13983>.

Carson City Master Plan 2006 – Recreation Objectives: <http://www.carson.org/home/showdocument?id=892>

Carson City Open Space Master Plan, June 2000: <http://www.carson.org/government/departments-g-z/parks-recreation-open-space/brochures-maps-master-plans-and-reports/open-space-plan>.

Carson City Open Space Management Plan 2016, <http://www.carson.org/government/departments-g-z/parks-recreation-open-space/brochures-maps-master-plans-and-reports/management-plan-for-carson-city-open-space-and-parks-in>.

Carson Valley Trails Association: www.carsonvalleytrails.org.

CAWQCB 2015, [California Nonpoint Source Program Implementation Plan 2014 – 2020](#), California Water Boards, California Coastal Commission, and the California NPS Program, August 2015.

CAWQCB 2015, [Indian Creek Reservoir Phosphorus TMDL Implementation Status Report 2015](#), April 28, 2015.

CAWQCB 2015, *Non-Point Source Encyclopedia*, California Water Quality Control Board, updated February 12, 2015 found at:
http://www.waterboards.ca.gov/water_issues/programs/nps/encyclopedia/index.shtml

Chandra, Dr. Sudeep and Barnes, Jason, *2013 Carson River Literature Review*, For Mark Drew California Trout Inc., 360 Pine Street, 4th Floor, San Francisco, CA 94104, 2013.

Champion, Sally 2014. US Department of Agriculture, Forest Service Carson Ranger District, Carson City, NV. Personal comments via electronic mail.

Churchill County Master Plan 2015: <http://churchillcounty.org/DocumentCenter/View/8884>.

Cobourn, John and Lewis, Steve. 2015. *Floodplain Protection Inventory for the Carson River*, UNCE Special Publication 15-05, October 2015.

CRC 2007, *Carson River Watershed Adaptive Stewardship Plan*, Carson River Coalition (CRC), 2007.

CRC. 2009. Carson River Coalition 10 Year Celebration Meeting Notes, May 19, 2009.
www.cwsd.org.

CRC 2014, Carson River Coalition - River Corridor Working Group Meeting Notes, 9/18/2014.

CWSD and DRI. 2007. Upper Carson River Watershed Water Quality Monitoring Program Final Report, Prepared for the California State Water Resources Control Board, June 2007.

Denney, Preston 2014. GIS Technician, Churchill County Planning, NV. Personal comments via electronic mail, July 14, 2014.

Denton, Marianne. 2014. USGS – Carson City, NV. Personal comments via electronic mail, May 19, 2014.

Donahue, C; Randals, E; and Marlow, D 2014. NDEP – Carson City, NV. Personal comments via electronic mail and telephone.

Douglas County Master Plan 2011 – Parks and Recreation Element:
<http://www.douglascountynv.gov/DocumentCenter/Home/View/960>.

Douglas County Comprehensive Trails Plan 2003:
<http://www.douglascountynv.gov/DocumentCenter/View/93>.

Environmental New Service. 2009. *Atlantic Richfield will spend \$8M to Remedy Leviathan Mine*. <http://www.ens-newswire.com/ens/jan2009/2009-01-22-092.html>.

Ewing, Ben. 2013. CA Dept of Fish and Wildlife – North Central Region, Rancho Cordova, CA. Personal Comments via electronic mail.
FPST¹ 2014. Fallon Paiute-Shoshone Tribe's Nonpoint Source Assessment Report, Approved September 16, 2014.

FPST² 2014. Fallon Paiute-Shoshone Tribe's Nonpoint Source Management Plan, Approved September 16, 2014. Appendix B (Fallon Paiute-Shoshone Tribe Best Management Practice Handbook 2014)

Fryer, Shane. 2014. Alpine Watershed Group, Markleeville, CA. Personal comments via electronic mail, May 14, 2014.

GBBO (Great Basin Bird Observatory). 2010. *Nevada Comprehensive Bird Conservation Plan*, ver. 1.0, Great Basin Bird Observatory, Reno, NV. Available online at www.gbbo.org/bird_conservation_plan.html.

Gonzales, Carmen 2014. Fallon Paiute Shoshone Tribe, Fallon, NV. Personal Comments via electronic mail.

HDR 2011. *Hydraulic Modeling and Floodplain Mapping Guidelines, Carson River, NV & CA*, Prepared for the Carson Water Subconservancy District, October 2011.

Herbst, David. 2009. *Bioassessment Monitoring of Acid Mine Drainage Impacts in Streams of the Leviathan Mine Watershed: An Update for Spring-Fall 2006 Surveys*. Prepared for U.S. EPA Region 9.

JBR 2012. *Middle Carson River Habitat Conservation Plan*, prepared by JBR Environmental Consultants, Inc. March 2012.

Knapp, Roland and Nelson, Craig 2016, *Final Report Microbial Source Tracking a Bacteria-Impaired Waters* for Lahontan Regional Water Quality Resource Control Board March 2016, http://www.waterboards.ca.gov/lahontan/publications_forms/available_documents/microbial_report.pdf.

LVEA 2009. *The Truckee Canal: Water for a Sustainable Future*. Lahontan Valley Environmental Alliance, Fallon, NV.

Lichvar, R.W. 2013. *The National Wetland Plant List: 2013 wetland ratings*. Phytoneuron 2013-49: 1-241.

Luhby, Tami 2012, CNNMoney *Nevada's Triple Economic Whammy* published February 4, 2012, www.cnnmoney.com

Lutz, Alexandra and James, Ed. 2012. Streamflow Changes in the Carson River System, Desert Research Institute and Carson Water Subconservancy District, Reno and Carson City, Nevada. Available online at http://www.cwsd.org/newcms/Admin/Uploads/2013-8-6AppendixB_Water%20System.pdf.

Lyon County Master Plan 2010 – Parks, Recreation and Open Space Chapter 7: <http://www.lyon-county.org/DocumentCenter/View/1519>.

McIvor 2005, *Important Bird Areas of Nevada*, Donald E. McIvor, Lahontan Audubon Society, Reno, NV. www.NevadaAudubon.org.

Muscle Powered: <http://musclepowered.org/>

Mussulman, Sarah 2013, High Mountain Lakes ES, CA Dept of Fish and Wildlife – North Central Region, Rancho Cordova, CA. Personal Comments via electronic mail.

Naranjo, R.C., Welborn, T.L., and Rosen, M.R., 2013, The distribution and modeling of nitrate transport in the Carson Valley alluvial aquifer, Douglas County, Nevada: U.S. Geological Survey Scientific Investigations Report 2013–5136, 51 p.

NVAPCP 2013. *Nevada Air Quality Trend Report, 2000-2010*. Nevada Air Pollution Control Program, Carson City, Nevada.

Nevada Dairy Commission, website as of January 2014, <http://dairy.nv.gov/Nevada-Dairy-Farms/>

Nevada Department of Agriculture, website as of January 2014, <http://agri.nv.gov>

Nevada Natural Heritage Program. 2008. *2007 Nevada Priority Wetlands Inventory*. E. Skudlarek (ed.) Prepared for Nevada Division of State Parks. Carson City, Nevada. Sierra Nevada Conservancy. 2010. Grants Database at http://www.sierranevada.ca.gov/grants_database.html. Accessed on May 12, 2010.

NDCNR 2010, *Designated Groundwater Basins of Nevada*, April 2010, Nevada Department of Conservation and Natural Resources, Office of the State Engineer, Division of Water Resources, 901 S. Stewart Street Carson City, Nevada 89701, State Engineer Jason King, P.E.

NDEP 2014, *Water Quality Standards Review: Carson River from US Highway 95A to Lahontan Dam, DRAFT Rationale Document*, Bureau of Water Quality Planning, February 2014

NDEP 2014, *2012 Nevada Water Quality Integrated Report*, April 2014, Nevada Division of Environmental Protection, website as of March 2016, http://ndep.nv.gov/uploads/documents/IR2012_Report_Final.pdf

NDEP 2015, *2014 Nevada Water Quality Integrated Report*, October 2015, Nevada Division of Environmental Protection, website as of March 2016, https://ndep.nv.gov/uploads/water-wqm-docs/IR2014_Report.pdf

Otis Bay 2007. *Assessment of the Middle Carson River and Recommendations for the Purpose of Recovering and Sustaining the Riverine Ecosystem-Executive Summary*, Otis Bay Ecological Consultants and the Bureau of Land Management, June 20, 2007.

RCI 2013. *Comprehensive Regional Water System Plan for the Carson River Watershed*. Prepared by Resource Concepts, Incorporated for Carson Water Subconservancy District, Carson City, NV. August 21, 2013.

Scanland, Rob 2014. U.S. Bureau of Reclamation, Water Rights Specialist. Personal comments to Ed James via telephone, July 7, 2014.

Sierra Front Dispatch Center, WildWeb <http://www.wildcad.net/WCNVSFC.htm>

State of California. October 2013. *State & Federally Listed Endangered & Threatened Animals of California*. The Natural Resources Agency, Department of Fish and Wildlife, Biogeographic Data Branch, California Natural Diversity Database. Available online at <http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/TEAnimals.pdf>.

U.S.B.R. 2011. Truckee Canal Re-Operations webpage.
http://www.usbr.gov/mp/truckee_canal.html

U.S.B.R. 2013. Newlands Project Planning Study Special Report. April 2013. Bureau of Reclamation Mid-Pacific Region Lahontan Basin Area Office.

U.S. Drought Monitor 2017, National Drought Mitigation Center ,
<http://droughtmonitor.unl.edu/Home.aspx>

U.S. EPA Leviathan Mine Superfund Site Overview.
<http://yosemite.epa.gov/R9/SFUND/R9SFDOCW.NSF/VIEWBYEPAID/CAD980673685?OPENDOCUMENT>.

U.S. EPA Carson River Mercury Site Overview
<http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/ViewByEPAID/NVD980813646>.

U.S. EPA Hazardous Waste Generators/Pharmaceuticals,
<https://www.epa.gov/hwgenerators/proposed-rule-management-standards-hazardous-waste-pharmaceuticals>, EPA website May 18, 2017.

USDA 2012, *East Carson River Project Decision Memo*, Genny Wilson, District Ranger, U.S. Department of Agriculture, U.S. Forest Service, Carson Ranger District, May 2012.

USDA 2014, *Forest Pest Conditions in Nevada 2013*, U.S. Department of Agriculture, U.S. Forest Service, Nevada Division of Forestry. April 2014. Compiled by Gene Phillips, Forest Health Specialist, NDF DCNR & Danielle Reboletti, USFS, Entomologist.

USDA 2007, East Carson River Strategy, U. S. Department of Agriculture, U. S. Forest Service, Carson Ranger District, Humboldt-Toiyabe National Forest, Alpine County, California and Douglas County, Nevada,
http://www.theanglersedge.com/downloads/East_Carson_River_Strategy_061907.pdf

U.S. Fish and Wildlife Website: <http://www.fs.usda.gov/>

U.S. Forest Service Website: <http://www.fs.fed.us/>

U.S.G.S Carson River Flood Chronology Website
<http://nevada.usgs.gov/crfld/Carson/floodevents.htm>.

Vargas, Karen 2014. Nevada Department of Fish and Wildlife. Personal comments via telephone 9/23/2014.

Western Great Basin Coordination Center website
https://gacc.nifc.gov/wgbc/predictive/intelligence/ytd_historical/paststatistics/Past_Season_Statis_tcs.html

Wilkinson 2014. Personal email communication on October 6, 2014 with Rich Wilkinson, DVCD Manager.