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Water Quality Issues on the Middle & Upper Carson River

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Introduction

Like most rivers flowing through populated areas, the Carson River sometimes has problems with water quality. These problems vary from county to county, from year to year, and from season to season. Unlike many rivers, the Carson River does not suffer from water pollution from factories discharging their waste products.

Rivers in undisturbed watersheds generally have good water quality. The Carson River has water quality problems primarily because human activity has made many alterations to the Carson River Watershed throughout history. The impacts of human activity have accumulated over time to produce much of the water quality degradation in the river today. The activities have included historic logging and mining, road and bridge construction, and urbanization. Other changes include diversion of river water out of the natural channel into irrigation ditches and sloughs, straightening of the natural channel, building levees of various kinds, and human-caused soil erosion elsewhere in the watershed. Some of these disturbances continue to occur in the beginning of the 21st century. The impacts of urbanization and residential sprawl have rapidly increased since about 1960. When soils, rivers or streams are disturbed, the watershed tends to release phosphorus, other plant nutrients, and sediment into the river.

Nationwide, communities are being required by state and federal government to establish a process for setting total maximum daily loads (TMDLs) to help reduce water quality problems in their watersheds. The purpose of this fact sheet is to describe the context and background for this water quality program in our community.

Basics of Water Quality

The overall goal of the Federal Clean Water Act (CWA) is to make all rivers, lakes and streams in the nation fishable and swimmable. (A different national law, the "Safe Drinking Water Act" governs Drinking Water Standards). The CWA divides all pollution of water bodies into two broad categories: point source and non-point source pollution. **Point sources** are so-named because the contamination enters the stream or lake from an easily identified point, usually a waste discharge pipe from a factory or wastewater treatment plant. **Non-point sources** are the thousands of small diffuse sources of pollution such as road and parking lot surfaces, eroding soil, small chemical or oil leaks, and fertilizer or pesticide misuse.

Historic Background for Today's Water Quality Problems

Before the first European-American settlers arrived in Dayton and Genoa in 1851, many human activities occurred along the river. As long as these activities were dispersed and low-impact, the river continually restored itself after earthquakes, fires, droughts and floods. In 1850, the human population was still low, and Native Americans lived hunting, fishing and gathering, mostly nomadic lifestyles. The river had a rich wetland system along its valley floors, cold-water fish habitat in many years from at least the Dayton area to the headwaters, and cottonwood "gallery forests" shading the stream in numerous areas as it meandered through its valley floors. Water stayed clean longer, and flowed more consistently during dry times than it does today. Flooding out of the channel was normal and frequent but caused few problems.

The Comstock Lode silver rush in the 1860s changed life for Native Americans and the river forever. Increased populations and the technology to support them brought permanent settlements with less tolerance for flooding and more demand for food, lumber, and firewood. Mining, milling and other polluting activities of an industrial society commenced. For example, mercury was used in processing the ore, and not all of it was reclaimed. More land was put into agricultural production, and more river water was diverted into irrigation ditches. Large-scale logging in the Sierra deforested many slopes, and at times the logs were stacked 8 feet high next to the river for miles upstream and then floated downstream by the destructive process of releasing a wall of water from behind "splash dams." The forests of the Sierra Nevada were said to be entombed in the mines of Virginia City in the late 1800s.

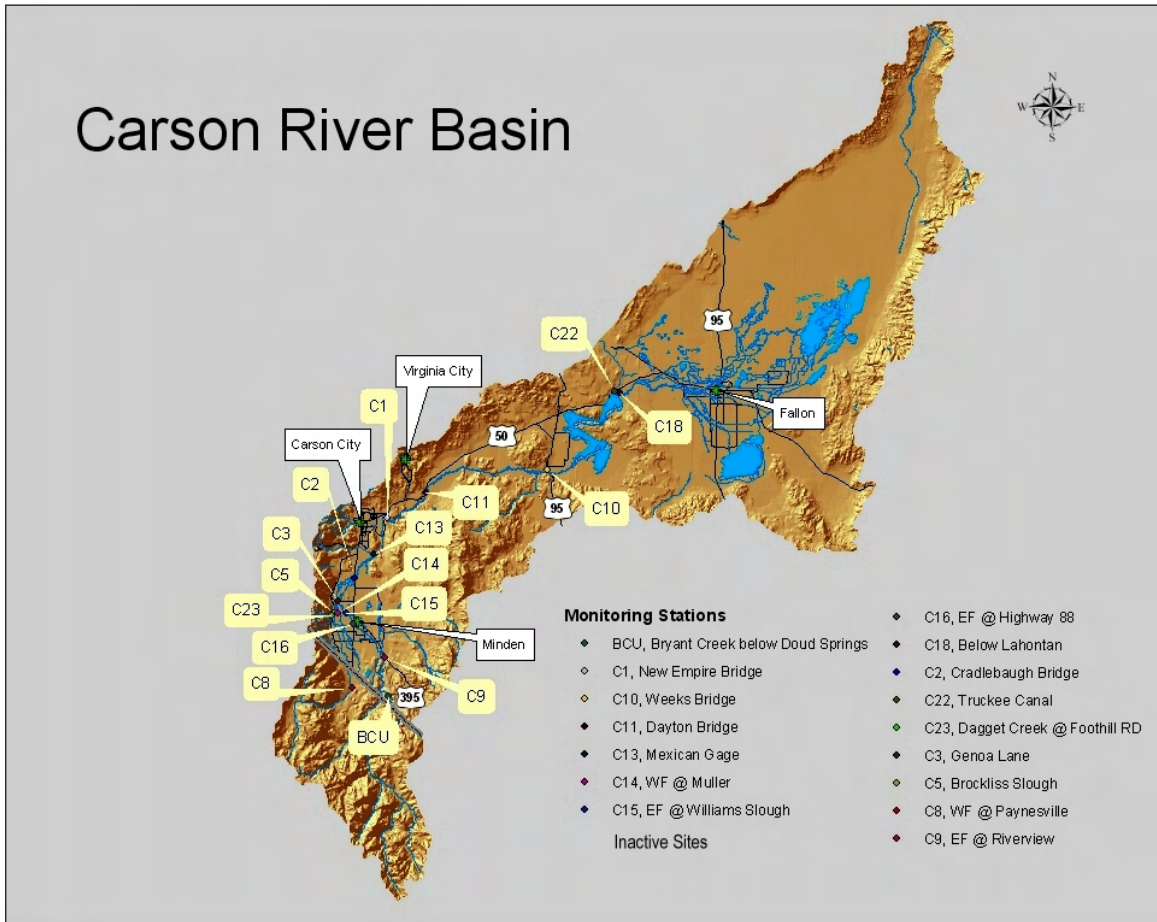
Later, modern transportation and drainage systems streamlined the watershed to move storm water quickly to the river, under bridges and away. In the 20th century, urban development and road-building steadily accelerated until, by 2000, the watershed had one of the fastest growing populations in the fastest growing state in the nation.

The cumulative effect of all the river alterations of the past 150 years is complex, but it can be summed up this way. The river channel has downcut or incised several feet into many valley floors, and the riparian wetlands and streamside forests have diminished or disappeared in many areas. Furthermore, the amount of water in the river channel during the growing season is much reduced, to the point that many reaches have little or no flowing water in July, August and September of most years. Riparian and aquatic habitats have been lost in many places.

Water Quality Standards on the Carson River

The Clean Water Act directs states to set water quality standards to meet the designated beneficial uses of the water in each water body. Beneficial uses produce a public or private benefit. Such uses include irrigation; watering of livestock; municipal, domestic and industrial supply; propagation of wildlife; and propagation of aquatic life.

Water quality standards are created to ensure that designated beneficial uses for water are supported. Beneficial use standards are set at a level to protect the most sensitive beneficial use designated (NDEP, 1994). In the upper Carson River down to New Empire Gage in Carson City (See map below), the most sensitive beneficial use is propagation of aquatic life. The species of concern are rainbow and brown trout. Between Mexican Gage and New Empire Gage, small-mouth bass is also a species of concern. Below New Empire Gage, river water should be suitable for propagation of catfish, walleye and white bass.



The Carson River Watershed, with the upper and middle portions on the left half of the map

As part of an effort to identify the level of beneficial use attainment throughout the nation, the CWA directs the states to prepare a Biennial Water Quality (305(b)) Report to Congress. The states report whether designated beneficial uses on each water body are “fully,” “partially,” or “not” supported by the current water quality. In addition to the 305(b) Report, the CWA also requires a 303(d) Report that designates as “impaired” any water bodies that do not meet beneficial use standards. Every two years each state must compile a “303(d) List” that specifies what parameters or numerical standards are impaired or “not in attainment.” For example, the Carson River through Carson Valley is listed for failure to meet turbidity, temperature, total suspended solids, and total phosphorus numeric standards (NDEP,2002). (See Table 1., next page)

Biological resource managers who study fish populations doubt whether rainbow and brown trout are currently able to propagate naturally between New Empire in Carson City and the upper reaches

of the Carson Valley. Interestingly, trout were found as far downstream as Dayton 35 years after Comstock mining activity began. In June of 1896, the Lyon County Times reported, “several more nice trout, weighing from three-fourths of a pound to a pound and a half each were caught in the Carson River at this point this week.”

Though the Nevada 303(d) list shows that numeric standards for total phosphorous, temperature, total iron, total suspended solids (TSS) and turbidity are sometimes exceeded, other factors may also contribute to problems with meeting the beneficial use standard. Inadequate summer flows often contribute to high summer water temperatures and low dissolved oxygen, preventing attainment of the “propagation of aquatic life” standard. This is a long-term problem that may require decades to resolve.

Table 1.

Summary of impaired waters in the Carson River as reported on the 2002-303(d) list. For details, obtain the full document by calling NDEP, Bureau of Water Quality Planning, (775) 687-9453, or by going to their Web site: <http://ndep.nv.gov/bwqp01.htm>.

Carson River Basin	Potential Problem
Bryant Creek near state line	arsenic, copper, iron, nickel, temperature, total suspended solids, turbidity
East Fork at state line to Highway 395	iron, turbidity
East Fork at Highway 395 to Hwy 88	temperature, turbidity
East Fork at Highway 88 to Muller Lane	iron, temperature, total phosphorus, turbidity
West Fork at Muller Lane to state line	iron, total phosphorus, temperature, turbidity
East Fork at Muller Lane to Genoa Lane and West Fork at Muller Lane to Genoa Lane	iron, total phosphorus, total suspended solids, temperature, turbidity
Genoa Lane to Cradlebaugh	total phosphorus, total suspended solids, iron, temperature, turbidity
Cradlebaugh to Mexican Gage	total phosphorus, total suspended solids, iron, temperature, turbidity
Mexican Gage to New Empire	total phosphorus, iron, temperature, turbidity
New Empire to Dayton Bridge	total phosphorus, iron, mercury, total suspended solids
Dayton Bridge to Weeks	total phosphorus, iron, mercury, total suspended solids, turbidity
Weeks to Lahontan Dam	total suspended solids, total phosphorus, iron, mercury, turbidity
Lahontan Reservoir to Carson Sink	mercury
Stillwater Marsh	mercury, arsenic, boron

Water Quality Restoration Plans for “Impaired” Waters

The U.S. Environmental Protection Agency (EPA) has directed states to develop restoration plans for all impaired waters on their 303(d) list. These water bodies are targeted for water quality improvement on these water bodies, the state is required to develop total maximum daily loads (TMDL). TMDLs establish the amount of each pollutant that the water body can receive and still meet water quality standards and support its beneficial uses (NDEP, 2004, Watershed Assessment). Since the Carson River is not affected by point sources, the State of Nevada must determine how to set a pollutant loading “cap” for every nonpoint source pollutant that contributes to the non-support of beneficial uses.

The State of Nevada has proposed a **three-phase framework for developing its TMDLs for the Carson River:**

1. Phase one, evaluate whether or not a particular beneficial use is appropriate or needs to be revised. Much of this phase could involve use attainability analysis (UAA).
2. Phase two, since the current 303 (d) listings may have been based upon inappropriate or outdated criteria or limited data, impairment of revised beneficial use needs to be confirmed.
3. Phase three, develop the TMDL for the pollutants of concern (NDEP, 2004, Project Plan).

The Nevada Division of Environmental Protection (NDEP), in its Carson River Watershed Project Plan (2004), has stated, “it is believed that the ‘propagation of aquatic life’ beneficial use for the Carson River is too broad and needs to be revised.” As noted above, many resource managers, such as biologists from the Nevada Division of Wildlife doubt whether the Carson River between Gardnerville and Carson City supports a cold-water fishery. The question is: Does the community want to try to attain that standard, or should we declare it to be unrealistic and “unattainable”?

The NDEP has stated that prior to initiation of a UAA on the beneficial use of a cold-water fishery, it will prepare a **“Comprehensive River Health Report Card,”** to characterize the health of the river from a Clean Water Act perspective (NDEP, 2004, Project Plan). The River Health Report Card will:

- Discuss the history of water quality regulations, aquatic life in the river, land use, etc.
- Characterize conditions needed to attain the aquatic life beneficial use.
- Characterize current chemical, physical, and biological conditions of the river.
- Compare current conditions to those needed to attain the propagation of aquatic life.
- Characterize the source and cause of impairment as natural or human-caused.
- Present recommendations for future work toward standard revisions, source assessments, TMDL development, etc.

NDEP will complete interim TMDLs for selected parameters by December 2004. In addition, NDEP will review the beneficial use of “municipal and domestic supply” for Lower Carson River Class Waters (below Lahontan Reservoir) and perhaps for Bryant Creek.

What Local Residents Can Do

County, state, and federal government and agency representatives meet regularly as the Carson River Coalition (CRC). They meet to discuss a regional, watershed-wide approach to questions such as how to improve water quality, wildlife habitat and floodplain management. The water quality working group of the CRC will serve as an advisory board

for the River Health Report Card process. To learn more about these public discussions, call the Carson River Watershed Coordinator, (775) 887-9005 or the Carson Water Subconservancy District, (775) 887-7450.

In addition to these meetings, many resource managers and property owners are working to improve water quality by implementing best management practices (BMPs) to reduce non-point source water pollution throughout the Carson River Watershed. BMPs, defined by the Clean Water Act and outlined by the State BMP Handbook, are techniques to prevent excess soil erosion and to prevent most animal waste, fertilizers, pesticides, and other contaminants from reaching streams and lakes. BMPs are also designed to prevent excess runoff of rainwater and snowmelt and to increase infiltration of such water to recharge groundwater aquifers.

The basic goal of all BMPs is to compensate for human impacts by restoring natural watershed processes. Watersheds are the source of rivers and store water from rain and snow in the soil, in aquifers, and in surface reservoirs, and then release the water slowly to the river itself. Property owners can increase the water-catching and storing characteristics of the watershed by retaining vegetation cover and encouraging infiltration of water into soil (not compacting soil). Local jurisdictions can encourage flooding across floodplains and prevent new channels (gullies) along roads, trails and other human-use areas. Residents can help to prevent pollution of water on its way to the river by implementing BMPs at home.

If the Carson River community is interested in restoring portions of the river for water quality, wildlife habitat, functioning floodplains, flood control, and other natural processes, such efforts take substantial time and money. It may be that protection of the river’s floodplain will require investment of public funds to assist landowners. In many cases, ranchers would need financial help to enable them to keep the lands near river channels in agricultural use rather than selling it to developers. This is a decision that the public would need to support.

For information about a collaborative Water Quality Education Program sponsored by University of Nevada Cooperative Extension, the Carson Valley Conservation District, the USDA Natural Resources Conservation Service, and the Nevada Division of Environmental Protection, please call the Gardnerville office of University of Nevada Cooperative Extension, (775) 782-9960.

For further reading:

Carson River Advisory Committee, 1996. Carson River Master Plan.

Nevada Division of Environmental Protection (NDEP), 1994. State Handbook of Best Management Practices.

NDEP, 1996. The Upper Carson River Watershed Management Plan.

NDEP, 2002. 303d List

NDEP, 2004. Carson River Watershed Project Plan.

NDEP, 2004. Carson River Watershed Assessment, A report card on the health of the Carson River watershed and its Aquatic Life.

Nevada Division of Water Planning, 1997. Carson River Chronology.