Basin Profile: Carson River Watershed
Original Report By: Christine Wehner, University of Virginia
Profile Prepared By: Laura Szczyrba

Water Scarcity Status

- Settlement in the Carson River Basin and the development of agriculture are the main causes of increased water demand and scarcity. As a result, the Carson River Basin must import water to sustain itself.
- Population in the watershed is growing, and current rates will overwhelm the annual urban water supply by 2035.
- Water flows to the Carson Sink and Stillwater National Wildlife refuge are unreliable, threatening important habitats for many species, including migratory birds.

Basin Overview
Northwest Nevada, United States of America
Area: 10,400 sq km (4,015 square miles)
Climate: Dry
Basin population: 150,000

Figure 1. Map of Carson River Watershed (Wikipedia: Carson River)

The Carson River is about 10,400 square kilometers (4,015 square miles) in size. It begins in the Sierra Nevada, continuing eastward into northwestern Nevada until its terminus at the Carson Sink.

Most of the water available in the Carson River basin comes from snowmelt, which appears vulnerable to future climate change. The Lahontan Reservoir, located on the Carson River, was built in an effort to buffer annual water fluctuations to some extent. This reservoir receives supplementary water from the Truckee River via the Truckee Canal. Since the construction of the Lahontan Reservoir, water flows to the Carson Sink and Stillwater National Wildlife refuge have been reduced considerably because of irrigation consumption in the basin. Currently, there are no diversions out of the Carson River Basin due to a California-Nevada Interstate Compact, which has never been signed into law by Congress, but is nevertheless honored.

The basin supports a population of about 150,000 people, but that number is growing, and some estimates suggest that the basin could be home to more than 450,000 people by 2050. In 1995, the land use in the Carson River Basin was about 62% rangeland, 18% forest, 14% water and wetlands, and 5% irrigated agriculture.

The 1905 Nevada Water Law specifies that water belongs to the public, not the private sector. In California, the State Water Resources Control Board administers water rights based on riparian and appropriative surface water

rights. The California Department of Fish and Game has purchased water rights in order to protect the ecotourism that is so important in the Carson River Basin. In Nevada, the distribution of surface water rights is based upon the appropriation doctrine, meaning that the priority of a water right is based on the first date of use of that water right. When there is not enough water to satisfy all rights, this appropriative doctrine is implemented.

Agriculture dominates the economy in the majority of the Carson River Basin. Ranchers harvest meat from beef cattle, sheep, poultry, pigs, goats, ostriches, and emus. Alpacas, sheep, and goats provide fibers, and horses, donkeys, llamas and mules are raised for recreation and packing. Dairy produced in the watershed provides cheese and milk for neighboring regions. Farmers produce garlic, onions, corn, sunflowers, cantaloupes, melons, wheat, and oats. Alfalfa and hay are the most common crops produced within the watershed, and the alfalfa is exported out of the watershed for dairy cattle and livestock feed. Alfalfa is a drought-tolerant crop, but responds well to irrigation and is productive almost proportionally to the amount of water it receives. In addition, alfalfa has a longer growing season than many other crops and therefore uses a higher volume of water.

Water Scarcity Impacts

Environmental Impacts

Since the construction of the Lahontan Reservoir, water flows to the Carson Sink and Stillwater National Wildlife refuge have been reduced considerably because of irrigation consumption in the basin. These areas are important habitats for many species, including migratory birds. Actions taken under the Endangered Species Act have forced farmers to reduce their water withdrawals to some extent. But unfortunately, while these actions have reduced water withdrawals they have actually *increased* the net consumptive use of water in the basin, thereby reducing the volume of water draining into the Carson Sink wetlands.

In 1991, 77,500 acres of land in and around the Carson Sink were designated as the Stillwater National Wildlife Refuge. Recognizing that the wetlands were not receiving sufficient water flows to sustain ecological health, The Nature Conservancy and the Environmental Defense Fund began purchasing water rights on behalf of the US Fish & Wildlife Service for dedication to environmental purposes. The area is still highly susceptible to water scarcity, however, as allocations of water for human use take precedent over environmental flows in the Nevada portion of the Carson River basin.

The US Fish and Wildlife Service has determined that an annual average of 125,000 acre-feet per year (0.15 cubic kilometers) is needed to sustain the wetlands downstream of Lahontan Reservoir. However, only about 55,640 acre-feet (0.07 cubic kilometers) presently enter the Carson Sink each year on average.

Economic and Social Impacts

Although water allocation priorities are based on time of first water use, there is one group of people that this policy excludes. Native Americans were using the waters of the Carson River long before appropriations were issued. However, their interests are underrepresented. According to Leah Wilds, “there is no room for absolute justice for Native Americans when it comes to western water because too much water has already been allocated” (Wilds, 2010). However, the Pyramid Lake tribe, whose ultimate goal is shutting down the Truckee river diversions to the Carson, has received compensation from the government and is making progress towards that goal.

As mentioned earlier, alfalfa is a significant user of water in the Carson River. Although no water is directly diverted out of the basin, this alfalfa and “virtual water” is sent out of the watershed after it is grown. Climate change will only exacerbate water scarcity, and it is important to prepare for the economic and societal impacts of more extreme weather.

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