

Carson

River

Chronology

A Chronological History of the Carson River and Related Water Issues

APRIL 1997
[First Update]



Nevada Division of Water Planning
Department of Conservation and Natural Resources

Notes to the Reader

These dates and happenings represent our best knowledge of the sequence of important events pertaining to the Carson River Basin, the Carson River, the Carson River's East and West Forks and various tributaries, storage reservoirs, diversions, the Carson, Eagle, and Dayton valleys, Lahontan Reservoir, Lahontan Valley and the Carson Sink and Desert, the Lahontan Valley wetlands, the Carson Lake and Pasture, the Newlands Irrigation Project, and related water supply, water quality, and environmental issues. Should you have information in conflict with these dates and/or events, or knowledge of additional events which you deem to be important in this regard, please contact:

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Publications in the Division of Water Planning's Nevada Water Basin Information and Chronology Series

Carson River Chronology

Humboldt River Chronology

Truckee River Chronology

Walker River Chronology

[NOTE: The most current versions of these chronologies are also available on the Internet through the Nevada Division of Water Planning's Home Page listed above.]

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Carson River Chronology

**A Chronological History
of the Carson River
and
Related Water Issues**

**APRIL 1997
[First Update]**

**A Publication in the
Nevada Water Basin Information and Chronology Series**

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CARSON RIVER CHRONOLOGY

Listing of Abbreviations and Acronyms Frequently Used

BLM	[U.S.] Bureau of Land Management (USDI)
cfs	Cubic Feet per Second (rate of flow)
COE	[U.S. Army] Corps of Engineers
CSWCB	California State Water Control Board
DCNR	Department of Conservation and Natural Resources (State of Nevada)
DEIS	Draft Environmental Impact Statement (EPA)
EA	Environmental Assessment (EPA)
EIS	Environmental Impact Statement (EPA)
EPA	[U.S.] Environmental Protection Agency
ESA	Endangered Species Act (USFWS/NMFS)
LVEA	Lahontan Valley Environmental Alliance
mg/l	Milligrams per Liter (TDS concentrations)
MSL	[Elevation Above] Mean Sea Level
NDEP	Nevada Division of Environmental Protection (DCNR)
NDOW	Nevada Division of Wildlife (DCNR)
NEPA	National Environmental Protection Act (EPA)
NMFS	National Marine Fisheries Service (U.S. Department of Commerce)
NRCS	Natural Resources Conservation Service (USDA)
NWR	National Wildlife Refuge (USFWS)
NWS	National Weather Service (NOAA/U.S. Department of Commerce)
OCAP	Operating Criteria and Procedures (USBR/TCID)
SPPCo	Sierra Pacific Power Company (Reno, Nevada)
TCCO	Truckee-Carson Coordination Office (USDI)
TCID	Truckee-Carson Irrigation District (Newlands Project)
TDS	Total Dissolved Solids (salinity)
TROA	Truckee River Operating Agreement (Negotiated Settlement)
TRPA	Tahoe Regional Planning Agency (California-Nevada)
SCS	Soil Conservation Service (now NRCS/USDA)
SDWA	Safe Drinking Water Act (EPA)
USBR	U.S. Bureau of Reclamation (USDI)
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USFWS	U.S. Fish and Wildlife Service (USDI)
USGS	U.S. Geological Survey (USDI)
USRS	U.S. Reclamation Service (now USBR)
WMA	Wildlife Management Area (NDOW)

Carson River Chronology

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A Chronological History of the Carson River and Related Water Issues

Introduction

Nevada is truly a land of contrasts and contradictions. As the driest state in the nation, it may seem somewhat peculiar for the State of Nevada to claim the remains of a prehistoric marine reptile as the official state fossil. Over 200 million years ago, in the Late Triassic period, the sixty-foot long Ichthyosaur—a term meaning “fish-lizard”—ruled the earth's oceans as the preeminent marine predator. Of course Nevada was much different in those days and was actually the floor of an ancient equatorial sea. In fact, the west coast of the continental United States at that time was very near the western border of the State of Wyoming, and a continental shelf covered much of eastern Nevada and western Utah with the deep ocean stretching from central Nevada westward.

It was in these warm, shallow equatorial waters of central and eastern Nevada that the prehistoric Ichthyosaurs roamed at will. As the land mass gradually rose and the seas receded ever westward, some 40 of these giant creatures became stranded in shallow mud flats in what is now the northwest corner of Nye County in central Nevada. Here they would remain, to be covered by thousands of feet of sediment, which gradually compressed into rock, and then to be thrust violently upward as part of the formation of the Shoshone Mountain Range, finally coming to rest 7,000 feet above the level of the sea in which they once lived and ruled. Their final resting place would eventually be uncovered in 1926 through geological exploration in the Union Mining District near the town of Berlin. In 1977, after reigning the world's oceans for approximately 135 million years, and some 200 million years after their final entombment, *Ichthyosaurus shonisaurus popularis*, named after the mountain range in which it was discovered, would become immortalized as Nevada's official state fossil.

From this ancient seabed, Nevada was formed by a gradual uplifting of the ocean floor and the effects of plate tectonics, a geological process which, on several occasions, fused huge land masses appearing out of the western ocean to Nevada's western shoreline. These continental collisions not only added to Nevada's land mass, moving the continent's coastline ever westward to its present location, but through the subduction process, or the sliding of older, heavier plates under newer, lighter plates, land masses were buckled and mountain ranges were thrust upwards. Further, as the submerging land masses were pushed ever deeper into the earth's molten depths, they were heated to such extremes that they caused volcanic eruptions and hydrothermal venting across vast portions of the State. Today, Nevada's geologic foundations consist primarily of igneous rock formations as the result of extensive volcanic activity, and sedimentary layers as a by-product of its early existence as a sea bed and the eventual wearing down of the mountain ranges that were subsequently created.

The Nevada we know today has existed for only the last few seconds on the geologic clock of time. As recently as 10,000 years ago Nevada was considerably wetter than today and much of the land was covered with ancient lakes and expansive and lush grasslands formed during the

last Ice Age. The largest of these lakes were the prehistoric Lake Lahontan in northwestern Nevada and Lake Bonneville, which covered most of northwestern Utah and extended into northeastern Nevada as well. As the massive ice sheet receded northward, the land dried, withering the abundant vegetation and leaving Nevada's water resources located primarily in shrinking desert lakes and locked beneath the sedimentary layers of the State's numerous elongated valleys.

Today, only Pyramid Lake and Walker Lake in west-central Nevada provide an indication of the prior existence of Lake Lahontan and this glacial epoch period. Surrounding these few remaining remnants of this bygone era, the watermarks etched high above the present lake levels provide a fleeting testament of Nevada's previous environment.

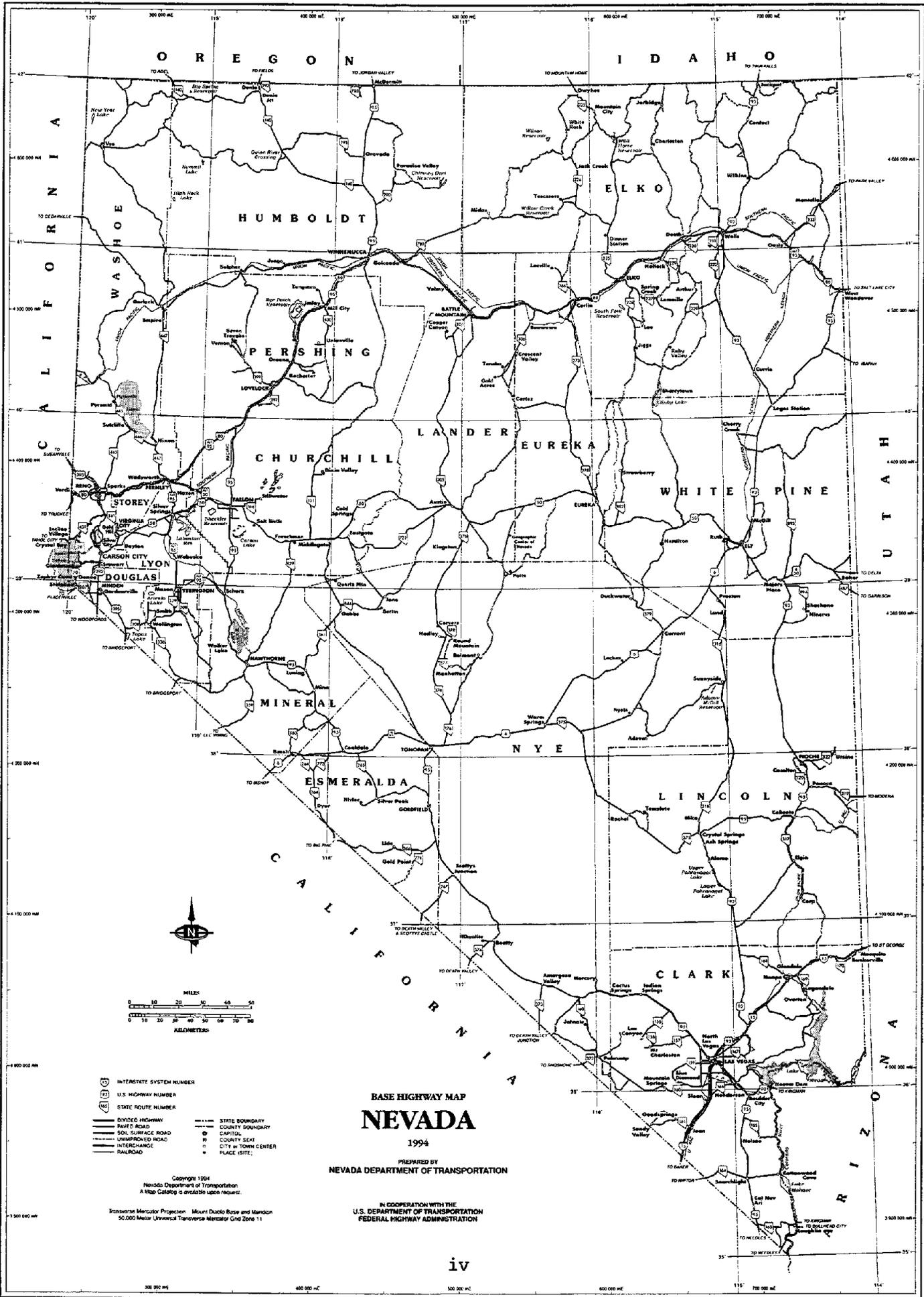
Geology, geography, and climate would combine to have profound effects on the nature of Nevada's future development. The lofty peaks of the Sierra Nevada Mountains, stretching along much of Nevada's western border, would interrupt the prevailing easterly flow of storm systems and the State's access to natural precipitation from the moisture-laden storm fronts coming in off the Pacific Coast. The resultant "rain shadow" rapidly dried up the land. Over much of Nevada a massive elevated bowl formed, an area we now call the Great Basin. This relatively high, but inward sloping region effectively stretched from the City of Reno in the west to Salt Lake City in the east and from Southern Oregon in the north to Death Valley, California in the south. From within this vast expanse, no surface waters flow outward to the sea.

The only readily available surface waters entering this huge depression are the seasonal rivers fed by melting snow and flowing from the mountain ranges along Nevada's western frontier and out of a range of lofty peaks in north-central Nevada called the Ruby Mountains. The resultant rivers consist principally of the Humboldt River, the only major river wholly contained within Nevada, flowing out of the Ruby, Jarbidge, Independence, and East Humboldt Mountain ranges and running approximately 265 miles mostly westward towards the Humboldt Sink, and the Truckee, Carson, and Walker rivers which flow eastward out of the Sierra Nevada Mountains in the west.

These river systems would become crucial to the future development of Northern Nevada. The Truckee River, from its uppermost headwaters in the Sierra Nevada Mountains above Lake Tahoe and draining the Lake Tahoe Basin, courses its way over 140 miles to its terminus at Pyramid Lake. The Carson River drains an area south of Lake Tahoe and flows over 180 miles to the Carson Sink (Playa) and provides waters to important wetland habitat in that area. The Walker River drains an area in the Sierra Nevada Mountains southeast of Lake Tahoe and flows almost 160 miles to its terminus at Walker Lake. Eventually, all these river terminus locations have become stressed and natural habitat and animal species threatened, as ever greater human demands are placed on the available flows.

The above introduction was provided courtesy of Gary A. Horton and was extracted from his NEVADA: A Historical Perspective of the State's Socioeconomic, Resource, Environmental, and Casino Gaming Development, © July 1995, Business & Economic Research Associates, Reno, Nevada.

Nevada Base Highway Map was provided courtesy of the Nevada Department of Transportation (NDOT). The map outlining the Carson and Truckee River Basins and the Carson River system flow schematic diagram showing Carson River Basin gaging station locations were provided courtesy of U.S. Geological Survey (USGS), Water Resources Division, Nevada District Office, Carson City, Nevada..

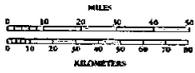


**BASE HIGHWAY MAP
NEVADA**

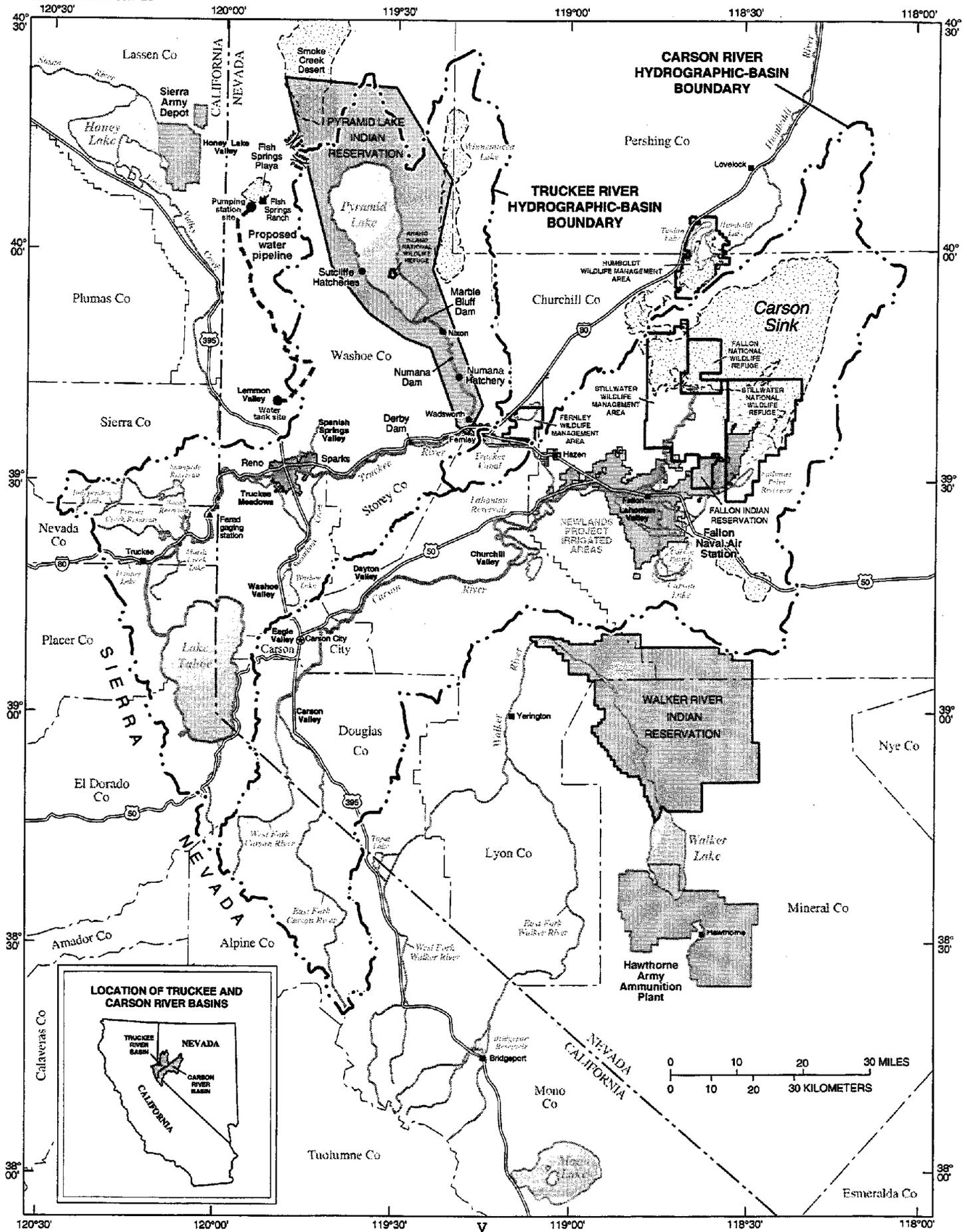
1994
PREPARED BY
NEVADA DEPARTMENT OF TRANSPORTATION

IN COOPERATION WITH THE
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

- INTERSTATE SYSTEM NUMBER
- U.S. HIGHWAY NUMBER
- STATE ROUTE NUMBER
- DIVIDED HIGHWAY
- PAVED ROAD
- SOIL SURFACE ROAD
- UNIMPROVED ROAD
- INTERCHANGE
- RAILROAD
- STATE BOUNDARY
- COUNTY BOUNDARY
- CAPITOL
- COUNTY SEAT
- CITY IN TOWN CENTER
- PLACE (SITE)



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A Map Catalog is available upon request.
Transverse Mercator Projection Mount Diablo Base and Meridian
50,000 Meter Universal Transverse Mercator Grid Zone 11



Base from U.S. Geological Survey digital data 1:100,000, 1977-85
 Albers Equal-Area Conic projection
 Standard parallels 29°30' and 45°30', central meridian -119°00'

For additional information, contact
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 333 W. Nye Lane / Carson City, NV 89706

**HYDROLOGIC FEATURES OF THE TRUCKEE AND CARSON RIVER BASINS
 AND ADJACENT AREAS, WESTERN NEVADA AND EASTERN CALIFORNIA**

Carson River Chronology

A Chronological History of the Carson River and Related Water Issues

The information contained in **Part I—Overview** of this *Carson River Chronology* constitutes a general background and informational description of the Carson River system and the Carson River Basin and its geophysical, geologic, and hydrologic characteristics and attributes. **Part II—Pre-Twentieth Century** and **Part III—Twentieth Century** of this chronology contain a relatively detailed listing of some of the more important events associated with the Carson River Basin, the Carson River, the Carson River's East and West Forks, the Carson River Basin's interconnection with the Truckee River Basin via Derby Dam and the Truckee Canal, the Newlands Irrigation Project, the Lahontan Valley wetlands, the Carson Sink and Desert, and related water supply, use, development, water rights, water quality, and water-related environmental issues.

Part I—Overview

Introduction

The Carson River Basin encompasses an area of approximately 3,966 square miles (2,538,230 acres)¹ in the states of California and Nevada. The basin stretches in a generally north and then northeast direction from its headwaters located south of the Lake Tahoe Basin and just north of Sonora Pass in the Sierra Nevada Mountains to its terminus in the Nevada desert. The Carson River Basin lies south of the Lake Tahoe and Truckee River basins² and north of the Walker River Basin.³ The upper portion of the Carson River Basin, which is drained by the Carson River's East and West forks, is mostly contained within Alpine County, which forms part of California's North Lahontan Hydrologic Region of California.⁴ The Carson River's two forks merge in the northern part of Carson Valley, located in Douglas County, Nevada, and form the Carson River mainstem, which then continues on towards the river system's terminus in the Carson Sink. Of the Carson River Basin's total surface area, approximately 606 square miles (387,840 acres), or just over 15 percent lie within the State of California, while the remaining 3,360 square miles (2,149,680 acres), or almost 85 percent, lie within the State of Nevada.⁵ [See **Table 1, Nevada Hydrographic Areas in the Carson River Basin**, for a description of the hydrographic areas and sub-areas contained within the Nevada portion of the Carson River Basin.]

Similar to the adjacent Truckee River Basin and the Walker River Basin, the vast majority of the Carson River Basin's surface area, and certainly most of its demands for water resources, lie within the State of Nevada. However, most of the basin's precipitation and high alpine storage reservoirs are located in the State of California.⁶ Not surprisingly, this extreme geographic separation between the Carson River Basin's principal supply of water and its principal demands for water has tended to exacerbate some of the controversies surrounding the rights to, and the uses of, water resources within the Carson River Basin and shared between these two states.

According to the California–Nevada Interstate Compact, approved by the respective state legislatures in September 1970 (California) and March 1971 (Nevada), Nevada is entitled to 80 percent of the additional (future) yields developed within the Carson River Basin (i.e., new water yields in excess of those required to satisfy existing beneficial uses), with the remaining 20 percent belonging to the State of California. This interstate compact also specifically states that the waters of the Carson River shall not be used in areas outside the Carson River Basin. Although this compact was never ratified by Congress, thereby making it law, its terms have been enforced through a “gentlemen’s agreement” and individual state legislative action.⁷ Furthermore, many of the provisions of this compact pertaining to the allocation of the waters of Lake Tahoe and the Truckee and Carson rivers have been incorporated into the 1990 Negotiated Settlement Act (Public Law 101–618).⁸

While flowing a relatively short 184 miles from the headwaters of its East Fork, located below Sonora Pass in the Sierra Nevada Mountains, the Carson River has experienced more than its share of controversy and holds the dubious distinction of being the cause of the longest-running litigation (1925–1980, 55 years) over water rights adjudication ever waged by the United States Government against private interests.⁹ Ultimately, water rights issues with respect to the Carson River were adjudicated through the Alpine Decree, initially filed on May 11, 1925 (*U.S. v. Alpine Land and Reservoir Company, et al.*), and issued on October 28, 1980.¹⁰ Even so, major issues still remain relative to interstate water rights in the Carson River Basin and the failure to secure Congressional approval of the California–Nevada Interstate Compact.

A Hydrologic Overview of the Carson River Basin

Major hydrologic characteristics of the upper Carson River Basin include the Sierra Nevada Mountains, which serve as the basin’s primary source of precipitation, snowpack, and runoff, a number of relatively small high alpine lakes and reservoirs, the East and West forks of the Carson River,¹¹ which merge on the west side of the Carson Valley, the Carson Valley agricultural area, consisting of approximately 35,000 acres of irrigated farmland,¹² the mainstem Carson River running through the northern portion of Carson Valley and, to the north, Eagle Valley, containing the state’s capitol, Carson City. The lower Carson River Basin may be considered as beginning at the head of Dayton Valley and ending at the furthestmost extent of the Carson Sink (Desert). This portion of the basin includes Dayton Valley, which was the location of extensive milling and ore processing operations during the days of the Comstock in the late 1800’s, and below that the Carson Plains. Also included in the lower Carson River Basin is Lahontan Dam and Reservoir, the Truckee Canal linking the Truckee River Basin to the Carson River Basin, and below Lahontan Dam, the Carson Diversion Dam and the Newlands Irrigation Project, and ultimately the basin’s terminus consisting of the Lahontan Valley and the Carson Sink (Desert). The basin’s terminus represents an extensive area possessing a number of diverse and distinct hydrologic, geologic, and geographic features.

The geology of the Lahontan Valley and the Carson Sink and Desert is quite varied and complicated, but most generally it represents the bottom of an ancient lake that experienced a number of periods of deep lake waters and complete desiccation. As a result of those successive stages of filling and drying, as much as 8,000 feet of sediment has been deposited in this area with

a average thickness of about 3,000 feet.¹³ During the Late Wisconsin glacial age, a period lasting from approximately 75,000 to 10,000 years ago, this area encompassing Lahontan Valley and Carson Desert periodically constituted the largest of the seven major sub-basins making up the ancient Ice Age Lake Lahontan.¹⁴ At its peak surface elevation of 4,380 feet above mean sea level (MSL), which occurred some 65,000 years ago,¹⁵ Lake Lahontan covered a surface area of approximately 8,655 square miles of northwestern Nevada, attained a maximum depth at Pyramid Lake of 886 feet¹⁶ and covered the Lahontan Valley wetlands to a maximum depth of about 700 feet where the Stillwater National Wildlife Refuge now exists.¹⁷

The present-day Lahontan Valley and Carson Sink and Desert, now considerably drier than during the late Wisconsin Age, possesses of a number of important and varied hydrologic features including lakes, marshes and wetlands, cultivated farmlands and pastures, barren desert sinks, alkali flats and playas. The entire lower basin extends in a generally north by northeast direction. In length, the basin extends approximately 56 miles from the Carson Lake and Pasture area in the south to the Carson Sink in the north. In width, the basin extends about 28 miles from the Carson Diversion Dam on the lower Carson River in the west to the Stillwater Point Reservoir in the east. In the upper northwest corner of this expanse, the Carson Sink is hydrologically connected to the Humboldt River Basin via the Humboldt River and the Humboldt Slough. Realistically, however, waters would enter the Carson Sink from the Humboldt River Basin via this connection only during extremely wet years.¹⁸

As compared to today, early explorers and travelers through this area were no doubt faced with far more extreme variations in hydrologic conditions when Lahontan Valley and the lower Carson River Basin received the full, unimpeded, uncontrolled, and highly seasonal flows of the Carson River. In 1882, I.C. Russell, who undertook early hydrologic studies of Nevada's western watersheds for the U.S. Geological Survey (USGS), reported the Lahontan Valley to be covered by water up to 40 square miles.¹⁹ Another early visitor to this area in 1898 described the Carson Sink as "...half shallow lake, half tule swamp which extends for 20 miles along the valley bottom and furnishes enough salt grass, sedges, and tules to winter many thousands head of stock, and a breeding ground for great numbers of water and shore birds."²⁰ As recently as September 1984, the Carson Sink received inflows of almost one-half million acre-feet²¹ as a result of the wettest year on record (1983), thereby temporarily creating a lake with a surface area of over 330 square miles (212,000 acres), making it for a time the largest body of water in Nevada.²²

In those early years of exploration in the lower Carson River Basin, the hydrologic conditions within the Lahontan Valley were subject to change quickly and dramatically. With scant natural precipitation (approximately 5 inches per year) and rates of evaporation of up to 70 inches per year (recorded at Fallon, Nevada),²³ the land became subject to considerable climatic and hydrologic change during the course of a year. Uncontrolled spring runoffs would temporarily inundate large portions of the Lahontan Valley, providing important wetland habitat for numerous animal species, particularly migrating waterfowl. However, after the spring run-off subsided, except during only the wettest of years, the extreme lower portions of the Lahontan Valley took on a much different appearance, namely that of the Carson Sink and the Forty-Mile Desert. This inhospitable expanse of barren wasteland and alkali salt flats, stretching essentially from the last waters of the Humboldt River and the Humboldt Sink (Lake) to the last waters of the Carson River constituted a serious impediment to early overland explorers and emigrants on their already arduous journey to reach

California during the mid-1800's.

Table 1, Nevada Hydrographic Areas in the Carson River Basin, shows the general characteristics and features of the hydrographic areas and sub-areas, along with related counties and principal cities, of the Nevada portion of the Carson River Basin, also designated as Nevada Hydrographic Region [or Basin] Number 8, one of 14 designated groundwater basin located within the State of Nevada.²⁴

Table 1—Nevada Hydrographic Areas in the Carson River Basin
Hydrographic Areas and Sub-Areas by County, Surface Area, and Area Number
[Basins Listed in General Upstream to Downstream Order]

Nevada Hydrographic Area/Sub-Area [Nearest Cities]	County(ies)	Surface Area ¹ (acres)	Surface Area ¹ (sq. ml.)	Nevada Area Number
Carson Valley [Minden, Gardnerville, Genoa]	Carson City, Douglas	268,160	419	105
Eagle Valley [Carson City]	Carson City, Douglas	44,160	69	104
Dayton Valley [Dayton, Virginia City]	Carson City, Douglas, Lyon, Storey	236,160	369	103
Churchill Valley [Fallon]	Douglas, Lyon, Pershing, Storey	307,200	480	102
Carson Desert [Fallon, Stillwater]	Churchill, Lyon, Pershing	1,294,080	2,022	101
Carson Desert/Parkard Valley Sub-Area [Lovelock]	Pershing	102,400	160	101A
Carson River Basin (in Nevada)		2,149,680	3,360	

¹ Includes only those hydrographic areas and sub-areas within the State of Nevada.

Source: *Nevada Hydrographic Basin Statistical Summary*, Office of the State Engineer, Nevada Division of Water Resources, and the Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada, 1988.

Lahontan Valley and the Carson Sink (Desert)

In the late 1800's and early 1900's, the southern portion of Lahontan Valley was dominated by the Carson Lake, which covered up to 20 percent of the Churchill Valley Hydrographic Area (see Table 1). One of the first official government reports about this area was written by Edward W. Kern, who led a detachment of John C. Frémont's 1845 expedition past the Carson Lake. Kern specifically described the Carson Lake as a "very pretty sheet of water, about 11 miles long, bound on the west by a low range of mountains [the Dead Camel Mountain range]. About mid-way on the west side a stream enters it."²⁵ The stream could only have been the Carson River and

indicated that prior to the winter of 1861–1862, the course of the Carson River turned south at Ragtown, entered the Carson Lake on its northwest side, and then exited from its northeast corner, flowing north and into the Carson Sink through the Stillwater Slough. In early 1862, however, a high spring runoff (freshet) opened an old channel of the Carson River, which led east directly to the Carson Sink.²⁶ Although reportedly efforts were made to divert the Carson River back to its original course, this was not entirely successful, and flows into Carson Lake generally subsided thereafter,²⁷ eventually reducing the lake from nearly 100 square miles (64,000 acres) observed in 1845 to less than 1,500 acres (2.3 square miles) by 1994.²⁸

Extensive irrigation below Lahontan Dam on Newlands Project farmlands around the City of Fallon in Churchill County, Nevada, has tended to alter the natural flows to the wetland areas further downstream and modified the hydrologic characteristics of the Lahontan Valley, tending to raise local water tables and requiring irrigation drainage systems. In addition, much of the water now reaching these wetland areas and the sink beyond consists of agricultural drainage (return flows). These waters tend to contain high concentrations of total dissolved solids (TDS) which, in addition to salts, also consist of potentially harmful and naturally-occurring constituents such as lithium, selenium, mercury, and arsenic.²⁹

Water quality issues within the Lahontan Valley wetlands became a major environmental issue in late 1986 and early 1987 when state and federal wildlife biologists reported a massive die off of fish near the mouth of the lower Carson River in the Carson Sink, which forms a part of the Fallon National Wildlife Refuge (NWR). Inflows to these wetland areas from the 1983 record high water year flushed numerous fish and considerable quantities of salts and other constituents into the lake that covered much of the Carson Sink. An unusual combination of high evaporation and freezing conditions quickly produced intolerably high concentrations of harmful dissolved solids, resulting in high rates of fish mortality. In addition to estimates of over seven million fish deaths due to rising TDS concentrations, the congregation of feeding birds facilitated an outbreak of avian cholera which killed approximately 1,500 aquatic birds.³⁰ While these events may be reasonably expected to naturally occur periodically for such basin terminus locations, the extreme conditions in 1986 and 1987 were exacerbated due to the especially high flows and the “flushing” effects these extreme discharges had on the Newlands Project’s agricultural drainage system.³¹

The Lower Carson River Basin and the Newlands Irrigation Project

The major hydrologic feature of the lower Carson River Basin is Lahontan Valley and, within this vast expanse, the Newlands Irrigation Project. This project not only has critical importance to the Carson River’s hydrology, but is also of particular importance to the Truckee River Basin due to its use of Truckee River waters as well. This agricultural project was authorized through passage of the National Reclamation Act of 1902, which was enacted as a means to reclaim arid desert lands and promote settlement in the sparsely-populated western states. Earlier attempts to encourage western settlement, e.g., Homestead Act (1862), Desert Land Entry (Desert Land) Act (1877), and the Carey Act (1894), had made the land available, but had not provided the necessary water to insure the lands’ successful development for agriculture.

The Reclamation Act of 1902 was intended to overcome this water supply shortfall. With respect to the Newlands Project (originally named the Truckee–Carson Irrigation Project), initial

estimates of the project's potential irrigable acreage tended to far exceed reality. Early "official" estimates of potential irrigable lands in the Lahontan Valley ranged from 400,000–500,000 acres.³² However, these impressive figures would be successively reduced as reality set in both with respect to the water actually available for irrigation and the quality of the soils to be irrigated. Immediately after passage of the Reclamation Act, the U.S. Department of the Interior (USDI), and its newly independent (from the USGS) U.S. Reclamation Service (USRS), attempted to secure the stored waters in Lake Tahoe in the Truckee River Basin, intending to bring those waters to Lahontan Valley and the lower Carson River Basin by means of an interlinking canal. This canal would take off from the lower Truckee River above Wadsworth and run along the western side of Lahontan Valley to a point along the Carson River above the project's irrigated farmlands.³³ By 1910, an average of 240,000 acre-feet per year was being diverted from the lower Truckee River for this reclamation project in the lower Carson River Basin.³⁴

By 1927, when the USDI formally turned over the management of the Newlands Project to the newly-created Truckee–Carson Irrigation District (TCID), the maximum acreage to be irrigated within the project was set at a more realistic 74,500 acres, and the maximum water diversion, using the waters from both the Carson and Truckee rivers, was established at 406,000 acre-feet per year.³⁵ Eventually, however, the salinity of the soil on project farmlands and limited available water supplies would further reduce the Newlands Project's irrigable acreage to 60,000–65,000 acres.³⁶ Today, project water diversions total approximately 320,000 acre-feet per year based on water-riighted acreage to be irrigated, designations of bench and bottom lands,³⁷ and their specific allowable water duties.³⁸ Of this total project water allocation, the amount diverted from the Truckee River has been reduced significantly since the early 1900's. From TCID diversions records, between 1910–1966 approximately 239,700 acre-feet per year were diverted at Derby Dam. Since 1988, this diversion amount has averaged approximately 164,050 acre-feet per year, of which some an average of 128,460 acre-feet per year have reached Lahontan Reservoir in the Carson River Basin.³⁹

In addition to the problems associated with the alkalinity of the soil in Newlands Project, Lahontan Valley farmlands were also initially prone to periodic flooding and saturated soils. Water logging of project farmlands began soon after the start of extensive project irrigation in 1906. By the end of 1918, more than 35,000 acres of land had the water table less than six feet below the ground surface. In 1921 the construction of deep drains was begun, and by the end of 1923 more than 150 miles of open drains existed to carry away both surface waste water from irrigation and subsurface waters. Although additional drainage ditches have been added to the project since that time, the area continues to experience a relatively high water table.⁴⁰

The Newlands Project diversions continue to represent the most significant single withdrawal and use of the Truckee River's waters. Derby Dam (originally the Truckee–Carson Diversion Dam), which diverts the waters of the lower Truckee River into the Truckee Canal, was completed in June 1905.⁴¹ Waters from the lower Truckee River began flowing into the Carson River Basin in August 1906 with the completion of the 32.5 mile Truckee Canal.⁴² At first, Truckee River waters were discharged directly into the lower Carson River. Highly variable stream flows and continued water shortages, particularly late in the growing season, quickly demonstrated the need for a major storage facility on the lower Carson River to better regulate water available to the Lahontan Valley farmlands. It was not until 1915, however, that this was accomplished with the

completion of Lahontan Dam and Reservoir. This reservoir has a total storage capacity of approximately 294,000 acre-feet (317,000 acre-feet with flashboards installed).⁴³ Upon completion of Lahontan Dam, the Truckee Canal was re-routed to enter this storage facility.

On December 31, 1926, the U.S. Bureau of Reclamation (renamed from the USRS in 1923) turned over the management of the Newlands Project to the Truckee–Carson Irrigation District (TCID), an organization of Lahontan Valley farmers organized in 1918 to more vigorously pursue persistent irrigation and drainage problems. By this agreement, the USBR was to deliver to the Newlands Project 406,000 acre-feet of water per year for irrigating a maximum of 74,500 acres.⁴⁴ With the implementation of this 1926 contract, TCID came to assume responsibility for the operation of the Lake Tahoe Dam at the outlet to Lake Tahoe (and the head of the Truckee River) at Tahoe City in Placer County, California. TCID also took over the operation of Derby Dam on the lower Truckee River in Washoe County, Nevada, Lahontan Dam on the lower Carson River and, some six miles below Lahontan Dam, the Carson Diversion Dam, both of which are located in Churchill County, Nevada. The Carson Diversion Dam distributes the releases from Lahontan Reservoir into the project's principal "T" (T-Line) and "V" (V-Line) distribution canals. In addition, the project also consists of an extensive array of smaller distribution canals, laterals, and ditches stretching across much of Lahontan Valley.⁴⁵

According to diversion records, from 1910 through 1966, Truckee River diversions at Derby Dam averaged approximately 239,700 acre-feet per year.⁴⁶ In 1967, the USBR eliminated the diversion of Truckee River waters solely for power generation at the Lahontan Dam power plant,⁴⁷ a situation that had existed since the plant's completion in 1915. This action had a dramatic effect on future Truckee River diversions to the project. Since 1967, Truckee River diversions at Derby Dam have averaged 181,720 acre-feet per year, an average reduction of over 24 percent.⁴⁸ Beginning in 1988, the USBR implemented a new water allocation method for project farmlands ("maximum allowable diversion"), which, along with higher conveyance efficiency targets and Lahontan storage targets, further reduced annual Truckee River diversions at Derby Dam to approximately 164,050 acre-feet per year.⁴⁹ This latter period also coincided with the most severe recorded drought period in the history of the Truckee and Carson River basins.

Today, the Newlands Project consists of approximately 73,000 water-righted acres of which about 59,800 acres are actually irrigated. The project is divided into two areas. The Truckee Division consists of some 4,000 irrigated acres and includes the Fernley, Hazen, and Swingle Bench areas and is serviced directly from the Truckee Canal (i.e., Truckee River water only). The Carson Division consists of approximately 55,700 irrigated acres including the Stillwater, Stillwater Indian Reservation, Fallon, Island, and Sheckler areas serviced below Lahontan Dam (served by both Carson and Truckee River waters).⁵⁰

Table 2, Selected Truckee River and Truckee Canal Flows (Discharges), presents flows and differences in flows of the lower Truckee River waters above and below Derby Dam and above and below the Newlands Project's Truckee Division along the Truckee Canal. While these differences may provide a general indication of the actual level of these respective diversions, further explanation should be made with respect to this presentation. First, "average" annual flows and corresponding rates of flow for these gaging stations have been calculated over a comparable period of the water years (October 1st through September 30th) 1973 through 1995. Second, due

to the distances involved, differences above and below Derby Dam on the Truckee River, as well as above and below the Truckee Division on the Truckee Canal, reflect not only the water diversions at these points, but also river and canal losses due to evaporation, seepage, and phreatophyte⁵¹ usage between the specific gaging station locations.⁵²

Table 2—Selected Truckee River and Truckee Canal Flows (Runoff)

Average Flow Volumes are for the 1973–1995 Comparable Period of Record

Average Annual Runoff Measured in Acre-Feet [Rates of Flow in Cubic Feet per Second]^a

By Gaging Station Location (See notes below on respective periods for average, low, and high water years)	Average of 1973–1995 Water Years	Low Water Year	High Water Year
Truckee River at Farad (State Line) (Gaging Station 10346000) ¹	551,110 [761 cfs]	133,210 [184 cfs]	1,768,660 [2,443 cfs]
Truckee River below Tracy, Nevada, and above Derby Dam (Gaging Station 10350400) ²	565,690 [781 cfs]	111,490 [154 cfs]	1,977,160 [2,731 cfs]
Truckee River Immediately below Derby Dam (Gaging Station 10351600) ³	362,420 [501 cfs]	4,460 [6.16 cfs]	1,759,250 [2,430 cfs]
Difference—Above/Below Derby Dam^b	203,270	—*	217,910
Truckee Canal near Wadsworth above Truckee Division and 22.94 miles above Lahontan Reservoir (Gaging Station 10351300) ⁴	170,890 [236 cfs]	83,980 [116 cfs]	287,420 [397 cfs]
Truckee Canal near Hazen below Truckee Division and 3.35 miles above Lahontan Reservoir (Gaging Station 10351400) ⁵	127,220 [176 cfs]	29,970 [41.4 cfs]	238,910 [330 cfs]
Difference—Above/Below Truckee Division^b	43,670	54,010	48,510

^a Gaging station flows or flow volumes are based on average annual rates of flow in [bracketed] cubic feet per second (cfs). Bolded figures above these rates of flow measures show the average annual corresponding runoff volumes in acre-feet. One acre-foot equals 325,851 gallons. As a conversion measure between the rate of flow and the total runoff, a continuous rate of flow of one cubic foot per second is equivalent to a total runoff volume of approximately 723.97 acre-feet per year.

^b Flows, rates of flow, and differences for the average of the 1973–1995 water years are based on a comparable period of record. It should be noted that these differences reflect not only the water diversions associated with these points, but also stream and canal losses due to evaporation, seepage, and phreatophytes between the specific gaging station locations.

* Not relevant; difference represents different periods of record (1992 and 1931).

Gaging Station Notes:

¹ For complete years of record 1909–1995 average equals 542,980 acre-feet; High water year: 1983; Low water year: 1931.

² For complete years of record 1973–1995 average equals 565,420 acre-feet; High water year: 1983; Low water year: 1992.

³ For complete years of record 1918–1995 average equals 269,320 acre-feet; High water year: 1983; Low water year: 1931.

⁴ For complete years of record 1967–1995 average equals 181,720 acre-feet; High water year: 1978; Low water year: 1983.

⁵ For complete years of record 1967–1995 average equals 135,380 acre-feet; High water year: 1978; Low water year: 1983.

Source Data: *Water Resources Data, Nevada*, various issues, Nevada District Office, Water Resources Division, U.S. Geological Survey, Carson City, Nevada.

Recordings of the Truckee River USGS Farad gaging station, located 3.5 miles upstream from the California–Nevada border, are used to measure the Truckee River’s waters actually entering the State of Nevada. Based on the figures presented in Table 2, it may be seen that during the water years of 1973–1995, approximately 66 percent of the average annual discharge of Truckee River waters entering the State of Nevada and recorded at the USGS Farad gaging station (551,110 acre-feet) near the California–Nevada state line were available in the river below Derby Dam (362,420 acre-feet). Not shown in this table, over this same period of time the USGS Nixon gaging station at Pyramid Lake recorded average annual inflows of 397,650 acre-feet, indicating that of the average Truckee River flows entering Nevada, over 72 percent actually entered Pyramid Lake. The difference in the Truckee River flow readings taken at the Nixon gaging station and those taken just below Derby Dam is due primarily to Truckee Canal return flows from spills back into the Truckee River from the Gilpin Spill and the Paiute Spill.

Other major hydrologic features within Lahontan Valley include the Fallon National Wildlife Refuge,⁵³ Stillwater National Wildlife Refuge,⁵⁴ Nevada’s Stillwater Wildlife Management Area (WMA),⁵⁵ Carson Lake and Pasture,⁵⁶ and the river’s terminus, the Carson Sink (Playa) and Desert. Currently, a program is underway to transfer water rights from willing sellers in the Newlands Project for wetland restoration in the Stillwater NWR and Carson Lake and Pasture. It is the intent of the USDI and its U.S. Fish and Wildlife Service (USFWS) and the State of Nevada to purchase sufficient water from project water-right holders (willing sellers) in order to maintain up to 25,000 acres of wetland in the Lahontan Valley.⁵⁷ Future water purchases may also be made to keep water in the lower Truckee River below Derby Dam for the preservation of the endangered and threatened fish species in Pyramid Lake.⁵⁸ These water-acquisition programs represent a serious threat to Churchill County’s agriculturally-dependent economy. While the program targets “willing sellers,” the loss of agricultural water rights and productive land is destined to seriously disrupt other water users and dramatically alter the lower Carson River Basin’s hydrologic and socioeconomic conditions.

The Newlands Project—An Economic Mainstay of Churchill County

While controversy continues to surround the Newlands Project with respect to its sources of water, the project’s efficiency,⁵⁹ and the water quality of its return flows, few could deny the extensive and pervasive economic benefits that this reclamation project has provided to the Churchill County economy since its inception. In terms of economic importance, agriculture’s impact upon the Churchill County economy ranks only second to the contribution made by the Fallon Naval Air Station (NAS) to local employment, incomes, and spending. Farm marketings from the sale of the country’s agricultural products provide revenues of over \$30 million per year, making it the fourth most important agricultural-producing county in the state.⁶⁰ Furthermore, due to the export nature of many of these agriculture sales from Churchill County’s farms, the revenues from farm marketings provide a healthy infusion of new capital into the county’s economy, thereby multiplying its direct impact on local economic activity.⁶¹

Statistical and correlation analysis studies undertaken by the Nevada Division of Water Planning⁶² have clearly shown a high degree of economic “insulation” and the relative stability shown by the Churchill County economy. This “avoidance” of many of the adverse effects from

external economic influences (i.e., regional and national business cycles and interest rate trends), further attests to the stabilizing influences provided by Churchill County's farming sector to the overall county economy. Admittedly, a significant portion of these beneficial influences must also be attributed to the presence of the Fallon NAS, an influence which recently expanded in the spring of 1996 with the relocation of the Navy's Tactical Weapons School ("Top Gun") from Mirimar NAS, located near San Diego, California.

As an example of the relative importance of agriculture to the Churchill County economy, while the county's population comprises only 1.4 percent of Nevada's total population,⁶³ Churchill County's approximately 542 farms account for 18 percent of all farming units in the State of Nevada. Also, while containing only 4.4 percent of the state's total land area and 3.7 percent of its total land in farms, Churchill County accounts for over 8 percent of all irrigated farmland in the state. More importantly, Churchill County's 8 percent share of the state's total irrigated farmland produces a disproportionate 12.9 percent of the state's total farm marketings, thereby attesting to the suitability and productiveness of the region.⁶⁴

Throughout this century, farming, ranching, and agriculture have been an integral part of the Churchill County economy and a fundamental way of life for many of the residents of this area. It has been the crucial importance of this industry, as well as the rural lifestyle it has fostered, that has made issues pertaining to the preservation of existing agricultural water rights and the maintenance of a healthy agricultural sector, so sensitive to the local population.

To some degree, this area has become the victim of vastly changing federal priorities. In the late 1800's and early 1900's, extensive federal western land settlement programs and seemingly endless reclamation efforts were pursued to bring water and settlement to arid western lands and thereby increase the economic productivity and social benefits of the available resources of these areas. The Homestead Act (1862), the Desert Land Act (1877), the Carey Act (1894), and the Reclamation Act (1902) all provided clear testament of the federal government's commitment to this pursuit. In Churchill County these efforts have largely been a notable success.

Furthermore, based on the passage of the 1902 Reclamation Act and the subsequent approval of the Truckee-Carson (Newlands) Irrigation Project, the federal government, on behalf of these early Churchill County farmers, aggressively litigated and secured sufficient water rights to establish and maintain a viable agriculture industry. Specifically, on March 30, 1913, the federal government initiated a suit (*U.S. v. Orr Ditch Water Company, et al.*) on behalf of Newlands Project farmers against virtually all Nevada water users on the Truckee River. By means of this suit and the resultant 1944 Orr Ditch Decree, the farmers were provided, under Claim 3, the right to divert up to 1,500 cubic feet per second of Truckee River water at Derby Dam (although nominal canal capacity is 900 cubic feet per second). Later, on May 11, 1925, the federal government initiated a similar suit (*U.S. v. Alpine Land and Reservoir Company, et al.*) in which they filed a claim to waters of the Carson River for storage in Lahontan Reservoir to be used by project farmers. From this suit, the 1980 Alpine Decree granted the Newlands Project landowners the right to specific water duties, to be satisfied from both the Carson and Truckee rivers.

By the late 1960's and early 1970's, however, a new environmental awareness overtook the nation and marked the beginning of a break with past developmental policies. Federal legislation with respect to environmental priorities (1969 National Environmental Policy Act), the plight of

endangered and threatened species (1966 Endangered Species Preservation Act, 1969 Endangered Species Conservation Act, and 1973 Endangered Species Act), and mounting concerns over the rights of native-Americans, have come to reflect a new federal mandate and a new direction for national priorities and policies.

These changes in national priorities, no doubt, represent changes that are both confusing and disturbing to the vested agriculture interests in Churchill County. As a result of these altered national priorities, apparent federal “abandonment” to their needs, and growing attempts to curtail agriculture water use in the lower Carson River Basin, local governments, the business community, and agriculture interests formed of the Lahontan Valley Environmental Alliance (LVEA) in October 1993. Importantly, this action represented a recognition by highly diverse, and yet integrated interests in the Lahontan Valley that water is inextricably tied to virtually all facets of human endeavor in this region. Only time will tell if a lasting solution can be reached whereby environmental, agricultural, and economic interests can co-exist and share the limited waters of the Carson and Truckee River basins.

Carson River Flows (Runoff) and Rates of Flow

Table 3, Selected Carson River Gaging Station Flows (Runoff), presents average annual flows, or total runoff, in acre-feet per year (based on annualized rates of flow in cubic feet per second) for specific river flow conditions at specific gaging station locations for various periods of record through water year 1995 (October 1, 1994 through September 30, 1995). It should be noted that in accordance with recent Newlands Project Operating Criteria and Procedures (OCAP), water diversions from the lower Truckee River at Derby Dam are typically at their lowest when flows in the Carson River are at their highest. This is reflected by the differences appearing in this table between the Carson River’s USGS Fort Churchill gage and the river’s gage below Lahontan Reservoir, which reflects both Carson River flows and those Truckee River flows entering Lahontan Reservoir via the Truckee Canal. Consequently, during normal and low water years, runoff is greater below Lahontan Dam than above it, reflecting the addition of Truckee River waters.

Table 3—Selected Carson River Gaging Station Flows (Runoff)
Average Annual Runoff Measured in Acre-Feet [Rates of Flow in Cubic Feet per Second]^a

By Gaging Station Location (See notes below on respective periods for average, low, and high water years)	Average Year	Low Water Year	High Water Year
East Fork below Markleeville Creek, CA (Gaging Station 10308200) ¹	255,560 [353 cfs]	60,600 [83.7 cfs]	585,690 [809 cfs]
West Fork at Woodfords, CA (Gaging Station 10310000) ²	79,640 [110 cfs]	18,900 [26.1 cfs]	209,950 [290 cfs]
East Fork at Minden, NV (Gaging Station 10309100) ³	217,190 [300 cfs]	2,370 [3.27 cfs]	518,360 [716 cfs]
Carson River near Carson City, NV (Gaging Station 10311000) ⁴	290,310 [401 cfs]	42,350 [58.5 cfs]	826,770 [1,142 cfs]
Carson River near Fort Churchill, NV (Gaging Station 10312000) ⁵	266,420 [368 cfs]	26,280 [36.3 cfs]	804,330 [1,111 cfs]
Carson River below Lahontan Reservoir near Fallon, NV (above Carson Diversion Dam) (Gaging Station 10312150) ⁶	367,050 [507 cfs]	131,040 [181 cfs]	771,750 [1,066 cfs]
Carson River at Tarzyn Road near Fallon, NV (drain into the Carson Sink) (Gaging Station 10312275) ⁷	23,170 [32.0 cfs]	1,720 [2.38 cfs]	107,870 [149 cfs]
Stillwater Point Reservoir Diversion Canal near Fallon, NV (Gaging Station 10312210) ⁸	10,350 [14.3 cfs]	3,600 [4.97 cfs]	22,080 [30.5 cfs]
Paiute Drain below TJ Drain near Stillwater, NV (Gaging Station 10312277) ⁹	3,360 [4.64 cfs]	120 [0.17 cfs]	11,150 [15.4 cfs]

^a Gaging station flows or runoff volumes are based on average annual rates of flow in [bracketed] cubic feet per second (cfs). Bolded figures above these rates of flow measures show the average annual corresponding runoff volumes in acre-feet. One acre-foot equals 325,851 gallons. As a conversion measure between the rate of flow and the total discharge, a continuous rate of flow of one cubic foot per second is equivalent to a total runoff of approximately 723.97 acre-feet per year.

Gaging Station Notes:

¹ For years of record 1960–1995; High water year: 1983; Low water year: 1977.

² For years of record 1901–1995; High water year: 1907; Low water year: 1977.

³ For years of record 1974–1995; High water year: 1995; Low water year: 1977.

⁴ For years of record 1940–1995; High water year: 1983; Low water year: 1977.

⁵ For years of record 1911–1995; High water year: 1983; Low water year: 1977.

⁶ For years of record 1967–1995; High water year: 1983; Low water year: 1992.

⁷ For years of record 1985–1995; High water year: 1986; Low water year: 1992. (In 1983, before this period of record, it was estimated that nearly 500,000 acre-feet flowed into the Carson Sink. However, some of this inflow to the Carson Sink also came from the lower Humboldt River via the Humboldt Sink and the Humboldt Slough.)

⁸ For years of record 1991–1995; High water year: 1995; Low water year: 1992.

⁹ For years of record 1991–1995; High water year: 1995; Low water year: 1992.

Source Data: *Water Resources Data, Nevada, Water Year 1995*, U.S. Geological Survey Water-Data Report NV-95-1, Nevada District Office, Water Resources Division, U.S. Geological Survey, U.S. Department of the Interior, Carson City, Nevada, 1996.

The Carson River—The East Fork

The Carson River East Fork is considerably longer than the West Fork as well as considerably larger in terms of its total discharge (annual flow). From its headwaters to its confluence with the West Fork near Walley's Hot Springs on the west side of Carson Valley near Genoa in Douglas County, Nevada, the East Fork has traveled a distance of nearly 65 miles. By comparison, from its headwaters to its confluence with the East Fork, the West Fork has traveled only about 33 miles.⁶⁵ The East Fork has recorded an average annual discharge of 255,560 acre-feet⁶⁶ near Markleeville, located in Alpine County, California, where the East Fork exits the Sierra Nevada Mountains. This reflects a volume of approximately 3.2 times the average annual discharge of 79,640 acre-feet⁶⁷ recorded nearby on the Carson River West Fork at Woodfords, also in Alpine County, where the West Fork leaves the Sierra Nevada Mountains.⁶⁸

The Carson River East Fork begins high in the Sierra Nevada Mountains in Alpine County, draining the north slope of Sonora Peak (11,462 feet) and the east slope of Stanislaus Peak (11,220 feet). After flowing 15.2 miles in a generally northerly direction, the East Fork meets Poison Creek. After another 5.8 miles, the East Fork joins with Silver King Creek at the south end of Silver King Valley. Silver King Creek drains an area just north of Lost Cannon Peak (11,099 feet) and Wells Peak (10,833 feet). The upper reaches of both the East Fork of the Carson River and Silver King Creek drain areas just north of the Walker River Basin's West Fork (West Walker River) drainage area.

After merging with the waters of Silver King Creek, the East Fork flows through Silver King Valley, and 3.2 miles further downstream the East Fork meets the outflow of Bagley Valley. Nearly three miles further along it meets Wolf Creek, and after another 2.6 miles, the waters of Silver Creek enter the waters of the East Fork. Silver Creek has its own extensive drainage area consisting of an area in the southwest portion of the Carson River Basin enclosed by Highland Peak (10,934 feet) and Silver Peak (10,774 feet) on the east, Tryon Peak (10,080 feet) on the south, and Ebbetts Peak (9,211 feet) and Reynolds Peak (9,690 feet) on the west. Along with its own tributary, Nobel Creek, Silver Creek drains Upper Kinney Lake (8,640 feet), Lower Kinney Lake (8,560 feet), and Kinney Reservoir (8,480 feet).

Another 2.5 miles downstream from the confluence with Silver Creek, the Carson River East Fork receives the waters of Monitor Creek, which drains Heenan Lake (7,084 feet) and its tributary, Heenan Creek. Some 3.2 miles further along, the East Fork passes under Hangman's Bridge (which has an interesting history with respect to acquiring its name),⁶⁹ and then 1.4 miles further downstream the East Fork meets the waters of Markleeville Creek. Markleeville Creek is formed just above Markleeville, California, from the confluence of Pleasant Valley Creek and Hot Springs Creek. Hot Springs Creek drains Hot Springs Valley, and above that, Burnside Lake (8,080 feet) and Charity Valley Creek, which originates just to the east of The Nipple (9,340 feet). Along the way, Hot Springs Creek also picks up a number of smaller tributaries to include Spratt Creek, Musser and Jarvis Creek, Shay Creek, and Sawmill Creek, the latter creek originating just below Markleeville Peak (9,417 feet).

Pleasant Valley Creek, the other major tributary of Markleeville Creek, drains Pleasant Valley and, above that, Raymond Lake (8,760 feet), which is located just below Raymond Peak (10,011

feet). Further to the west, Pleasant Valley Creek also drains Lower Sunset Lake (7,680 feet), Hellhole Lake (7,800 feet), and Tamarack Lake (7,840 feet).

Almost nine miles downstream from where Markleeville Creek joins the Carson River East Fork, the river crosses the California–Nevada state line, and just over one mile downstream from the state line the waters of the Carson River East Fork receive the waters of Bryant Creek. Bryant Creek drains an extensive area in the eastern part of the Carson River Basin north of Monitor Pass and Leviathan Peak (8,963 feet) to include the major tributaries of Leviathan Creek, Mountaineer Creek, Poison Creek, and (the ephemeral)⁷⁰ Barney Riley Creek, all of which are located within California. Leviathan Creek's waters are seasonally affected by toxic acid mine drainage⁷¹ and other dissolved minerals leeching from the Leviathan Mine site. High spring runoff tends to cause evaporation ponds located at the Leviathan Mine site to overflow, spilling toxic substances into Leviathan and Bryant Creeks. The Leviathan mine site⁷² is located nine miles above the Carson River's East Fork and approximately 1.5 miles above the confluence of Leviathan and Mountaineer creeks, which together form Bryant Creek.⁷³

Pollution of the waters of Leviathan Creek and Bryant Creek first became evident shortly after 1952⁷⁴ when the Isabell Construction Company, which was employed by the Anaconda Copper Mining Company, removed some 22 million tons of the overburden from this mining site and dumped the waste, which contained large quantities of low-grade sulfur ore, into three dump or "spoil" sites, one of which was the Leviathan Creek canyon. The Leviathan Creek canyon dump site covered 26 acres to a depth of more than 130 feet. Subsequently, in April 1954 and November 1959, releases of large amounts of acid mine drainage into Leviathan Creek resulted in extensive fish kills in Leviathan and Bryant creeks, and extending as far as ten miles down the Carson River East Fork below the entry of Bryant Creek.⁷⁵

Monitoring data taken between 1954–1975 showed significant mining impacts to water quality in this area in the form of high metal and sulfate concentrations, and low pH (acidic) and low dissolved oxygen concentrations⁷⁶ in Leviathan and Bryant creeks. During this same testing period, iron and arsenic concentrations were found to exceed U.S. Public Health Service 1962 Drinking Water Standards seven miles downstream from the mine. Also during this study, no fish were found in Leviathan or Bryant creeks between the mine and the Carson River East Fork, a distance of some nine miles. The State of California purchased the Leviathan Mine site in 1983 and began an on-going pollution abatement program. A remediation program was begun by the State of California in 1983 and completed in 1985. While considerable success was achieved from these efforts, acid mine drainage remains a problem, particularly during high-flow periods.⁷⁷

Just over 3.5 miles below the mouth of Bryant Creek, the East Fork arrives at Horseshoe Bend. Approximately one mile to the west lies Mud Lake (5,100 feet), which is fed by a diversion from Indian Creek as well as waters from the Carson River West Fork. Outflows from Indian Creek will eventually join the East Fork 4.2 miles downstream from Horseshoe Bend. Three miles downstream from Horseshoe Bend, the East Fork enters the southern portion of Carson Valley, most of which lies in Douglas County, Nevada. Carson Valley is approximately 22 miles long and nearly 10 miles wide on the valley floor. The valley contains approximately 35,000 acres of irrigated farmland and represents one of the earliest settled and most productive agricultural areas in western Nevada. Water diversions, ditch construction, and ranching and farming began

in this valley in the late 1850's and early 1860's. As early as 1860 there was approximately 4,700 acres under irrigation on the East Fork and 3,900 acres were irrigated on the West Fork.⁷⁸

In its course through Carson Valley, the waters of the East Fork are rapidly diminished by extensive irrigation diversions. From its entry into Carson Valley's southern end, the East Fork flows in a generally north by northwest direction for some 11 miles, skirting the valley's principal towns of Minden and Gardnerville to the south and west, and heading towards the western side of the valley, where it eventually joins the Carson River's West Fork at a point approximately one mile northeast of Walley's Hot Springs and less than 1.5 miles southeast of Genoa.

The Carson River—The West Fork

The Carson River West Fork is both shorter and significantly smaller than the East Fork, having only about one-third the average discharge of the East Fork.⁷⁹ Even so, the West Fork tends to have a richer and earlier history than the East Fork due to its strategic location along the major transportation route for the Carson Pass and Luther Pass, which were used by early explorers, miners, and emigrants. These passes through the Sierra Nevada Mountains provided early access to Placerville, California and the placer gold fields (via Luther Pass), as well as providing a direct route to the rich farmlands of California's Central Valley (via Carson Pass).

The origins of the Carson River West Fork begin at the Lost Lakes (Upper or East Lost Lake—8,640 feet, and the Lower or West Lost Lake—8,560 feet) located just below The Nipple (9,340 feet). After flowing just over two miles, the West Fork picks up Forestday Creek and then enters Faith Valley. After another nearly 4.5 miles, the West Fork enters Hope Valley where it picks up Red Lake Creek. Red Lake Creek drains Red Lake (8,840 feet) and Crater Lake (8,160 feet) and the area to the east of Red Lake Peak (10,061 feet). It is recorded that it was from this peak that John C. Frémont, in February 1844, first saw Lake Tahoe lying some 16 miles to the north as he struggled through these snow-covered mountains on his way to Sutter's Fort, located near the confluence of the American and Sacramento rivers in present-day Sacramento, California.

Two miles into Hope Valley, the Carson River West Fork merges with Maxwell Creek, which brings with it the waters of Scotts Lake (8,012 feet). Two miles below Maxwell Creek, the West Fork merges with Willow Creek, which comes down from the north just below Freel Peak (10,881 feet) and passes through Horse Meadow. After traveling a total of some five miles through Hope Valley, the West Fork enters the steep West Carson (Woodfords) Canyon where it falls nearly 1,460 feet over a distance of five miles (5.5 percent grade) on its way to the canyon's mouth at Woodfords.⁸⁰ Within the West Carson Canyon, the West Fork picks up a number of smaller tributary streams intermittently flowing from Horsethief Canyon, Hidden Canyon, Deep Canyon, Cloudburst Canyon, Merk Canyon, Acorn Canyon, and Cary Canyon.

Before leaving the West Carson Canyon at Woodfords, the first irrigation ditches take off for irrigating Diamond Valley, a small valley area lying to the south and east between the West and East forks of the Carson River. These diversion ditches include Snowshoe Thompson Ditch No. 1 and No. 2.⁸¹ These ditches also take winter water to Mud Lake via Diamond Valley and Indian Creek.⁸² From Woodfords, the West Fork travels due east 3.5 miles to where it comes abreast of the townsite of Paynesville (located near the junction of U.S. Route 88 and Foothill Road), at

which point it enters the southwest corner of Carson Valley. From this point the West Fork heads practically due north for nearly 14 miles along the western side of Carson Valley towards its confluence with the Carson River East Fork near Walley's Hot Springs.⁸³

To the north of Woodfords and along the Carson Range's eastern slope in Carson Valley, a number of smaller tributary streams and creeks, some of which are either ephemeral or intermittent, drain the steep canyons, subsequently flowing either into the West Fork or into the extensive canal and slough system which criss-crosses the valley's floor. Some of the more prominent of these include (from south to north) the intermittent streams of Stuard and Larson canyons and Fredericksburg Canyon, Luther Creek, flowing from Fay Canyon, and flows from Jobs Canyon, located just to the north of Jobs Peak (10,633 feet), a majestic peak which dominates the Carson Range along the western side of Carson Valley. Sheridan and Barber creeks, which flow into the Park and Bull Slough, also contribute to the valley's water resources, as do the flows from Mott Canyon, Daggett Creek flowing out of Haines Canyon and the Kingsbury Highway (Grade) drainage area, and the creeks flowing out of Genoa Canyon and Sierra Canyon.

To the north of Carson Valley in Eagle Valley (Carson City), tributary streams and creeks empty into this valley as well, also draining the eastern slope of the Carson Range, which borders the Lake Tahoe (Truckee River) drainage basin. Principal streams include Clear Creek, flowing from Spooner Summit (U.S. Highway 50) and Duane Bliss Peak (8,658 feet), as well as Kings Canyon Creek and Ash Creek further to the north, both of which flow into Eagle Valley Creek.⁸⁴

Carson Valley—A Natural Floodplain

Carson Valley is situated along and below an extended section of the steep slope of the eastern face of the Carson Range of the Sierra Nevada Mountains. On the east it is bordered by the Pine Nut Mountains. The valley's surrounding mountains are typically drained by a number of short, steep stream courses which are periodically subject to flood conditions. Carson Valley serves as a natural catchment basin for these water courses and because of its shape and configuration with respect to the surrounding mountains, it serves as a natural floodwater receptacle. Not unexpectedly, with virtually no upstream reservoirs to lessen the impact of inflows, the valley has been subject to a number of damaging floods. On the other hand, this "flood-plain effect" has served the valley well by making its approximately 35,000 acres of irrigated farmland some of the richest and most productive in the state.

In addition to the main river channels of the East and West forks in the southern portion of the valley, and the Carson River mainstem running through the valley's northern portion, Carson Valley is also interlaced with numerous old river channels, locally referred to as sloughs. These channels are particularly prevalent between the East and West forks and at times have served to merge these two forks well before their normal natural convergence in the northwestern portion of the valley southeast of Genoa. During periods of high water flow, these channels, which are subject to blockage, heavy sedimentation, and extensive erosion, fill rapidly and facilitate extensive flooding across the valley's floor. As a result of the limited drainage capacity of this valley, the rated channel flood capacities of both the East and West forks are relatively low. The East Fork's rated flood capacity south of Gardnerville is only 2,500 cubic feet per second and that of the West Fork is only 600 cubic feet per second at Woodfords.

Table 4—Carson River Selected (Gaged) Stream Inflows^a
Average Annual Runoff Volumes in Acre-Feet [Flow Rates in Cubic Feet per Second]^b

By Major Reach and Tributary (Listed by Gaging Station Number—See notes on respective average, low, and high water years)	Average Water Year	Low Water Year	High Water Year
East Fork—Bryant Creek (Gaging Station 10308800) ¹	6,470 [8.94 cfs]	2,660 [3.67 cfs]	14,480 [20.0 cfs]
East Fork—Indian Creek (Gaging Station 10309035) ²	9,270 [12.8 cfs]	9,270 [12.8 cfs]	9,270 [12.8 cfs]
East Fork—Pine Nut Creek (Gaging Station 10309050) ³	910 [1.26 cfs]	210 [0.29 cfs]	3,110 [4.29 cfs]
East Fork—Buckeye Creek (Gaging Station 10309070) ⁴	570 [0.79 cfs]	8 [0.011 cfs]	1,870 [2.58 cfs]
West Fork—Fredericksburg Canyon Creek (Gaging Station 10310300) ⁵	1,820 [2.51 cfs]	1,020 [1.41 cfs]	3,520 [4.86 cfs]
West Fork—Miller Creek (Spring) (Gaging Station 10310350) ⁶	440 [0.61 cfs]	250 [0.35 cfs]	750 [1.04 cfs]
West Fork—Daggett Creek (Gaging Station 10310400) ⁷	1,320 [1.83 cfs]	690 [0.95 cfs]	2,580 [3.57 cfs]
Carson River—Clear Creek (Gaging Station 10310500) ⁸	3,480 [4.81 cfs]	1,510 [2.09 cfs]	8,110 [11.2 cfs]
Carson River—Kings Canyon Creek* (Gaging Station 10311100) ⁹	1,060 [1.46 cfs]	250 [0.35 cfs]	3,320 [4.58 cfs]
Carson River—Ash Canyon Creek* (Gaging Station 10311200) ¹⁰	2,280 [3.15 cfs]	910 [1.26 cfs]	5,630 [7.77 cfs]
Carson River—Vicee Canyon Creek* (Gaging Station 10311260) ¹¹	110 [0.15 cfs]	2 [0.003 cfs]	280 [0.39 cfs]
Carson River—Eagle Valley Creek* (Gaging Station 10311300) ¹²	2,160 [2.98 cfs]	300 [0.42 cfs]	11,370 [15.7 cfs]

^a Gaged streams have been listed sequentially by their USGS gaging station numbers.

^b Gaging station flows or runoff volumes are based on average annual rates of flow in [bracketed] cubic feet per second (cfs). Bolded figures above these rates of flow measures show the average annual corresponding runoff volumes in acre-feet. One acre-foot equals 325,851 gallons. As a conversion measure between the rate of flow and the total runoff, a continuous rate of flow of one cubic foot per second is equivalent to a total runoff volume of approximately 723.97 acre-feet per year.

* Eagle Valley Creek is also fed by Kings Canyon Creek, Ash Canyon Creek, and Vicee Canyon Creek.

Gaging Station Notes:

¹ For years of record 1961–1995; High water year: 1969; Low water year: 1964; ² For years of record 1994–1995; High water year: 1995; Low water year: 1995; ³ For years of record 1980–1995; High water year: 1983; Low water year: 1994; ⁴ For years of record 1980–1995; High water year: 1983; Low water year: 1994; ⁵ For years of record 1989–1995; High water year: 1995; Low water year: 1992; ⁶ For years of record 1989–1995; High water year: 1995; Low water year: 1991; ⁷ For years of record 1966–1995; High water year: 1969; Low water year: 1994; ⁸ For years of record 1948–1995; High water year: 1952; Low water year: 1992; ⁹ For years of record 1976–1995; High water year: 1983; Low water year: 1992; ¹⁰ For years of record 1976–1995; High water year: 1983; Low water year: 1992; ¹¹ For years of record 1984–1995; High water year: 1995; Low water year: 1990; ¹² For years of record 1985–1995; High water year: 1986; Low water year: 1991.

Source Data: *Water Resources Data, Nevada, Water Year 1995*, U.S. Geological Survey Water-Data Report NV-95-1, Nevada District Office, Water Resources Division, U.S. Geological Survey, U.S. Department of the Interior, Carson City, Nevada, 1996.

As an example of the degree by which the Carson River's East and West forks' flood stages periodically have been exceeded, in 1937 the East Fork flooded with a peak flow of 12,000 cfs near Gardnerville; during the November–December 1950 flood period the channel reached a peak rate of flow of 13,500 cfs; in December 1955 the East Fork's channel attained a peak flow of approximately 14,000 cfs; and in January 1997 the East Fork attained a new record peak flood flow of 20,000 cfs. Concurrently, on the West Fork at Woodfords, the 1937 flood resulted in a rate of flow of 3,500 cfs; during the November–December 1950 flood a flow rate of 3,300 cfs was attained; during the December 1955 flood, a similar peak rate 3,300 cfs was measured at Woodfords; and during the June 1997 flood a new record flow of 8,000 cfs was attained.⁸⁵ Any floodwater head coming down out of the mountains in excess of the rated channel capacity quickly causes both rivers' main courses to overflow and become bypassed, soon overflowing the sloughs as well and rapidly spreading across the valley's rich farmlands. While acknowledging the oftentimes beneficial effects of spreading flood waters across a floodplain, the raging forks of the Carson River have readily demonstrated an ability to create new channels with frequently damaging results to land, livestock, and infrastructure throughout Carson Valley.

The Carson River—Confluence and Mainstem

After forming the main Carson River from its East and West forks northeast of Walley's Hot Springs and southeast of Genoa, the Carson River heads north and then northeast, crosses U.S. Highway 395 near the historic site of Cradlebaugh's Bridge,⁸⁶ and then exits the Carson Valley by passing between Hot Springs Mountain and Prison Hill. The Carson River then travels north along the eastern edge of Eagle Valley and the present site of Carson City to the old site of Empire City,⁸⁷ where the river turns east and enters the upper end of the relatively narrow Dayton Valley. On its course through this canyon to Dayton, the river drops nearly 240 feet over a distance of just over ten miles. It was along this stretch, due both to the available hydro power and proximity to the Comstock mines to the north, that the mine owners established their ore-processing mills. By 1862 there were 23 stamping mills along this stretch, all run by water power.⁸⁸

At Dayton, located approximately 10.6 miles downstream from Empire City, Gold Canyon joins Dayton Valley and empties into the Carson River. This point on the river marks the location where gold (and not silver) was first discovered in this area in 1852. These early placer miners, unaware at the time of the vast silver riches that lay beneath their modest gold diggings, followed the faint trails of gold up Gold Canyon and, to the northeast, up Sixmile Canyon towards the present site of Virginia City. Later, in 1858, it was discovered that the troublesome blue mud the miners had routinely discarded in their search for gold was rich in silver, valued at over \$3,000 per ton. These two canyons would mark the geologic boundaries of one of this nation's richest silver strikes—the Comstock Lode.⁸⁹ Efforts to extract this vast body of silver wealth would begin a period of natural resource exploitation (timber cutting and water diversions) and environmental degradation (deforestation, soil erosion, water pollution, arsenic and mercury spills), the effects of which have carried forward to the present day. During the Comstock's peak years of production of 1862–1880, approximately \$296,400,000 worth of silver and gold were removed from the deep recesses of its mines. Over its entire active mining period, which lasted from 1857 to 1921, the Comstock yielded \$386,346,931 in total mineral production, of which \$222,315,814 was in silver, \$164,023,917 was gold, and \$7,200 was copper and lead.⁹⁰

Below Dayton, the Carson River enters the Carson Plains and continues east for nearly 15 miles to Table Mountain. Just over nine miles downstream from Table Mountain the Carson River meets the Adrian Valley, which enters the lower Carson River valley from the south. The Adrian Valley has special historic significance for both the Carson and Walker River basins and in ancient times it formed a hydrologic linkage between the flow of the Walker River and that of the Carson River. During the Late Wisconsin, or Ice Age, a period lasting from 75,000 to 10,000 years ago, ascending waters from the Ice Age Lake Lahontan would come up this portion of the lower Carson River valley and reach a point on the river just below Dayton (4,380 feet MSL).

Before Lake Lahontan's waters would nearly reach Dayton, however, they would also flow up the Adrian Valley, spilling over the Adrian Pass (4,294 feet) and begin filling the lower Walker River Basin and the Walker Lake sub-basin. It is also believed that during the intervening "interpluvial periods," when Lake Lahontan was in one of its recession phases, the natural course of the Walker River was periodically diverted to a course along the west side of Mason Valley below Yerington, located in Lyon County, Nevada. From there it would flow out of the Walker River Basin through the Adrian Valley to the Carson River, and thereby contribute to the periodic desiccation of Walker Lake.⁹¹ During such times, the Walker River became a tributary of the Carson River and the two basins became hydrologically linked.

Nearly ten miles downstream from the Adrian Valley, the Carson River flows into Lahontan Reservoir (when the reservoir is at its spillway surface elevation of 4,159 feet MSL, corresponding to a reservoir volume of approximately 294,000 acre-feet). Following the contours of this reservoir, the Carson River's bed travels a circuitous 17.4 miles through Lahontan Reservoir to Lahontan Dam, where the waters of the Carson River merge with those of the Truckee River, which have been diverted at Derby Dam and enter Lahontan Reservoir from the north via the Truckee Canal. Six miles below the Lahontan Dam, the Carson River arrives at the Carson Diversion Dam, which marks the beginning of the Lahontan Valley and the primary distribution system regulating the diversion of the Carson River's waters into the principal "T" (T-Line) and "V" (V-Line) canals of the Newlands Project.⁹² Below this point, the Carson River enters the labyrinth of canals, laterals, and ditches making up the Newlands Project water distribution system, and, except during high flow periods, effectively loses its identity as a river system.

Principal Storage Facilities of the Upper Carson River Basin

Major storage facilities of the upper Carson River Basin, stretching from the Carson Valley to the headwaters of the East and West forks, along with their storage rights and priority dates and water source, are detailed in **Table 5, Carson River Upper Basin Reservoirs**. River flows and water releases from these lakes and reservoirs are controlled by the U.S. District Court (Federal) Water Master in Reno, Nevada (through a Deputy Federal Water Master in Carson City), in accordance with specific operating criteria contained in the 1980 Alpine Decree.⁹³ Diversions at Derby Dam on the lower Truckee River, which flow into Lahontan Reservoir via the Truckee Canal, are also controlled by the Federal Water Master in accordance with the 1944 Orr Ditch Decree and its incorporated 1935 Truckee River Agreement and 1915 Floriston rates.⁹⁴ In the lower Carson River Basin, releases from Lahontan Reservoir and their diversion at the Carson Diversion Dam are controlled by TCID in accordance with the current OCAP.

Table 5—Carson River Upper Basin Reservoirs
Storage Reservoir, Water Right Priority Date, Capacity, and Water Source

Reservoir	Priority Date	Capacity† (acre-feet)	Water Source
Located in Alpine County, California			
Tamarack Lake	1895	404	East Fork, Pleasant Valley Creek
Kinney Meadows	1895	435	East Fork, Silver Creek
Upper Kinney Lake	1895	320	East Fork, Silver Creek
Lower Kinney Lake	1895	495	East Fork, Silver Creek
Wet Meadows	1895	207	East Fork, Pleasant Valley Creek
Lower Sunset Lake	1895	250	East Fork, Pleasant Valley Creek
Upper Sunset Lake	1895	68	East Fork, Pleasant Valley Creek
Summit Lake	1901	31	East Fork, Pleasant Valley Creek
Raymond Lake	1895	50	East Fork, Pleasant Creek
Heenan Lake	1923	2,948	East Fork, Heenan Lake Creek
Burnside Lake	1892	100	East Fork
Scott Lake	1895/1918	100/408	West Fork, Scott Creek
Red Lake	1895/1922	300/803	West Fork, Red Lake Creek
Crater Lake	1895	167	West Fork, Crater Lake Creek
Upper Lost Lake	1924	92	West Fork
Lower Lost Lake	1924	127	West Fork
Located in Douglas County, Nevada			
Mud Lake	1879/1909	789/2,383	East Fork, Indian Creek and West Fork
Allerman No. 1, 2, and 4	1877/1905	250/831	East Fork, on Allerman Canal
Ambrosetti	1882	200	East Fork, below Williams Slough Ditch

† Reservoir capacities are in acre-feet as shown in the 1980 Alpine Decree (*United States v. Alpine Land and Reservoir Company, et al.*). Actual capacities may differ due to subsequent changes to facilities.

Source: Reprinted courtesy of the *CARSON RIVER ATLAS*, Department of Water Resources, The Resources Agency, State of California, Sacramento, California, December 1991, page 18.

The Carson River—Terminus

The Carson River terminates in a geologically varied area consisting of the Lahontan Valley and Carson Sink and Desert. Depending on the time of year and annual precipitation and accumulated snowpack water content in the upper basin, the hydrologic characteristics of this area can range from an extensive labyrinth of interconnected lakes, marshes, wetlands and aquatic environments to barren, alkali desert and salt flats. The entire basin represents the largest expanse of the ancient Ice Age Lake Lahontan, which during its various highstands over the last 75,000 years attained a peak surface elevation 4,380 feet MSL and covered the Lahontan Valley and Carson Sink to a maximum depth of approximately 700 feet. Geologically, the basin consists of unconsolidated, fine-grained Pleistocene lake and playa deposits, young fan gravels, and prograding delta deposits of Quaternary age.⁹⁵ Maximum depth to bedrock in the valley exceeds 8,000 feet, while the average depth of the sediments filling the basin is about 3,000 feet.⁹⁶

The "rain-shadow effect" of the Carson, Virginia, and Pine Nut mountain ranges of the Sierra Nevada Mountains to the west of Lahontan Valley effectively interrupts moisture-laden Pacific storms entering this region and allows little precipitation to fall within Lahontan Valley. As a testament to the extreme aridity of this area, average annual precipitation is only about five inches, while annual evaporation exceeds sixty inches, an extreme ratio of evaporation to precipitation of over 12 to 1. Before extensive upstream storage and water diversions, the Lahontan Valley was generally inundated in late winter and early spring by the unhindered runoff of the melting snowpack accumulated in the upper reaches of the basin. After this runoff period, a drying pattern would ensue during the remainder of the year until the winter precipitation period commenced again in October–November. This highly seasonal pattern of lower basin inundation and desiccation has been disrupted since the completion of the Newlands Project in the valley in 1903, and particularly after the completion of Lahontan Reservoir in 1915. As a result of these developments, this area has received waters from both the Carson and Truckee rivers on a far more consistent and continual basis. In addition to extending the application of water to the valley's irrigated farmlands, it has also created problems with respect to excessive water logging of soils and, in turn, limited the use of some project lands for agricultural purposes.

Carson River Basin Water-Related Issues

Initial conflicts over the waters in the Carson River Basin began in the early 1860's and precipitated from the competing uses for the waters of the Carson River between the farmers and ranchers in Carson Valley and the Comstock ore processing and milling interests along the river's reach through Dayton Valley below Empire City. The loggers ("wood men") in the upper basin above Carson Valley also had a vested stake in the conflict over the use of the Carson River's waters. However, their interests in undertaking "wood drives" down the river and through Carson Valley were effectively served if the Comstock ore milling operations received sufficient water to operate the numerous stamping (ore-crushing) mills in Dayton Valley. To the miners, logging operations were crucial to their operations, and provided the necessary timbers to shore up the mines, the cord wood to fuel their machinery, operate their lifts and pumps, and run the railroad trains which carried both ore to the mills and supplies to the mines, and the timbers and ties to build the railroads that provided essential freight and transportation services throughout the area.

This period of conflict between the ranchers and mill men, which lasted from the early 1860's through the late 1890's, became especially acrimonious during drought years when the limited flows of the Carson River were generally insufficient to simultaneously meet the needs of both parties. The initial appropriation of water, beginning in the early 1850's for the irrigation of farmlands in Carson Valley, pre-dated that of the mills, which began their operations by the early 1860's. The mill operators, in particular, needed a steady and sufficient year-round instream flow for their stamping mills, whereas the farmers diverted extensive amounts of water both for the irrigation of cultivated fields and to flood new lands in preparation for future planting. While some original irrigated acreage pre-dated (prior appropriation doctrine) the water rights of the mills, and were generally recognized as such by the mill men, the major conflict arose over new lands brought under irrigation after the commencement of the milling operations further downstream. Each new irrigation ditch brought additional land under irrigation and increased the farmers' demands for the river's limited supply of water. It was these added lands and their irrigation ditches that became issues of intense early conflict and controversy on the Carson River. By one source, it was estimated that only 4,700 irrigated acres on the Carson River East Fork and 3,900 acres on the West Fork pre-dated the arrival of the stamping mills. However, by 1866, total irrigated acreage on the East Fork alone had more than doubled to an estimated 10,963 acres.⁹⁷

By 1883 the mill men had instituted a fairly effective, if not somewhat ruthless, means to handle what the mill owners deemed to be excessive upstream irrigation diversions and thereby insure the survival of both Carson Valley's agricultural industry and the Comstock's milling and mining operations, particularly during low-water years. To effect this, the mines appointed their own "water men" who would travel the entire Carson River system throughout Carson Valley and limit water diversions. For those farmers and ranchers found to be persistently diverting waters in excess of their rightful needs, more drastic actions were sometimes necessary. On such occasions, the water men would break down the diversion dams and block the head of the irrigation ditches, at times being forced to destroy a portion of the diversion ditch altogether.

Despite these seemingly harsh actions, by general consensus the system worked surprisingly well, even for the farmers. On one particular occasion, after the mills recalled their water men and the river's allocations were left up to the Carson Valley farmers alone, it was recorded that the farmers, unable to apportion the river's waters among themselves, requested that the mills' water men return to the valley to perform this beneficial function on a more equitable basis.⁹⁸ Thus the concept (i.e., necessity) for a watermaster for the Carson River was recognized early on. These conflicts eased by the late 1890's as the Comstock era drew to a close, and along with it the mines' needs for hydro power for their stamp mills. Subsequently, for a brief period of time in the late 1890's and early 1900's, Carson Valley's farmers and ranchers had the waters of the Carson River pretty much to themselves.

Conflict over Carson River water rights arose again in the early twentieth century. With the passage of the Reclamation Act in 1902 and the commencement of agricultural operations of the Truckee-Carson (Newlands) Irrigation Project beginning in 1905, new demands arose for the Carson River Basin's limited water resources. This controversy arose between two competing groups of agricultural interests at virtually opposite ends of the basin. In addition to growing irrigation demands, there also arose the need for water for municipal and industrial uses, particularly in Carson City (Eagle Valley) and the Minden-Gardnerville (Carson Valley) area.

The original vision of the Truckee–Carson (Newlands) Project never actually anticipated using solely the waters of the Carson River for the irrigation of its farmlands in Lahontan Valley. In fact, the stored waters of Lake Tahoe and the Truckee River were always considered an important, if not an integral component of the success of this reclamation project. Truckee River waters for the Newlands Project were initially sought in 1913 with the filing of the *U.S. v. Orr Ditch Water Company, et al.* Eventually, 31 years later these rights would be secured with the issuance of the 1944 Orr Ditch Decree. This adjudication granted the Newlands Project the right to divert up to 1,500 cubic feet per second of Truckee River water at Derby Dam and transport that water via the Truckee Canal to project farmlands in Lahontan Valley. After the completion of Lahontan Dam and Reservoir in 1915, water rights from the Carson River were sought with the 1925 filing of the *U.S. v. Alpine Land and Reservoir Company, et al.* This lawsuit was eventually settled in 1980 through the issuance of the Alpine Decree.

While the 1944 Orr Ditch Decree appeared to settle water rights issues for a while in the Truckee River Basin, dramatic effects on Pyramid Lake soon brought the issue of this interbasin transfer of water to the forefront once again. The era of litigation over the continued use of Truckee River waters on Newlands Project farmlands would begin in the late 1960's and would initially be based on the "reservation doctrine" (Winters Rights Decision).⁹⁹ By this concept, the Pyramid Lake Paiute Indian Tribe attempted to show that since the reservation's heritage was based on the bounty and viability of the Pyramid Lake and lower Truckee River fisheries and not agriculture, sufficient water rights should have been granted for the restoration and preservation of Pyramid Lake. This approach failed in 1983 when the U.S. Supreme Court refused to re-open the Orr Ditch Decree to adjudicate additional water for the Tribe, leaving them the original 30,000 acre-feet per year for irrigation purposes.

With the failure of this approach, the Indian Tribe would begin a new approach, basing its claim for additional Truckee River water rights on the endangerment of a fish in Pyramid Lake. In 1966 the Endangered Species Preservation Act was passed and in the following year the Pyramid Lake cui-ui (*Chasmistes cajus*), an omnivorous lake sucker endemic only to Pyramid Lake and the lower Truckee River, was identified under that act as a fish species in danger of extinction. The cui-ui fish species had figured prominently in the Pyramid Lake Tribe's heritage, in fact, providing for one of these people's earliest names: *Kuyuidokado*, or cui-ui eaters.¹⁰⁰

In February 1967 the U.S. Secretary of the Interior issued the first Operating Criteria and Procedures (OCAP) for the Newlands Project. The implementation of these operational procedures spawned a series of litigation by the Pyramid Lake Paiute Indian Tribe as to how water was used on project farmlands and what portion of that water should come from the Truckee River Basin. As a consequence of these legal filings, OCAP revisions have attempted to meet the needs of endangered and threatened fish species in Pyramid Lake.¹⁰¹ As a result, these operating procedures are now intended to both improve on-project efficiencies and reduce Truckee River diversions. Even so, Newlands Project rights to the waters of both the Carson and Truckee rivers represent the single greatest demand for water on both of these river systems.

Much of this controversy centers on the interbasin transfer to the Carson River Basin of a significant percentage of the total flow of the Truckee River that enters the State of Nevada each year. Between 1910 and 1966, this amount of diverted Truckee River waters has been estimated

at nearly 240,000 acre-feet per year,¹⁰² and comprised 42.9 percent of average annual flows of 559,300 acre-feet per year measured at the USGS Farad gaging station (California–Nevada state line) over this period of record. During the more recent period of record (1967–1994), and subsequent to the issuance of the Newlands Project’s first OCAP, Truckee River diversions at Derby Dam¹⁰³ have averaged approximately 183,280 acre-feet per year, and comprised 31.3 percent of average annual flows of 584,980 acre-feet per year measured at the Farad gaging station. Since the imposition of the 1988 OCAP and new water allocation methods for the project, diversions at Derby Dam have averaged approximately 167,760 acre-feet per year during the period of 1988–1994,¹⁰⁴ and comprised 62.7 percent of average annual flows of 267,430 acre-feet per year measured at the Farad gaging station. This 1988–1994 period of record represented the most severe period of drought in the northern Nevada watersheds, hence tending to distort these diversion figures relative to total flows (discharges) entering Nevada.

This interbasin transfer of a significant portion of the Truckee River’s waters has raised a number of inter-related water issues including: (1) Pyramid Lake Paiute Indian Tribe water rights (the “reservation doctrine” based on the 1908 Winters Rights Doctrine),¹⁰⁵ and attempts to use this doctrine to obtain sufficient water for the restoration of the Pyramid Lake fishery (denied by the U.S. Supreme Court); (2) the obligation of the federal government (U.S. Fish and Wildlife Service) for the survival of threatened and endangered fish species within Pyramid Lake based on the Endangered Species Act;¹⁰⁶ (3) the restoration and preservation of a minimum amount of wetlands in Lahontan Valley for the protection of migratory bird populations to include issues dealing with both water quantity and water quality; (4) increasing municipal water needs within the Truckee River Basin, and particularly securing sufficient upstream drought storage for the Reno–Sparks metropolitan area; and (5) issues over the quality of the water in the lower Truckee River below the Truckee Meadows Water Reclamation Facility.

Another major issue with respect to the lower Carson River Basin centers not just on the quantity of water to be made available to the Lahontan Valley wetlands, but also its quality. An incident of extensive fish and bird mortality in this area, following particularly heavy inflows from the Carson and Humboldt rivers in 1986 and 1987, clearly demonstrated the potential exposure of this area to potentially-harmful, naturally-occurring constituents contained in the waters flowing into these wetlands. The Lahontan Valley wetland system encompasses a large portion of the lower Carson River Basin and includes the Stillwater National Wildlife Refuge (NWR), the Fallon NWR, Stillwater Wildlife Management Area and, at the south end of the valley, the Carson Lake and Pasture. This extensive and ecologically diverse area serves as a key production, migration, and wintering area for up to one million waterfowl, shorebirds, and raptors. Each spring and fall this area hosts a significant percentage of certain species of the Pacific Flyway’s migratory birds. In 1988 the system was named to the Western Hemisphere Shorebird Reserve Network and has been nominated for inclusion under the Convention of Wetlands of International Importance. In addition, the health of the White Pelicans at the Anaho Island NWR, which was established in Pyramid Lake in 1913 to protect the White Pelican nesting colonies, has been shown to be inextricably linked to the viability of the Lahontan Valley wetlands.¹⁰⁷

Another water-related controversy in the Carson River Basin deals with the mercury content of the soils and riverbed of the lower Carson River near and below Brunswick Canyon, where some of the largest of the 75 Comstock–era mills were located in the late 1800’s. It has been

estimated that during the 30-year peak of the Comstock mining era (1865–1895), some 200,000 flasks of mercury,¹⁰⁸ or approximately 7,500 tons, were lost in the milling process and that only about 0.5 percent of that total was ever recovered. Mercury concentrations in soil samples have been found to be some 200 times greater below the mill sites than above them; the highest concentrations in the Carson River have been found just upstream from Lahontan Reservoir.¹⁰⁹

In August 1990, this stretch of the Carson River through Dayton Valley and extending downstream to Lahontan Reservoir, to include Carson Lake, Stillwater NWR, and Indian Lakes in Lahontan Valley, along with adjoining tributaries stretching nearly to Virginia City itself, was declared a "Superfund site" by the U.S. Environmental Protection Agency (EPA) in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).¹¹⁰ Controversy not only surrounds the mercury's real and potential threat to both animal life and the human inhabitants, but also the need to undertake the comprehensive and extensive remediation plan proposed by the EPA—removal of approximately 5,000 cubic yards of the upper soil strata at five selected sites within this area.¹¹¹

This situation has become exacerbated by the rapid growth in population of Carson City and surrounding communities, and particularly the resultant development spreading downstream from that city and through the Dayton Valley. The Commissioners of Lyon County, in which most of the declared remediation sites are located, have attempted to block the EPA's remediation efforts, arguing that there is no evidence of potential harm from the mercury deposits and that further action is destined to generate unwarranted publicity, harm tourism to the area, reduce property values, and waste taxpayers' money.¹¹² Concerns have also been raised over the reluctance of prospective businesses to relocate to potential Superfund sites which may require future remediation efforts.¹¹³

Derby Dam, the Truckee Canal, and Lahontan Reservoir

Derby Dam, located on the lower Truckee River approximately 11 miles upstream from Wadsworth, Nevada, is the regulating structure by which Truckee River waters are diverted into the 32.5-mile long Truckee Canal. These waters are used for irrigation within the Truckee Division of the Newlands Project, as well as for storage in Lahontan Reservoir in the lower Carson River Basin. The dam, originally named the Truckee River Diversion Dam, was completed by the U.S. Reclamation Service (renamed the U.S. Bureau of Reclamation in 1923) in June 1905. The Truckee Canal was completed through to the lower Carson River the following year. Without upstream storage on the Carson River, however, the project's agricultural season was subject to the vagaries of the highly seasonal and largely unregulated flows of both these river systems. As a result, in dry years the growing season was frequently shortened, production levels diminished, and multiple cropping not always possible. These problems were significantly mitigated in 1915 with the completion of Lahontan Dam and Reservoir, which provided the project with approximately 294,000 acre-feet of storage capacity (317,000 acre-feet with flashboards installed) on the lower Carson River just upstream from the project's farms.

Lahontan Dam and other project structures, stretching as far upstream on the Truckee River as the outlet dam at Lake Tahoe, are currently operated by TCID under a temporary contract with the USBR. The project's water rights, water diversions, and water duties are specified in various

decrees and agreements, including the 1935 Truckee River Agreement, the 1944 Orr Ditch Decree, the 1980 Alpine Decree, and the current Newlands Project OCAP. The terms of these stipulations allow for the diversion of up to 1,500 cubic feet per second (Claim 3 of the Orr Ditch Decree with a 1902 priority date, although the canal's nominal capacity is only 900 cfs)¹⁴ from the Truckee River at Derby Dam and water duties of 3.5 acre-feet per acre per year on bottom lands and 4.5 acre-feet per acre per year on bench lands for project irrigated acreage (1944 Orr Ditch Decree and 1980 Alpine Decree).

In 1968 the Pyramid Lake Paiute Indian Tribe filed a lawsuit against the U.S. Secretary of the Interior claiming that the 1967 OCAP, the first set of operating criteria to be established by the Secretary for this project, was allowing water to be wasted within the Newlands Project. The suit was primarily intended to improve project efficiencies and thereby reduce Truckee River diversions at Derby Dam. In February 1973, the Gesell Opinion (named after Judge Gerhard Gesell, U.S. District Court in Washington, D.C.) was issued which called for a new OCAP and an immediate reduction in Newlands Project diversions from the 1926 contract delivery quantity of 406,000 acre-feet per year (using both Carson and Truckee River waters) to 350,000 acre-feet per year, with step-wise reductions thereafter to an ultimate level of 288,129 acre-feet per year.¹⁵ A lawsuit was subsequently filed in 1974 by the City of Fallon against the imposition of this new OCAP. The appeals process on this suit continued through 1988, at which time a new OCAP, and new water allocation method, were instituted.

Under the present project OCAP, the quantity of water which may be diverted from the Truckee River at Derby Dam varies with the determination of the irrigation entitlement each year and the predicted runoff from the Carson River and water in storage in Lahontan Reservoir.¹⁶ These more recent project OCAPs, as originally derived from the 1973 Gesell Opinion, have attempted to minimize the use of Truckee River waters as much as possible.

On behalf of the Pyramid Lake Indian Tribe, the USDI now claims that between 1973 and 1988 TCID over-diverted approximately 1,058,000 acre-feet of Truckee River water and is calling for this recoupment to be repaid to Pyramid Lake. Churchill County, the City of Fallon, and TCID officials, as well as Newlands Project farmers, have claimed that because the City of Fallon filed a 1974 lawsuit against the implementation of the new OCAP, in part calling for a complete Environmental Impact Statement (EIS) under the National Environmental Protection Act (NEPA), the 1973 OCAP should not have been implemented. TCID has further claimed that, as the appeals process for these suits against the implementation of the new OCAP were not fully resolved until 1988, the claim for recoupment of excessive diversions before that time is unreasonable.¹⁷ The recoupment of Truckee River waters remains a major issue in the eventual resolution of the Negotiated Settlement Act (Public Law 101-618) which, when passed by Congress in November 1990, was intended to settle the myriad of claims and outstanding lawsuits associated with these issues pertaining to the allocation and use of Carson River and Truckee River waters.

Of particular concern to the Lahontan Valley farmers is Section 209(h)(1) of this 1990 act which specifies that, among other things, outstanding debts owed by TCID to the federal government relating to the project costs will not be canceled unless and until an agreement has been reached concerning claims for recoupment of water diverted in excess to the amounts permitted by applicable OCAP. More recent actions (December 1995) by the City of Fallon and

Churchill County involved filing an injunctive suit to prevent the implementation of the Negotiated Settlement, and particularly the continued purchase of water rights in the project for transfer to the Lahontan Valley wetlands, until a new EIS has been completed.¹¹⁸

One week after that action was taken by Churchill County officials, the U.S. Justice Department filed a lawsuit against TCID to recoup, with “interest,” excess waters diverted by TCID over the 15-year period from 1973 through 1988.¹¹⁹ This controversy over Truckee River diversions has been exacerbated when Churchill County officials filed a request with the USBR for supplemental Truckee River water rights under the Orr Ditch Decree (Claim No. 3),¹²⁰ and further when the State Engineer held hearings in early 1996 on TCID’s September 1930 request for 100,000 acre-feet of unappropriated (flood) flows of the Truckee River.¹²¹

At issue in TCID’s 1930 filing are the Truckee River’s excess (unallocated, i.e., flood) flows, waters which the Pyramid Lake Paiute Tribe would rather see flow into Pyramid Lake. Hearings before the Nevada State Engineer on this request were not held until May 1994, at which time USDI categorically filed their objection to TCID’s request and stated their refusal to permit the use of any federal facilities for the diversion, conveyance, storage, or distribution of additional waters from the Truckee River, even if a state water permit was issued. Based on this “threshold issue” alone, on May 31, 1994, the State Engineer denied TCID’s application without ruling on whether there exists unappropriated water, whether the application would interfere with existing rights, or whether the application would threaten to prove detrimental to the public interest.¹²² Subsequently, on June 30, 1994, TCID filed an appeal in the Third Judicial Court of the State of Nevada, in and for the County of Churchill, to the State Engineer’s ruling. The court ruled to remand the case back to the State Engineer for a re-hearing so additional evidence and testimony could be presented. These hearings were held in late January 1996 and the State Engineer has yet to issue a ruling on the matter.

The Churchill County request for supplemental municipal and industrial water is particularly singular as it represents the first such interbasin request in recent history for Truckee River waters for a use other than agriculture.¹²³ Many individual water users in this area rely on shallow alluvial aquifers, portions of which are recharged by Newlands Project water. This has heightened local concerns that water rights purchases on lands irrigated by the project could dramatically affect the reliability of future water supplies for homes and businesses.¹²⁴ The Negotiated Settlement specifies that the Secretary of the Interior is authorized to “...operate and maintain the [Newlands] project for the purpose of...municipal and industrial water supply in Lyon and Churchill counties, Nevada.”¹²⁵

Current Diversions Out of the Carson River Basin

Currently there are no diversions of water outside of the Carson River Basin. In fact, Article VII of the California–Nevada Interstate Compact specifically prohibits waters of the Carson River from being used in areas outside the Carson River Basin.¹²⁶ While this compact has never been ratified by Congress, its provisions have been accepted through a “gentleman’s agreement” and individual state legislation.¹²⁷

Current Diversions Into the Carson River Basin

While no waters are diverted out of the Carson River Basin, this basin receives waters diverted from the Truckee River Basin.¹²⁸ The basin is also the recipient of natural, high-water year inflows from the Humboldt River Basin via the Humboldt Sink and Humboldt Slough, and infrequent flows from the Walker River Basin via Adrian Valley. The following is a list of the known current diversions into the Carson River Basin. All these diversions have as their source either the Lake Tahoe Basin or, ultimately, the Truckee River Basin.

- [1] *Marlette Lake, Franktown Creek, and Hobart Creek Reservoir*—The Marlette Lake water system, originally constructed in 1873, was intended to meet the growing needs of Virginia City during the Comstock era. This water system, which at one time consisted of flumes, a tunnel, and over 21 miles of an inverted suction pipeline, first ran from just below Hobart Creek Reservoir (which is fed by Hobart Creek) on Franktown Creek, which drains into Washoe Valley and Washoe Lake, then across Washoe Valley to Five-Mile Reservoir in the Virginia City range on the east side of Washoe Valley. A second pipeline from Franktown Creek was completed in 1875. A third pipeline (originally consisting of a flume and tunnel system), this time tapping the waters of Marlette Lake, which drains directly into Lake Tahoe, was completed in 1887. The current system pumps water directly from Marlette Lake to Hobart Creek Reservoir. Total diversion from this source is approximately 3,000 acre-feet per year.
- [2] *Harvey Place Reservoir*—Located in Alpine County, California, this reservoir receives advanced secondary treated effluent from the South Tahoe Public Utility District (STPUD) in the Lake Tahoe Basin (Truckee River Basin). Effluent exports, amounting to approximately 5,000 acre-feet per year (4.5 million gallons per day),¹²⁹ are routed from the southern end of Lake Tahoe through a pipeline running generally along the course of the Upper Truckee River and over Luther Pass from El Dorado County, California, into Alpine County and the Carson River Basin. These effluent exports began in 1968 when Indian Creek Reservoir was constructed by STPUD. Beginning in 1989, exports were re-routed to Harvey Place Reservoir and Indian Creek Reservoir was turned into a freshwater recreational area managed by the U.S. Bureau of Land Management (BLM).
- [3] *Carson Valley*—Located in Douglas County, Nevada, Carson Valley receives the treated effluent from the Incline Village General Improvement District (IVGID) and the Douglas County Sewer Improvement District (DCSID), which together cover the municipal water uses of the Nevada portion of the Lake Tahoe Basin (as part of the Truckee River Basin). The IVGID pumps approximately 1,700 acre-feet per year (1.5 million gallons per day) of treated waste water from its Incline Village treatment plant, along the east side of the lake to Spooner Summit, then down Clear Creek Valley to wetlands located in the northeastern portion of Carson Valley. The DCSID handles sewage collection and treatment on the Nevada side of Lake Tahoe from Glenbrook to the Nevada-California state line at South Lake Tahoe. It pumps approximately 2,600 acre-feet (2.3 million gallons per day) of treated effluent over the Kingsbury Grade (Haines Canyon) and then to the east

side of Carson Valley in the Pine Nut Range where it receives winter storage. During the irrigation season, these stored waters are then pumped back across Carson Valley and used for supplemental irrigation.¹³⁰

- [4] *Derby Dam and the Truckee Canal*—These facilities, the first components constructed under the Truckee–Carson Irrigation Project in 1905–1906 (later renamed the Newlands Project), constitute the most significant means of diversion and conveyance of water from the lower Truckee River to the lower Carson River. For the water years 1967–1995, on the average, approximately 181,720 acre-feet of water flowed each year into the Truckee Canal at Derby Dam on the lower Truckee River. Truckee River waters flow through the 32.5-mile long Truckee Canal, first paralleling the river, then running along the western side of Lahontan Valley and into Lahontan Reservoir on the lower Carson River just above the project farmlands. Of this annual average of 181,720 acre-feet of water diverted at Derby Dam, about 135,380 acre-feet per year, or nearly 75 percent of the total diverted amount, has actually flowed into Lahontan Reservoir.¹³¹

Carson River Operating Requirements and Procedures

The Alpine Decree embodies the principal governing criteria under which water rights are administered within the Carson River Basin. The Alpine Decree is the federal court adjudication of the water rights on the Carson River system and is the primary regulatory criteria of Carson River operations today. The decree is administered by a Federal Water Master appointed by the U.S. District Court. The decree, finally entered on October 28, 1980 after initial litigation was begun on May 11, 1925 (*U.S. v. Alpine Land and Reservoir Company, et al.*), established the respective water rights (to surface waters only) of the parties to the original lawsuit, both in California and Nevada. The decree did not make an interstate allocation of the Carson River between California and Nevada; it only quantified individual water rights. Neither state was a party to the decree.

In addition to Carson River surface water rights, the Alpine Decree also established the rights to reservoir storage in the upper basin reservoirs (see Table 5, **Carson River Upper Basin Reservoirs**) and confirmed the historical practice of operating the river “on rotation,” so that irrigators with more “junior priorities” (prior appropriation doctrine) could be served as long as possible.¹³² The Carson River’s upper basin reservoirs were permitted to fill out of priority order, in accordance with historical practice. The decree also specifically recognized “riparian water rights”¹³³ in California (as distinguished from the quantified “appropriative water rights”¹³⁴ used in Nevada). For purposes of water distribution, the Carson River and its East and West forks were divided into eight (8) segments, and when the river went into “regulation” (i.e., there was not enough water in the upper Carson River to serve the most junior priority), each segment of the river was to be administered autonomously.

Duties of water were set forth for various locations according to bench land and bottom land designations. For lands in the Newlands Project (i.e., below Lahontan Dam) in Churchill County near Fallon, Nevada, the Alpine Decree provided for a maximum water duty of 4.5 acre-feet per acre per year for water-righted bench lands and 3.5 acre-feet per acre per year for water-righted

bottom lands *delivered to the land*.¹³⁵ For lands above the Newlands Project (i.e., above Lahontan Reservoir), the Alpine Decree provides for water duties of 4.5 acre-feet per acre per year for bottom lands, 6.0 acre-feet per acre per year for alluvial fan lands, and 9.0 acre-feet per acre per year for bench lands *diverted to the canal*.¹³⁶ These water duties were based on the consumptive use, or “crop irrigation requirement,”¹³⁷ of alfalfa, as it is a dominant and the highest water-using crop grown in Nevada. While the Alpine Decree established water duties for bench and bottom lands throughout the Carson River Basin, it made no identification of those lands.

The Alpine Decree also affirmed Newlands Project water rights as an “appurtenant water right” for the patented lands, effectively transferring water rights to these land holders individually rather than to the federal government. This individual ownership of project water rights has severely restricted the federal government’s ability to reclaim water rights for other purposes (e.g., wetland restoration and endangered fish species), and it has also affected Newlands Project farmers’ ability to readily transfer water rights from one parcel of water-righted land to another.¹³⁸

For purposes of administering the decree, the Carson River and its tributaries were divided into eight segments as follows:¹³⁹

- [1] *Segment 1*—The East Fork of the Carson River from the California–Nevada state line up to the headwaters of the East Fork in the Sierra Nevada Mountains;
- [2] *Segment 2*—The East Fork of the Carson River from the California–Nevada state line to the confluence of the East and West Forks of the Carson River;
- [3] *Segment 3*—The West Fork of the Carson River from the gauge at Woodfords, California upstream to the headwaters in the Sierra Nevada Mountains;
- [4] *Segment 4*—The West Fork of the Carson River from the gauge at Woodfords to the California–Nevada state line;
- [5] *Segment 5*—The West Fork of the Carson River (and Brockliss Slough) between the California–Nevada state line and the confluence of the East and West Forks of the Carson River;
- [6] *Segment 6*—The main stream of the Carson River from the confluence of the East Fork, West Fork and Brockliss Slough to the gauge at Carson City;
- [7] *Segment 7*—The main stream of the Carson River from the Carson City gauge to Lahontan Reservoir. This segment is further subdivided for administration into autonomous sub-segments:
 - (a) Mexican Ditch, Dayton and the reach between Rose Ditch and Cardelli Ditch, inclusive;
 - (b) Gee Ditch;
 - (c) Koch Ditch;
 - (d) Houghman and Howard Ditches;
 - (e) Buckland Ditch.
- [8] *Segment 8*—The area below the Lahontan Dam [Lahontan Valley].

Another operating decree affecting water flows in the Carson River Basin is the 1944 Orr Ditch Decree. This adjudication of Truckee River water rights within Nevada granted the U.S. Bureau of Reclamation a right to divert up to 1,500 cubic feet per second into the Truckee Canal at Derby Dam (Claim 3, with a priority date of 1902).¹⁴⁰

Table 6—1995 Water Year¹ Impacts on Truckee and Carson River Storage Surface Water Elevations Measured in Feet; Volumes in Acre-Feet (AF)

Lake/Reservoir [Maximum Elevation—feet] [Storage Capacity—acre-feet]	Minimum Volume (AF) [Date]	Maximum Volume (AF) [Date]	Estimated Volume Change (AF)
Lake Tahoe Elevation—MSL ² (feet) [6,229.1 feet] [744,600 acre-feet] ³	-240,810 ⁴ 6,221.01 feet [October 31, 1994]	485,600 6,226.99 feet [July 29, 1995]	726,410 5.98 feet
Donner Lake [9,500 acre-feet]	2,800 [November 4, 1994]	9,620 [June 26, 1995]	6,820
Prosser Reservoir [29,840 acre-feet]	9,461 [March 23, 1995]	31,430 [July 11, 1995]	21,969
Independence Reservoir [17,500 acre-feet]	10,300 [January 1–4, 1995]	17,700 [August 4, 1995]	7,400
Stampede Reservoir [226,500 acre-feet]	66,843 [November 4, 1994]	236,199 [July 19, 1995]	169,356
Boca Reservoir [40,870 acre-feet]	5,775 [October 1, 1994]	39,176 [July 10–11, 1995]	33,401
Pyramid Lake Elevation—MSL ² (feet)	20,970,000 3,793.17 feet [January 3, 1995]	21,380,000 3,796.94 feet [July 31, 1995]	410,000 3.77 feet
Total Change in Storage for Above Lakes/Reservoirs (AF)			1,375,356
Lahontan Reservoir⁵ [295,500 acre-feet] ⁶	5,530 [October 3, 1994]	316,300 [July 25, 1995]	310,770

Table Notes:

¹ The 1995 (hydrologic) water year encompassed the period from October 1, 1994 through September 30, 1995. Figures are provisional USGS data and are subject to revision.

² MSL—surface elevation above *mean sea level*.

³ Measures only usable storage capacity above Lake Tahoe's natural rim of 6,223.0 feet above mean sea level (MSL) and its maximum allowable elevation of 6,229.1 feet MSL; equivalent to approximately 10,172 acre-feet per inch of surface elevation change above 6,223.0 feet MSL.

⁴ Represents additional storage required (deficit) to bring Lake Tahoe's surface elevation up to its natural rim of 6,223.0 feet MSL.

⁵ Carson River runoff volumes at the Fort Churchill Gage approximate flows into Lahontan Reservoir which, in combination with Lahontan Reservoir's storage level, will affect the quantity of Truckee River diversions at Derby Dam. Over the period October 1994 through the March 25, 1995 cutoff date, approximately 87,460 acre-feet were diverted at Derby Dam into the Truckee Canal, equivalent to 47 percent of a normal water year's diversions (for period of record 1967–1994) and almost 28 percent of the storage increase in Lahontan Reservoir.

⁶ Lahontan Reservoir storage capacity estimated at nearly 317,000 acre-feet with flashboards installed on the dam's spillway crest. Source Data: U.S. Geological Survey (USGS), Water Resources Division, U.S. Department of the Interior, Carson City, Nevada.

Effects of the 1995 High Water Year

A near-record year of precipitation in 1995—157 percent of normal for the Carson River Basin, 184 percent of normal for the Truckee River Basin, and 168 percent of normal for the Lake Tahoe Basin—did much to recharge the groundwater and fill lakes and reservoirs in the Truckee River and Carson River basins after eight years of drought conditions (1987–1994). **Table 6, 1995 Water Year Impacts on Truckee and Carson River Storage**, highlights the effects on the principal upstream water storage locations in Lake Tahoe and the Truckee River Basin, as well as the change in storage for Lahontan Reservoir in the lower Carson River Basin. Several of these Truckee River Basin storage reservoirs are of special importance to the Carson River Basin, and particularly the Newlands Irrigation Project, due to Derby Dam diversion rights from upstream storage—i.e., Lake Tahoe, Donner Lake, Prosser Creek Reservoir, and Boca Reservoir. Pyramid Lake’s increased volume of some 410,000 acre-feet represented a gain in one year of nearly 17 percent of the total volume lost (2,430,000 acre-feet) by Pyramid Lake over the previous eight years (1987–1994) of drought, clearly indicating the rapid change in hydrologic conditions which typically characterize these northern Nevada waterbasins.¹⁴¹

Water Basin Snowpack Water Content Trends

Table 7, Northern Nevada Water Basin Snow Water Content, presents an historical perspective of precipitation levels in Northern Nevada’s major water basins over the years 1980 through 1996 and is based on the percentage of average snow water content as of April 1st of each year (average year = 100 percent). This period is of special significance to the hydrology of these water basins as it included the wettest year on record for the Sierra Nevada Mountain water basins (1983) and the Humboldt River Basin (1984), as well as the most severe drought period on record (1987–1994) for these watersheds. These figures emphasize the extreme variations in snowpack and its water content from year to year. This presentation also shows how these watersheds are generally affected by the same winter storm systems, resulting in typically similar patterns of precipitation and snow water content measures. These year-to-year variances add support to concerns over using the concept of an “Average Water Year” for watershed forecasting and planning purposes, as there are so few such years in reality.

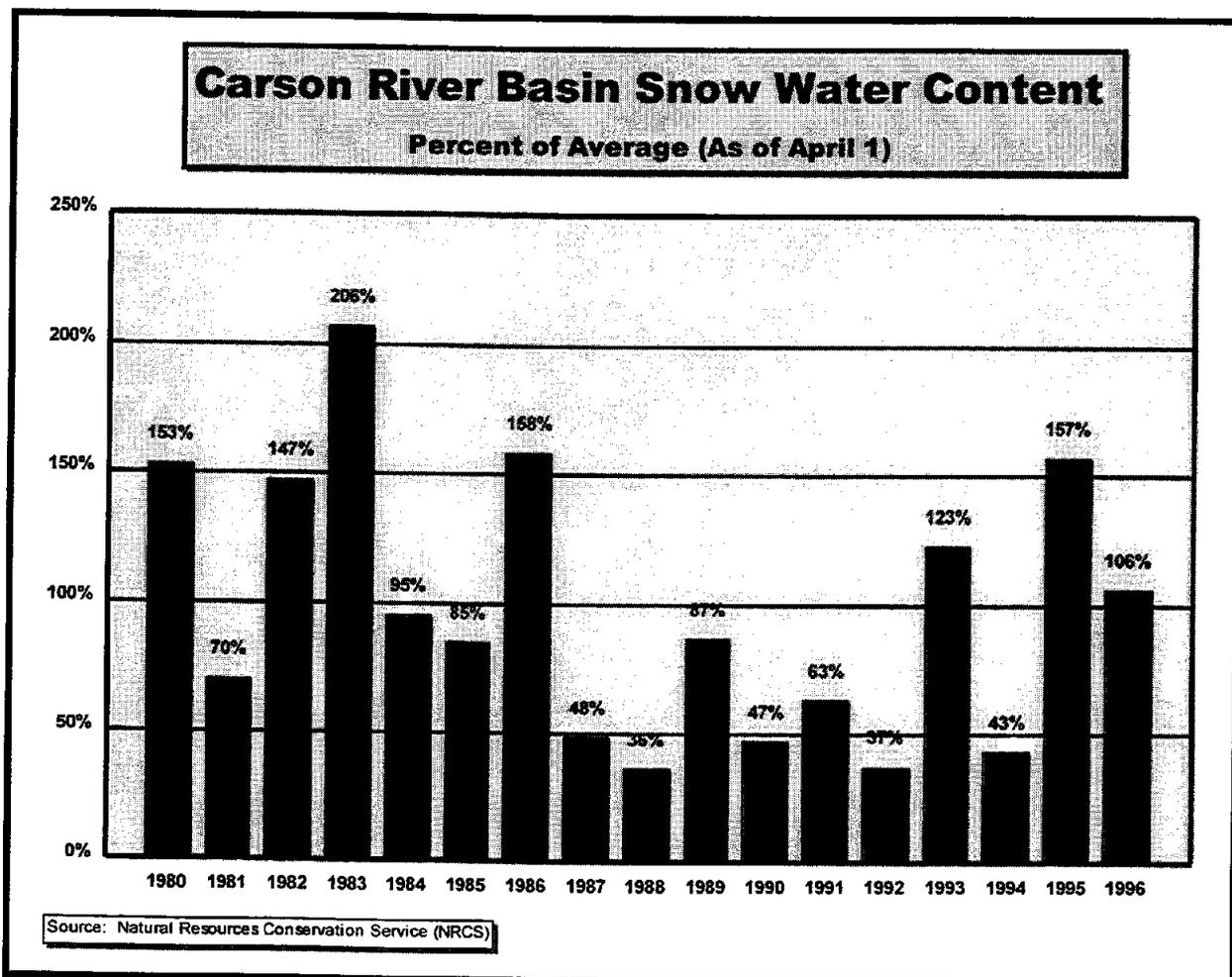
From this table we may also note the relative difference in snowpack water content of the wet period of record (1982–1986) and the drought period of record (1987–1994). During the wet period, snow water content in the Carson River Basin averaged 138 percent of normal, more than twice the average snow water content of 61 percent experienced during the eight year drought period of 1987–1994. The accompanying graph presents the 1980–1996 trends for the snow water content for the Carson River Basin specifically as of April 1st of each year. With respect to the figures in Table 7, despite the seemingly wide variability in the snow pack water content figures for the Carson River Basin, the average for the entire 1980–1996 period for this water basins was very close to the entire period of record average of 100 percent. Specifically, the average for this 1980–1996 period was 98 percent,¹⁴² thereby indicating that while individual values seem highly volatile, the pattern was, overall, “average.”

**Table 7—Northern Nevada Water Basin Snow Water Content
Snowpack Water Equivalent as a Percent of Average for This Time of Year
As of April 1—Percent of Water Basin Average (Average = 100 Percent)**

Water Year	Lake Tahoe Basin	Truckee River Basin [†]	Carson River Basin	Walker River Basin	Upper Humboldt Basin	Lower Humboldt Basin
1980	134%	134%	153%	170%	121%	131%
1981	62%	58%	70%	73%	55%	30%
1982	141%	149%	147%	156%	178%	173%
1983	202%	205%	206%	227%	157%	272%
1984	103%	100%	95%	106%	227%	296%
1985	90%	90%	85%	85%	115%	145%
1986	142%	134%	158%	170%	115%	115%
1987	56%	56%	48%	46%	75%	92%
1988	29%	32%	36%	40%	52%	44%
1989	93%	100%	87%	70%	103%	141%
1990	41%	50%	47%	47%	63%	45%
1991	64%	60%	63%	69%	72%	74%
1992	46%	45%	37%	54%	39%	33%
1993	149%	158%	123%	144%	95%	98%
1994	44%	50%	43%	46%	47%	36%
1995	168%	184%	157%	185%	73%	95%
1996	116%	121%	106%	113%	110%	107%
Percent of Water Basin Average (Average = 100%) Wet Years (1982–1986); Drought Years (1987–1994):						
82–86	136%	136%	138%	149%	158%	200%
87–94	65%	69%	61%	65%	68%	70%

[†] Snow water content figures for the Truckee River Basin exclude the Lake Tahoe Basin.

Source: Natural Resources Conservation Service (NRCS), U.S. Department of Agriculture, Reno, Nevada, May 1996.



Lake Lahontan, the Carson Sink, and Climatic Changes

Walker Lake, located in the Walker River Basin, and Pyramid Lake, located in the Truckee River Basin, represent the last major lake remnants of Ice Age Lake Lahontan. Due to Nevada’s typical “basin and range” topography, this ancient lake covered a highly irregular surface area of nearly 8,600 square miles throughout much of northwestern Nevada as recently as 12,500 years ago and experienced a number of fluctuations (ascensions and descensions) in its extent over the last 360,000 years. At its peak surface elevation of 4,380 feet MSL, Lake Lahontan covered some 8,655 square miles (5,540,000 acres) and attained a maximum depth of 886 feet at Pyramid Lake. The largest open expanse of this ancient lake was in the Lahontan Valley and Carson Sink area, where it attained a maximum depth of approximately 700 feet. The importance of studying this lake’s presence, and particularly its fluctuations, lies in the corresponding climatic conditions that fostered these hydrologic events and the changes in those conditions that led to its rapid rise and fall and, on occasion, its complete desiccation, with the possible exception of a pool remaining within Pyramid Lake.

Lake Lahontan was fed by the Truckee, Carson, Walker, Humboldt, Susan, and Quinn rivers.

At its maximum extent, Lake Lahontan encompassed seven major sub-basins in western Nevada including: (1) Smoke Creek/Black Rock Desert; (2) Carson Desert; (3) Buena Vista; (4) Walker Lake; (5) Pyramid Lake; (6) Winnemucca Dry Lake; and (7) Honey Lake. Associated with each of these basins was a primary "sill," defined as the lowest point on the divide between adjoining basins. The sills were important to the expansion of Lake Lahontan because only at the lake's surface water elevations above these threshold levels would its waters, originating in the basin's lowest point—Pyramid Lake—spill over into the adjacent basins. These sills included (listed respectively according to the corresponding sub-basin numbers above): (1) Pronto and Emerson Pass; (2) Darwin Pass; (3) Chocolate; (4) Adrian Valley (Pass); (5) none [Pyramid Lake was Lake Lahontan's lowest point in the basin]; (6) Mud [Winnemucca] Lake Slough; and (7) Astor Pass.¹⁴³

It was only at lake surface elevations above approximately 4,294 feet that all the seven sub-basins of Lake Lahontan were joined into one continuous, albeit highly irregular, lake. This particular elevation represented the highest point within the Adrian Valley, a narrow valley, almost ten miles in length, running from a point on the lower Carson River near the abandoned ruins of Fort Churchill in the Dayton Valley, southward to the northwest corner of Mason Valley in the Walker River Basin. Within this valley, the Adrian Pass constituted the sill over which an ascending Lake Lahontan spilled from the lower Carson River Basin into the lower Walker River Basin and the Walker Lake sub-basin.

Waters from an ascending Lake Lahontan flowed west up the lower Carson River into Dayton Valley and then south through the Adrian Valley and into the Walker River Basin. Once in the Walker River Basin, Lake Lahontan's waters then flowed down Campbell Valley to fill Walker Lake and the Walker Lake sub-basin, extending Lake Lahontan's southernmost reach to a point just south of the present-day town of Hawthorne in Mineral County, Nevada. Once this lower portion of the basin filled, Lake Lahontan's waters then flowed up Mason Valley to the present-day location of the City of Yerington in Lyon County, Nevada. Extensive scientific evidence based on sophisticated X-ray diffraction petrographic and radiocarbon analyses,¹⁴⁴ as well as detailed analysis of Walker Lake's lakebed core samples,¹⁴⁵ indicates that Lake Lahontan and its various hydrographic sub-basins have been subject to extensive fluctuations over the last 40,000 years and most of the sub-basins, with the possible exception of Pyramid Lake, have completely dried up on several occasions.

This apparent repetitive cycle of lake ascension and descension and related pluvial (wet) and inter-pluvial (dry) periods, has important implications for our own time period and the present hydrologic cycle, climatic conditions, and our expectations of natural versus man-caused changes within these various hydrographic basins. As recently as 15,000–13,500 years ago, it is believed that Lake Lahontan went through an ascension phase, attaining a surface elevation of approximately 4,370 feet MSL,¹⁴⁶ a surface area of slightly less than 8,600 square miles,¹⁴⁷ and the connection of all basins. Lake Lahontan's last high stand was estimated to have occurred some 12,500 years ago. Between 11,000 and 10,000 years ago, Lake Lahontan's surface level fell to approximately 3,871 feet, a surface elevation approximately equivalent to that which existed in Pyramid Lake during the early 1880's.

Warm and arid conditions have generally prevailed throughout the Great Basin from approximately 10,000 years ago to the present.¹⁴⁸ One period, however, appeared to represent an

exception. Beginning some 5,000 years ago, it is believed that the most recent lake period began and during that time the Lahontan Valley and the Carson Sink filled to a depth of approximately 80 feet (surface elevation of 3,950 feet MSL), gradually desiccating by the 1800's.¹⁴⁹ Further evidence also indicates that during this same period Walker Lake completely dried up on two more recent occasions—the first period being some 4,700 years before the present, a time period approximately coinciding with the filling of the Carson Sink, and then again 2,600 years before the present.

However, it is not certain whether these more recent periods of Walker Lake's desiccation were attributed to the region's climatic changes or to some natural re-channelization of the Walker River's mainstem northward below Yerington, along the western side of Mason Valley, and out of the Walker River Basin through the Adrian Valley, in which case the Walker River became a tributary of the Carson River.¹⁵⁰ However, if the Lahontan Valley was, in fact, inundated over this period, and this condition was due to a pluvial (i.e., wet) phase, however brief, then Walker Lake should not have been drying up, as evidence indicates it was. Therefore, this strongly suggests that it may have been the natural re-direction of the Walker River's flow (through the Adrian Valley and into the lower Carson River) and not climatic conditions that dried up Walker Lake during this period. This contribution of the Walker River's water to the Carson River would also help to explain the filling of the Lahontan Valley and the Carson Sink during this period.

Major Floods and Droughts

Table 8, Major Floods and Droughts in Northern Nevada—1907–1995, presents a listing of the more prominent extreme hydrologic events of the twentieth century which affected the major water basins of northern Nevada. A more extensive detailing of the major recorded flood events of the Carson River Basin and their effects on property are contained in Parts II and III of this chronology.

For an extensive analysis of the more recent flood of early January 1997, which set new record peak flows along both the Carson River East Fork and the West Fork, see Gary A. Horton, *The Flood of 1997—Final Report: An Analysis of Snowpack Water Content and Precipitation Changes in the Waterbasins of Western Nevada and the Effects on Runoff and Stream Flows, December 16, 1996—January 6, 1997*, Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada, January 1997, updated and revised May 1997.

Table 8—Major Floods and Droughts in Northern Nevada—1907–1995
Floods and Droughts in Northern Nevada's Major Hydrographic Basins

Event	Date	Areas Affected	Recurrence Interval† (years)	Remarks
Flood	March 1907	Sierra Nevada drainages	Unknown	May rank with 1950 and 1955 floods in Carson Valley and along Truckee River
Flood	February 1910	Upper Humboldt River Basin	> 100	Information limited. Similar to hydrologic conditions during February 1962 flood.
Drought	1928–37	Most of State, especially Humboldt River and Sierra Nevada drainages.	> 25	In parts of Humboldt River Basin, extended from 1923 to 1941.
Flood	November–December 1950	Sierra Nevada drainages	50	Not as severe as December 1955 flood in Carson River Basin.
Drought	1953–55	Most of State	About 10	December 1955 flooding ended drought in Sierra Nevada.
Flood	December 1955	Sierra Nevada drainage	40–100	Most severe flood from upper Carson River Basin downstream to Carson City.
Drought	1959–62	Most of State	10–20	Lasted 3–4 years depending on location.
Flood	February 1962	Humboldt River Basin	> 50	Rapid thawing and light rain on snowpack.
Flood	February 1963	Sierra Nevada drainages	50	Severe in Carson and Truckee River basins.
Flood	December 1964	Sierra Nevada drainages	20	
Drought	1976–77	Statewide except in south	About 10	Most severe along Sierra Nevada drainages.
Floods	March–June 1983	Statewide except in the south	< 10–50	Greatest snowmelt floods known except in Humboldt River Basin where they were exceeded in 1984.
Floods	April–June 1984	Centered in Humboldt River Basin	> 100	Greatest snowmelt floods known in the Humboldt River Basin.
Floods	February 1986	Sierra Nevada drainages	10–50	Greatest discharge in main rivers since 1963.
Drought	1987–1994	Statewide, especially in the Sierra Nevada drainages	Unknown	Worst period of drought on record.
Flood	May–June 1995	Carson and Walker River drainages	Unknown	Concentrated in the Carson River below Lahontan Reservoir and in the Walker River downstream of the state line.

† Recurrence interval; calculated from USGS data. Symbols ">" represent greater than; "<" less than.

Source: Reprinted in part from U.S. Geological Survey "Nevada Floods and Droughts," U.S. Geological Survey Water-Supply Paper 2375, Water Resources Division, Carson City, Nevada, 1989.

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[**Note:** Page numbers refer to pages in this part only, i.e., page 14 (below) is page I-14. Also, for entries with abbreviations or acronyms, check under those entries as well.]

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Notes to Part I:

1. From information provided by the U.S. Geological Survey (USGS), Water Resources Division, Carson City, Nevada.
2. For information on the Lake Tahoe and Truckee River basins, see Horton, Gary A., *Truckee River Chronology—A Chronological History of Lake Tahoe and the Truckee River and Related Water Issues*, Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada.
3. For information on the Walker River Basin, see Horton, Gary A., *Walker River Chronology—A Chronological History of the Walker River and Related Water Issues*, Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada.
4. For water planning and conservation purposes, the California Department of Water Resources (DWR) and the State Water Resources Control Board (SWRCB) of The Resources Agency, have divided the state into ten (10) Hydrologic Regions, also referred to as Hydrologic Study Areas (HSAs). These areas are based on the watershed or water basin concept. These California HSAs include: (1) North Coast Region; (2) San Francisco Bay; (3) Central Coast Region; (4) South Coast Region; (5) Sacramento River Region; (6) San Joaquin River Region; (7) Tulare Lake Region; (8) North Lahontan Region; (9) South Lahontan Region; (10) Colorado River Region. [See *The California Water Plan Update*, Bulletin 160-93, Volume 2, Department of Water Resources, The Resources Agency, State of California, Sacramento, California, October 1994, page 3. Also see Horton, Gary A., *WATER WORDS DICTIONARY*, Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada, for more on these HSAs and their geographic, hydrologic, and socioeconomic characteristics.]
5. *Nevada Hydrographic Basin Statistical Summary*, Office of the State Engineer, Nevada Division of Water Resources, and Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada, 1988.
6. Houghton, Samuel G., *A Trace of Desert Waters: The Great Basin Story*, University of Nevada Press, Reno, Nevada, 1994, page 61.
7. *California-Nevada Interstate Compact Between the State of California and Nevada*, Ratified by [the] State of California, September 19, 1970 (Chapter 1480, California Statutes 1970), Ratified by [the] State of Nevada, March 5, 1971 (Nevada Revised Statutes 538.600), Congressional Consent Pending, April 25, 1971, pages 19-20. This last covenant pertaining to uses of the Carson River's waters outside the basin is particularly interesting because of all the major water basins in northern and western Nevada—Truckee, Carson, Walker, and Humboldt—the Carson River Basin is by far the largest recipient of other basins' waters, and most especially the waters of the Truckee River Basin, to include waters diverted by Derby Dam through the Truckee Canal for the Newlands Project (approximately 181,720 acre-feet per year, 1967-1995, and 170,890 acre-feet per year, 1973-1995), Marlette Lake and Franktown Creek (Hobart Creek Reservoir) for Virginia City and Carson City water supplies (about 3,000 acre-feet per year), and the South Tahoe Public Utility District which conveys treated effluent (4,000-5,000 acre-feet per year) from the Lake Tahoe Basin through a pipeline over Luther Pass to Harvey Place Reservoir into Alpine County. [See *CARSON RIVER ATLAS*, Department of Water Resources, The Resources Agency, State of California, Sacramento, California, December 1991, page 24. Also see Horton, *Truckee River Chronology, op. cit.*, Part I, "Current Diversions from the Truckee River and Lake Tahoe Basins."] Additionally, the Incline Village (Washoe County, Nevada) General Improvement District (IVGID) at Lake Tahoe pumps approximately 1,700 acre-feet per year to a wetland area in the northern part of Carson Valley while the Douglas County Sewer Improvement District (DCSID), serving that portion of Lake Tahoe from Glenbrook to the Nevada-California border at South Lake Tahoe (Stateline), pumps approximately 2,600 acre-feet per year to a reservoir in the Pine Nut Mountains on the east side of Carson Valley, where these waters then flow back to the east side of the Carson Valley in the summer for irrigation use.
8. For a reprint of this act, see *TRUCKEE RIVER ATLAS*, Department of Water Resources, The Resources Agency, State of California, Sacramento, California, June 1991, Appendix 1, pages 99-117.
9. This litigation was prompted by the U.S. Department of the Interior (USDI) and U.S. Reclamation Service (USRS) in order to obtain water rights for Lahontan Reservoir (completed in 1915) and the Truckee-Carson (Newlands) Irrigation Project's farmlands below it. [See Murphy, Shane, *The Lore and Legend of the East Fork—A Historical Guide for Floating the East Carson River*, The Carson River Conservation Fund, Zephyr Cove, Nevada, 1982, page 66.]
10. On January 24, 1983, with respect to the issuance of the Alpine Decree (*U.S. v. Alpine Land and Reservoir Company, et al.*) on October 28, 1980, the decision of the lower court was affirmed by the Ninth Circuit Court of Appeals on all but one issue: It was found, on appeal, that the U.S. Ninth District Court's requirement of a 30,000 acre-foot minimum pool in Lahontan Reservoir for public fishing and recreation was not supported by evidence. This

portion of the decree was remanded to the lower court for additional findings. No subsequent effort was taken to establish such a minimum pool in Lahontan Reservoir until negotiations related to The Negotiated Settlement (Public Law 101-618) were conducted in 1995. [Correspondence, Office of the Solicitor, U.S. Department of the Interior, Bureau of Reclamation.]

11. As a note of convention, it is interesting to point out that on the Carson River system the two principal forks are commonly referred to as the Carson River East Fork and the Carson River West Fork. On the other hand, on the Walker River system immediately to the south, the convention is to refer to the two principal forks as the East Walker River and the West Walker River. [See Horton, *Walker River Chronology, op. cit.*]
12. In the *CARSON RIVER ATLAS* (Department of Water Resources, The Resources Agency, State of California, Sacramento, California, December 1991, page 91) it was reported that according to an earlier U.S. Geological Survey (USGS) report, about 47,000 irrigated acres existed in Carson Valley. Due to subsequent urbanization and changes in land ownership, however, this figure has since been reduced considerably. According to a more recent U.S. Census of Agriculture (1987), it was reported that a total of 41,000 irrigated acres existed in all of Douglas County. Allowing for several thousand acres of irrigated farmland in the Douglas County portion of Antelope Valley to the south in the Walker River Basin, the 35,000 irrigated acres reported here appears a reasonable estimate of current irrigated acreage in Carson Valley alone.
13. *Initial Bench & Bottom Land, Map and Criteria*, Newlands Project, Nevada, Division of Water and Power Resources Management, Water Operation and Maintenance Branch, Irrigation Section, U.S. Bureau of Reclamation (USBR), U.S. Department of the Interior, Sacramento, California, September 1990, revised January 1992, pages 11-12.
14. Benson, Larry V., "Preliminary Paleolimnologic Data for the Walker Lake Sub-Basin, California and Nevada," *Water Resources Investigations Report 87-4258*, U.S. Geological Survey (USGS), U.S. Department of the Interior, Denver, Colorado, 1988, page 2.
15. Actually, over this time period Lake Lahontan underwent several "peaking enlargements" which would have covered the Lahontan Valley and the Carson Sink. [See Benson, Larry V., "Fluctuation in the Level of Pluvial Lake Lahontan During the Last 40,000 Years," *Quaternary Research*, Volume 9, Number 3, University of Washington, 1978, page 316.]
16. Houghton, *op. cit.*, page 73.
17. During Lake Lahontan's highstand approximately 65,000 years ago, with less sediment in the Carson Sink of the lower Carson River Basin, the lakes's depth at this point was estimated to be approximately 700 feet. [See *Initial Bench & Bottom Land, Map and Criteria, op. cit.*, page 11.] During a later highstand, which began about 25,000 years ago, with more sediment and a slightly lower lake surface elevation (4,370 feet MSL), the maximum depth in the Lahontan Valley was estimated at about 500 feet. [See *Initial Bench & Bottom Land, Map and Criteria, op. cit.*, pages 11-12, and Strickland, Rose, "Stillwater: Its Friends and Neighbors," *Dividing Desert Waters*, Nevada Public Affairs Review, Number 1, 1992, Senator Alan Bible Center for Applied Research, University of Nevada, Reno, page 68.]
18. Realistically, there tends to exist some flow between these basins in most years. It has been estimated that whenever 300,000-350,000 acre-feet of water is released in a given year from Rye Patch Reservoir (located on the Humboldt River approximately 22 miles upstream from Lovelock, Nevada), there will be some inflow into the Carson Sink from the Humboldt Sink. Also, during the high-water period of 1983-1986 when nearly 500,000 acre-feet flowed into the Carson Sink, it was estimated that a significant portion of these inflows came from the lower Humboldt River Basin via the Humboldt Slough. [Personal communication, Norm Saake, Statewide Waterfowl Specialist, Game Bureau, Nevada Division of Wildlife (NDOW), Department of Conservation and Natural Resources, Fallon, Nevada, May 1996.] The last such recorded "connection" between the terminus locations of these two river basins, making for one contiguous body of water, was reported by the *Carson City Daily Appeal* on January 16, 1868, when it stated that "During the late storm the water in the sinks of the Carson and Humboldt rose above the land usually intervening and formed one immense lake." [See McQuivey, Robert, "Nevada Habitat and Fisheries Historical Media File," Habitat Bureau, Nevada Division of Wildlife (NDOW), Department of Conservation and Natural Resources, State of Nevada, Reno, Nevada, 1996.]
19. Houghton, *op. cit.*, page 86.
20. *CARSON RIVER ATLAS, op. cit.*, page 14.
21. Inflows into the Carson Sink during this period were from both the Carson River and the Humboldt River. [Saake, *op. cit.*]

22. Rowe, Timothy G., and Ray J. Hoffman, "Wildlife Kills in the Carson Sink, Western Nevada, Winter 1986–87," U.S. Geological Survey Water-Supply Paper 2350 (Selected Events), USGS Water Resources Division, Carson City, Nevada, 1988.
23. Saake, *op. cit.*
24. The U.S. Geological Survey (USGS) and the Nevada Division of Water Resources, Department of Conservation and Natural Resources, have divided the state into discrete hydrologic units for water planning and management purposes. These have been identified as 232 Hydrographic Areas (256 areas and sub-areas, combined) within 14 major Hydrographic Regions or Basins. These 14 Nevada Hydrographic Regions (Basins) are: (1) Northwest Region—Covers 3,073 square miles (1,966,080 acres) of northern Washoe and Humboldt counties and encompasses 16 hydrographic areas; (2) Black Rock Desert Region—Covers 8,632 square miles (5,524,480 acres) of parts of Washoe, Humboldt, and Pershing counties and includes 17 valleys (hydrographic areas), two of which are divided into two sub-areas each; (3) Snake River Basin—Covers 5,230 square miles (3,347,200 acres) in parts of Elko and Humboldt counties to include eight hydrographic areas; (4) Humboldt River Basin—Covers over 16,843 square miles (10,779,520 acres) in parts of eight counties—Elko, White Pine, Eureka, Humboldt, Lander, Nye, Pershing, and Churchill—and the largest stream (Humboldt River) wholly within Nevada. This basin contains 34 hydrographic areas and one sub-area; (5) West Central Region—Covers 1,656 square miles (1,059,840 acres) and includes parts of Pershing, Lyon, and Churchill counties and comprises five hydrographic areas; (6) Truckee River Basin—Encompasses 2,300 square miles (1,472,000 acres) containing parts of Washoe, Pershing, Douglas, Carson City, and Storey counties comprising 12 hydrographic areas; (7) Western Region—Covers 577 square miles (369,280 acres) and is wholly contained in Washoe County and contains nine valleys (hydrographic areas) one of which is divided into two sub-areas and another divided into one sub-area; (8) Carson River Basin—Covers 3,519 square miles (2,252,160 acres) and includes parts of six counties—Douglas, Carson City, Lyon, Storey, Churchill, and Pershing—containing five hydrographic areas and one sub-area along the Carson River and its tributaries; (9) Walker River Basin—Covers 3,048 square miles (1,949,440 acres) of Mineral, Lyon, and Douglas counties including five hydrographic areas, one of which has been divided into three sub-areas; (10) Central Region—By far the largest hydrographic region in Nevada covering 46,783 square miles (29,941,120 acres) in 13 counties—Nye, Elko, White Pine, Lincoln, Clark, Humboldt, Pershing, Churchill, Lander, Eureka, Lyon, Mineral, and Esmeralda. This region includes 78 valleys (hydrographic areas), 10 of which are divided into two sub-areas and one into three sub-areas; (11) Great Salt Lake Basin—Covers 3,807 square miles (2,436,480 acres) of the easternmost portions of Elko, White Pine, and Lincoln counties. It consists of eight hydrographic areas, one of which is divided into four sub-areas; (12) Escalante Desert Basin—This basin covers a large area in Utah but only a very small part of it is in Lincoln County—106 square miles (67,480 acres)—and is made up of only one hydrographic area; (13) Colorado River Basin—Covers 12,376 square miles (7,920,640 acres) including parts of Clark, Lincoln, Nye, and White Pine counties and is divided into 27 hydrographic areas; (14) Death Valley Basin—Covers 2,593 square miles (1,659,520 acres) of Nye and Esmeralda counties including eight hydrographic areas, one of which has been divided into two sub-areas. [See Horton, *WATER WORDS DICTIONARY*, *op. cit.*]
25. Simpson, Captain James H., *Report of Explorations Across the Great Basin in 1859*, U.S. Army Engineering Department, Washington, D.C., page 479.
26. Stewart, Robert E., unpublished notes, "Carson Lake Navigability," Nevada Division of State Lands, Department of Conservation and Natural Resources, Carson City, Nevada, 1995, page 2.
27. After this flood event, it was reported that local farmers forced the river back into its original channel to Carson Lake. The last flow from Carson Lake to Stillwater via the Stillwater River or Slough was reported to have occurred shortly after the turn of the century. [Saake, *op. cit.*]
28. Carson Lake's surface area has varied widely in recent years. As recently as 1972 its area was recorded at 14,040 acres (22 square miles), declining to only 1,900 acres (3 square miles) by 1977. After the high water years of 1983–86, the lake's area increased to 12,665 acres (20 square miles), subsequently declining to only 145 acres (0.23 square mile) by 1992, then enlarging to 1,361 acres (2.1 square miles) by 1994. [Source: "Table 1—Estimated Wetland Acres Within Lahontan Valley," U.S. Fish and Wildlife Service (USFWS), Stillwater National Wildlife Refuge, Fallon, Nevada, 1995.] More recently, Saake (*op. cit.*) reported that after the wet year of 1995, Carson Lake's water surface area increased to approximately 5,000 acres (7.8 square miles), and after another above normal year of precipitation in 1996, Carson Lake's surface area was reported at approximately 15,000 acres (23.4 square miles) in May 1996.
29. Rowe, *op. cit.*
30. *Ibid.*

31. It should be noted that typically very little drainwater (along with its dissolved solids and other potentially harmful and mostly naturally-occurring constituents) actually reaches the Carson Sink proper; most of these flows are directed into Carson Lake or the Stillwater National Wildlife Refuge. [Saake, *op. cit.*]
32. Townley, John M., *The Orr Ditch Case, 1913-1944*, Water Resources Center Publication 43007, Desert Research Institute, University of Nevada System, October 1980, pages 3-4.
33. Strong, Douglas H., *Tahoe: An Environmental History*, University of Nebraska Press, Lincoln, Nebraska, 1984, page 44.
34. Represents the average annual diversion down the Truckee Canal (Federal Water Master's gage) over the entire period of record of 1910-1966 as compiled by Sierra Hydrotech from TCID diversion records. The annual average diversion over this period was 239,700 acre-feet. [Personal communication, Al Olson, Lahontan Basin Projects Office, U.S. Bureau of Reclamation (USBR), Carson City, Nevada.]
35. *A Study of Water Rights and Their Enforcement [in the] Lake Tahoe, Truckee and Carson River Basins*, Prepared by Water Rights Study Group, Pyramid Lake Task Force, [for the] U.S. Department of the Interior, Office of the Solicitor, Sacramento Region, Sacramento, California, August 1971, page 103.
36. The amount of water-righted acreage within the Newlands Irrigation Project has typically varied from between approximately 58,000 acres and 65,000 acres. From a study using extensive aerial reconnaissance undertaken in July 1972, it was determined that the Newlands Project contained 64,388.4 acres of improved irrigated lands. This total acreage included 5,300.3 acres in the Truckee Division (along the Truckee Canal), which included the Fernley, Hazen, and Swingle Bench areas of the Newlands Project serviced from the Truckee Canal, and 60,209.1 acres in the Carson Division, which included the Stillwater, Stillwater Indian Reservation, Fallon, Island and Sheckler areas serviced below Lahontan Dam, for a total of 65,509.4 acres, less 1,121.0 acres of fallowed lands. [See Mahannah, C.N., J.C. Guitjens, and C.R. York, *Western Nevada Water Controversy*, Cooperative Extension Service, Max C. Fleischmann College of Agriculture, University of Nevada, Reno, January 1975, page 19.] Subsequently, in 1985, the U.S. Bureau of Reclamation performed an Environmental Assessment (EA) as part of their analysis for various Operating Criteria and Procedures (OCAP) scenarios. This EA found that within the Newlands Project, 63,100 acres were being irrigated, of which 57,518 acres had legal project water rights. Of the difference, 900 acres were irrigated by groundwater, 475 acres were irrigated with return flow rights, and 4,207 acres were irrigated which did not have documented water rights or for which water right transfer applications were not complete. [See *Final Environmental Impact Statement for the Newlands Project Proposed Operating Criteria and Procedures (OCAP)*, U.S. Department of the Interior, Bureau of Reclamation, Mid-Pacific Regional Office, Sacramento, California, December 1987, page S-4.]
37. The term "bench land" is a general term describing porous and coarse-textured (sandy-gravelly) well-drained soils, overlying a deep water table (if occurring), that exhibits relatively low water holding capacity and rapid infiltration of irrigation water. The term "bottomland," or "bottom land," represents a general term describing generally rich, loamy or fine-textured and poorly drained soils, overlying a shallow water table or possibly adjacent to a stream, lake or other body of water, that exhibits relatively good water holding capacity and slow to moderate infiltration of irrigation water. Bottom lands are often associated with a river's flood plain. The U.S. Department of the Interior, Bureau of Reclamation (USBR) criteria (revised 1992) has defined bottom land for Nevada's Newlands Irrigation Project as "those lands with a five-foot soil profile having a holding capacity equal to or exceeding 8 inches and/or a water table within 6 feet of the surface for a period equal to or exceeding 150 days. If neither of these factors apply, the land is designated as bench land." Lands classified as bench (or bottom) according to USBR criteria, above, will be limited to maximum water deliveries (duty) in accordance to the provision of the 1944 Orr Ditch Decree and the 1980 Alpine Decree, which are identical in establishing water duties and establish the following limits: (1) Eligible lands designated as bench lands may receive a maximum of 4.5 acre-feet per acre per year; (2) eligible lands designated as bottom lands may receive a maximum of 3.5 acre-feet per acre per year. [See Horton, *WATER WORDS DICTIONARY*, *op. cit.*]
38. The "water duty" represents a measure of the total volume of irrigation water required for irrigation in order to mature a particular type of crop. In stating the duty, the crop, and usually the location of the land in question, as well as the type of soil, should be specified. It also includes consumptive use, evaporation and seepage from on-farm ditches and canals, and the water that is eventually returned to streams by percolation and surface runoff. [See Horton, *WATER WORDS DICTIONARY*, *op. cit.*]
39. *Water Resources Data, Nevada*, various issues, U.S. Geological Survey Water-Data Report, Nevada District Office, Water Resources Division, U.S. Geological Survey, U.S. Department of the Interior, Carson City, Nevada.
40. *Initial Bench & Bottom Land, Map and Criteria*, *op. cit.*, page 11.
41. Townley, *The Orr Ditch Case, 1913-1944*, *op. cit.*, page 6.

42. The Newlands Project was not the first water development project to tap the waters of the Truckee River Basin for use within the Carson River Basin. The first interbasin transfer of the waters between these basins occurred in August 1873 when waters were diverted from Franktown Creek (originally named Dall Creek and then Hobart Creek) and the Hobart Creek Reservoir, which flows into Washoe Valley and Washoe Lake, then on to the Truckee River via Steamboat Creek, for delivery through 21 miles of pipe to Virginia City, in Storey County, Nevada, and located in the Carson River watershed. A second pipeline was completed along this same route in 1875 and then, in 1887, a third pipeline to Virginia City was completed, this time tapping the waters of Marlette Lake, which directly fed into the Lake Tahoe Basin. The Marlette Lake diversion was more complicated, however, and involved the construction of a flume, a tunnel through the Carson Range to take the water from the Lake Tahoe Basin (as part of the Truckee River Basin) to the east slope of the Carson Range, and then another flume to the Franktown Creek diversion points below Hobart Creek Reservoir. [See *The Marlette Lake Water System*, A Report on the Feasibility and Desirability of Its Retention, Bulletin No. 79, Legislative Commission of the Legislative Counsel Bureau, State of Nevada, Carson City, Nevada, February 1969.]
43. *CARSON RIVER ATLAS*, *op. cit.*, page 26. According to the Alpine Decree, "Lahontan Reservoir has a capacity of 295,149 acre-feet to the spillway crest. With 20-inch flashboards on the crest, the capacity is 317,280." [See Alpine Decree, Findings of Fact, Conclusions of Law, Tabulation and Administrative Provisions, *United State of America v. Alpine Land & Reservoir Company, a Corporation, et al.*, Civil No. D-183 BRT, Final Decree, United States Federal District Court for the District of Nevada, October 28, 1980, page 1.]
44. *A Study of Water Rights and Their Enforcement [in the] Lake Tahoe, Truckee and Carson River Basins*, *op. cit.*, page 103.
45. Within the Newlands Project, there are 102 miles of main canals, 312 miles of irrigation laterals, an extensive system of private ditches, 345 miles of drainage ditches, and numerous diversion dams and regulating reservoirs. Truckee-Carson Irrigation District offices are located in Fallon, Nevada (Churchill County), and its operations are managed by a project manager, a board of seven members, and approximately 50 full-time employees. [Personal communication, Lyman McConnell, Project Manager, TCID, May 13, 1996.]
46. Tabulated by Sierra Hydrotech from Truckee-Carson Irrigation District diversion records.
47. This elimination of the use of water for single-purpose power generation within the project was part of a "Bureau of Reclamation 9 Point 'Package' Proposal" supposedly negotiated between the U.S. Bureau of Reclamation and Truckee-Carson Irrigation District. In brief, these points included: (1) Operation of TCID facilities so as to maximize use of Carson River flows and minimize use of the Truckee River flows; (2) Furnish TCID for irrigation requirements 406,000 acre-feet annually; (3) Freeze TCID water rights at the present level of approximately 74,500 acres; (4) Eliminate the use of water for single-purpose power generation; (5) Withdraw from TCID custody of the 64-acre tract at Lake Tahoe and divert it to public use with no direct remuneration to TCID; (6) TCID to complete payment [of project facilities] in accordance with its existing contractual obligation; (7) To assist in accomplishments of objectives (1) and (2), and in consideration of points (3), (4), (5), and (9), the U.S. will undertake certain rehabilitation programs on a non-reimbursable basis [with a total estimated cost of approximately \$3.5 million]; (8) Re-negotiate the three party agreement for the Stillwater Wildlife Management Area in accordance with recent discussions between TCID and USFWS [this action would involve retention of custody of the land by TCID and an agreement on a percentage split of drainage and return flows to the Stillwater area and the Carson Lake [and] Pasture to the south; and (9) Revoke custody of fringe areas of custodial land which are of little value to TCID. [According to correspondence provided by Truckee-Carson Irrigation District, June 3, 1996, this agreement was sent to Washington, D.C., but was never ratified. Nevertheless, TCID "was required to comply with its provisions including the repair of the Truckee Canal which was to be partially reimbursed by the federal government but was not."]
48. *Water Resources Data, Nevada, Water Year 1995*, U.S. Geological Survey Water-Data Report NV-95-1, Nevada District Office, Water Resources Division, U.S. Geological Survey, U.S. Department of the Interior, Carson City, Nevada, 1996.
49. According to U.S. Bureau of Reclamation estimates and hydrology model results, the most recent expected diversions at Derby Dam are approximately 109,000 acre-feet per year, of which 69,000 acre-feet would flow into Lahontan Reservoir. [Personal communication, Al Olson, USBR, Lahontan Basin Area Office, Carson City, Nevada, July 31, 1996.]
50. Olson, *op. cit.*
51. Phreatophytes are perennial plants which are very deeply rooted, deriving their water from a more or less permanent, subsurface water supply; they are thus not dependent upon annual precipitation for survival. [See Horton, *WATER WORDS DICTIONARY*, *op. cit.*]

52. The Truckee River U.S. Geological Survey gaging station located immediately below (1,500 feet) Derby Dam [gaging station 10351600] does not reflect return flows from the Truckee Canal which are spilled back into the Truckee River above Wadsworth from the Gilpin spill structure and the Pyramid spill structure. These spills occur before the first Truckee Canal USGS gaging station [gaging station 10351300] and are therefore not reflected in that measurement as Truckee Canal diversions for the Newlands Project. Spills from these structures will enter the Truckee River between the gage below Derby Dam and the USGS gage at Wadsworth. Anecdotal evidence indicates that these return flows from the Truckee Canal back into the lower Truckee River have, at times, been substantial. [Personal communications with Saake, *op. cit.*, and Olson, *op. cit.*]
53. Established in 1931, the Fallon National Wildlife Refuge encompasses approximately 17,900 acres (28 square miles) where the Carson River terminates in the Carson Sink and is situated within the northwest portion of the Stillwater Wildlife Management Area (WMA). Due to limited and uncertain flows of the Carson River at its terminus, generally not enough water enters this refuge to maintain it as a viable wetlands. The area is currently managed by the U.S. Fish and Wildlife Service (USFWS) and is included as part of the Stillwater WMA.
54. Located approximately 15 miles east of the City of Fallon in Churchill County, Nevada, and on the edge of the Carson Sink, the Stillwater National Wildlife Refuge was formally established in 1991 when 77,500 acres (121 square miles) of the Stillwater Wildlife Management Area (WMA) were set aside to preserve critical nesting areas and habitat for migratory waterfowl and other birds using the Pacific Flyway in western Nevada. In 1948, in order to preserve a shrinking wetland system, the USFWS and the Nevada Fish and Game Commission entered into an agreement with TCID to develop and manage 24,000 acres (350 square miles) of USBR Newlands Irrigation Project lands, designated as the Stillwater WMA, for wildlife habitat protection and preservation. Today, the Stillwater NWR includes a variety of habitats, from freshwater sloughs and marshes to brackish-water marshes and alkali flats. Each habitat hosts a unique assemblage of plants and invertebrates, which in turn attracts more than 160 bird species and many other animals.
55. Located in Churchill County, Nevada, the Stillwater Wildlife Management Area was established in 1948 and currently consists of 143,866 acres (225 square miles) of lands under joint management by the Nevada Division of Wildlife (NDOW) and the U.S. Fish and Wildlife Service (USFWS).
56. The Carson Lake and Pasture was created in 1918 when the U.S. Reclamation Service (USRS, later the U.S. Bureau of Reclamation, USBR) fenced off a tract of about 14,700 acres of vacant land in the vicinity of Carson Lake in the southern portion of the Lahontan Valley for the creation of a pasture in which the Newlands Project's water users might graze their surplus stock during the crop growing season. In addition to the fencing, several miles of laterals (canals) were constructed for the irrigation of the area in order to increase the growth of pasture grass. Some 5,000 additional acres were added to this pasture area in 1920. The USRS originally operated the pasture by charging a small rental fee per head of stock grazed. [See Dangberg, *Conflict on the Carson*, Valley Historical Society, Minden, Nevada, November 1975, page 157.]
57. U.S. Fish and Wildlife Service water rights purchases will be made for the Stillwater National Wildlife Refuge, while State of Nevada water right purchases will be made for Carson Lake and Pasture. These water rights purchases are authorized under Public Law 101-618, Section 206.
58. Water rights acquisitions for the Pyramid Lake fishery are covered under Public Law 101-618, Section 207(c).
59. Project efficiency is a measure of a water distribution system's ability to transport and apply water to a desired effect with a minimum of effort, expense, or waste. With respect to irrigation project efficiency, the following terms generally apply: (1) Canal efficiency—the volume of water diverted into a canal system versus total water available for farm headgate deliveries; (2) Irrigation efficiency—the percentage of water applied that can be accounted for in soil moisture increase; and (3) Farm efficiency—the amount of water actually required for growing a crop compared to the amount of irrigation water that is diverted at the farm headgate. [See Horton, *WATER WORDS DICTIONARY*, *op. cit.*]
60. Churchill County has the fourth highest level of farm marketings in Nevada and is ranked after Lyon, Humboldt, and Elko counties. [See *1987 Census of Agriculture*, Volume 1, Geographic Area Series, Part 28, Nevada State and County Data, Agriculture Division, Bureau of the Census, U.S. Department of Commerce, Washington D.C., June 1989.]
61. Horton, Gary A., *Churchill County Agricultural Analysis—An Analysis of the Churchill County Agriculture Sector Using Census Data and County Survey Results*, Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada, August 1992, revised November 1995.
62. Correlation analysis is a statistical means to measure the degree of linear relationship, or "coincidence of change" between two variables, producing a value of variance termed the correlation coefficient. In strict correlation analysis, no inference of "causation," i.e., one variable being "explained" by the variations of another, is made. This concept

of causation must be shown or inferred by other means, such as previous, or *a priori*, information that two sampled variables are indeed related to one another. [See Horton, Gary A., *Churchill County Correlation Analysis—Correlation Analysis of Churchill County's Primary Economic Indicators*, Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada, June 1992.]

63. "Population of Nevada's Counties and Incorporated Cities," Office of the State Demographer, Bureau of Business and Economic Research, College of Business Administration, University of Nevada, Reno, December 19, 1995.

64. *1987 Census of Agriculture, op. cit.*

65. See analysis in the following sections of Part I of this chronology for a detailed breakout of distances along each segment of the Carson River's East Fork, West Fork, and mainstem. These figures may also be interpreted from Figure 3, Longitudinal Profile of the Carson River, *CARSON RIVER ATLAS, op. cit.*, page 6.

66. For the 1960–1995 period of record.

67. For the 1901–1995 period of record.

68. Recorded at U.S. Geological Survey (USGS) gaging station 1030820 (below Markleeville, California), and USGS gaging station 10310000 (at Woodfords, California). [See USGS *Water Resources Data, Nevada, op. cit.*]

69. On the afternoon of December 18, 1872, probably the most notorious murder in Alpine County took place at Fisk's Hotel in Silver Mountain City. On that afternoon, one Ernest Reusch stood outside the hotel and cold bloodedly murdered E.H. Errickson who was playing cards inside. Apparently, Errickson had recently won over the affection of Reusch's bride of only two weeks. After making sure that Errickson was dead, Reusch turned himself in to the authorities. In June 1873 a grand jury indicted Reusch for murder and a change of venue was granted to hold the trial in Bridgeport, located in Mono County. Anticipating that a lengthy trial would drain the treasury of Alpine County, at 10 p.m. on the night of April 18, 1874, a group of masked vigilantes waited at this bridge and intercepted the party transporting Reusch to trial in Bridgeport. Without resistance, Reusch was removed from custody and thrown from the bridge with a hangman's noose around his neck. Reusch was subsequently buried in the Markleeville cemetery. The Coroner's Inquest failed to identify the exact nature of the incident or the names of any of the participants. [See Murphy, Shane, *The Lore and Legend of the East Fork—A Historical Guide for Floating the East Carson River*, The Carson River Conservation Fund, Zephyr Cove, Nevada, 1982, pages 36–39.]

70. An ephemeral stream is a stream that flows only in direct response to precipitation, and thus discontinues its flow during dry seasons. Such flow is usually of short duration. Most of the dry washes of more arid regions may be classified as ephemeral streams. Ephemeral streams are different from intermittent (or seasonal) streams, which flow only at certain times of the year when it receives water from springs, rainfall, or from surface sources such as melting snow. [See Horton, *WATER WORDS DICTIONARY, op. cit.*]

71. Acid mine drainage represents the acidic water that flows into streams from abandoned mines or piles of mining waste or tailings. The acid arises from the oxidation of iron sulfide compounds in the mines by air, dissolved oxygen in the water, and chemoautotrophs, which are bacteria that can use the iron sulfide as an energy source. Iron sulfide oxidation products include sulfuric acid, the presence of which has reduced or eliminated aquatic life in many streams in mining regions. [See Horton, *WATER WORDS DICTIONARY, op. cit.*]

72. The Leviathan Mine is one of a number of abandoned mine sites in the upper Carson River Basin. According to information provided by the California Regional Water Quality Control Board, Lahontan Region, along the East Fork of the Carson River there are 34 known abandoned mine sites (31 gold and silver, 1 tungsten, 1 mercury, and 1 sulfur—Leviathan). Along the West Fork of the Carson River there are nine known abandoned mine sites (3 copper, 4 tungsten, and 2 gold and silver). The two most conspicuous of these abandoned mine sites, and the ones of greatest potential environmental harm, are the Leviathan Mine and the Vaca Mine, located to the south of the Leviathan Mine site along Monitor Pass and Monitor Creek. [Personal communication, Bruce Warden, California Regional Water Quality Control Board, Lahontan Region, July 31, 1996.]

73. According to Katherine Schoen, Water Resource Control Engineer, California Regional Water Quality Control Board, Lahontan Region, Leviathan Creek's waters remain toxic to this day, particularly during periods of high runoff during the spring. As a result, virtually no fish have been observed in Leviathan Creek or Bryant Creek all the way to the East Fork of the Carson River. In an average year, approximately three million gallons overflow from holding ponds erected on the mine site; during the high-water year of 1996, approximately eight million gallons of acid mine drainage overflowed from the evaporation holding ponds into Leviathan Creek. A continuous source of pollution to this creek system is the underdrain pipe erected beneath the spoil dump which contains springs which percolate through the mine residue. A California program to correct this channel underdrain system, prevent evaporation holding pond overflow, and re-vegetate the site remains in effect. [Personal communication, Katherine Schoen, Water Resource Control Engineer, California Regional Water Quality Control Board, Lahontan Region, July 26, 1996.]

74. While no pre-mining water quality data exists, in a letter written by California Department of Fish and Game Warden Artie G. Brown, he stated that Leviathan Creek was always polluted downstream of the Leviathan Mine as evidenced by yellow colored water and yellow sediment ("yellowboy") deposited on the bottom of the stream bed. Therefore, mining activity may have only worsened a pre-existing condition. Even so, fish were reportedly caught in Bryant Creek as late as May 1953, indicating that such a condition was not nearly as severe as after the mining began. [See *Leviathan Mine 5-Year Workplan*, California Regional Water Quality Control Board, Lahontan Region, California Environmental Protection Agency, State of California, Sacramento, California, July 1995, page 11.]
75. *Leviathan Mine 5-Year Workplan*, California Regional Water Quality Control Board, Lahontan Region, California Environmental Protection Agency, State of California, Sacramento, California, July 1995, page 11.
76. Dissolved oxygen represents the amount of free (not chemically combined) oxygen dissolved in water, wastewater, or other liquid, usually expressed in milligrams per liter, parts per million, or percent of saturation. Adequate concentrations of dissolved oxygen are necessary for the life of fish and other aquatic organisms and the prevention of offensive odors. Dissolved oxygen levels are considered the most important and commonly employed measurement of water quality and provide an important indicator of a water body's ability to support desirable aquatic life. The ideal dissolved oxygen level for fish is between 7 and 9 milligrams per liter (mg/l); most fish cannot survive at levels below 3 mg/l of dissolved oxygen. Secondary and advanced wastewater treatment techniques are generally designed to ensure adequate dissolved oxygen in waste-receiving waters. [See Horton, *WATER WORDS DICTIONARY*, *op. cit.*]
77. *Leviathan Mine 5-Year Workplan*, *op. cit.*, pages 6–12 and 28.
78. Dangberg, *Conflict on the Carson*, *op. cit.*, pages 2 and 70.
79. Measured at Woodfords, California, on the Carson River West Fork, and at Markleeville, California, on the Carson River East Fork.
80. Writing in 1860, Henry DeGroot reported that "After leaving this valley [Hope Valley] it [the Carson River West Fork] rushes through the wild and rocky defile known as Carson Cañon, an impetuous torrent, falling twelve hundred feet in five miles." [See Dangberg, *Conflict on the Carson*, *op. cit.*, page 1.]
81. Between 1856 and 1864, John "Snowshoe" Thompson, a native of Norway, fashioned his own skis and volunteered to carry the mails between Placerville ("Hangtown"), California, and Genoa, Nevada, when the snows along "Hangtown Road" became too deep for normal equestrian travel. [See Murphy, *op. cit.*, page 45.]
82. Written communication, R. Michael Turnipseed, State Engineer, Nevada Division of Water Resources, Department of Conservation and Natural Resources, Carson City, Nevada, March 15, 1996.
83. Nearly three miles after the Carson River West Fork crosses the California–Nevada state line, it bifurcates into the West Fork and Brockliss Slough, with most of the flows going down the Brockliss Slough. From this point to its confluence with the Carson River East Fork near Genoa, the West Fork serves primarily as a catchment for irrigation return flow from the western side of the East Fork. U.S. Geological Survey water budget information, along with field observations and data obtained from the Federal Water Master, indicate that when the streamflow in the Carson River West Fork is less than about 80 cubic feet per second, all flow from the West Fork is diverted into Brockliss Slough. The Carson River East Fork, West Fork, and Brockliss Slough then combine near Genoa, Nevada, to form the mainstem Carson River. [See Hess, Glen W., "Progress Report on Daily-Flow Routing Simulation for the Carson River, California and Nevada," U.S. Geological Survey Open-File Report 96–211, USGS, Water Resources Division, Carson City, Nevada, 1996, pages 6 and 14.]
84. Downstream from Carson Valley on the Carson River, most of the ungaged tributaries are ephemeral and therefore do not typically supply a significant volume of water to the Carson River. [See Hess, *op. cit.*, page 12.]
85. See *History of Flooding—Carson Valley and Carson City Watershed*, U.S. Department of Agriculture (USDA), Special Report on Water and Related Land Resources, Central Lahontan Basin, Carson River Sub-Basin, Soil Conservation Service (SCS), U.S. Department of Agriculture, Carson City, Nevada, November 1973. The figures listed here are those presented later in the chronology section (Part III) and were reported in the source reference under the detailed occurrence of each flood event. Somewhat incongruently, in the introduction of this source work (page 1), different figures were noted for these flood events. For example, for the 1937 flood, peak flow rates for the Carson River East and West forks were 10,300 cfs and 3,500 cfs, respectively; for the 1950 flood event, 12,100 cfs and 4,730 cfs, respectively; and for the 1955 flood event, 17,600 cfs and 4,810 cfs, respectively. These differences may be attributable to differences between instantaneous peaks (maximum recorded) and daily means, although the source reference made no such distinction. For information on the flood of 1997, see Horton, Gary A., *The Flood of 1997—Preliminary Report: An Analysis of Snowpack Water Content and Precipitation Changes in the Waterbasins of Western Nevada and the Effects on Runoff and Stream Flows*, December 16, 1996–January 6, 1997, Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada,

January 1997, updated and revised February 28, 1997.

86. This site has historic significance in terms of early conflicts along the Carson River between Carson Valley farmers and the Comstock mill men on the lower Carson River in Dayton Valley below Empire City. It was at this point along the river's reach, generally considered near the river's exit from the Carson Valley, that the mill men, in their first major legal suit against Carson Valley ranchers over water rights (*Union Mill and Mining Company v. H.F. Dangberg, et al.*), demanded a perpetual right to a year-round flow of 6,000 miners inches, equivalent to 150 cubic feet per second (cfs), or nearly 110,000 acre-feet per year.

87. Empire City, located at the head of Dayton Valley, represented an historic site during the Comstock era. It was here that the massive log drives from the upper Carson River Basin generally terminated, although sometimes "deliveries" of wood were made along the Carson River through Dayton Valley to individual mills. At this location the huge square-cut timbers and cord wood were removed from the river, cut into usable timbers and planks, and hauled up to the Comstock to continue the excavation of the mines and provide power for the mine hoists and other equipment. It has been estimated that during a 30-year period in the late 1800's, approximately 35 million board feet, or some 5 million cords of wood were removed from the upper reaches of the basin and floated down the Carson River to Empire City. Eventually, the once vast forests of the upper Carson River Basin were reduced to isolated pockets of timber cut back from the river by a mile to a mile and a half. [See Murphy, *op. cit.*, page 45.]

88. Dangberg, *Conflict on the Carson, op. cit.*, page 7.

89. Land, Barbara and Myrick, *A Short History of Reno*, University of Nevada Press, Reno, Nevada, 1995, page 25.

90. Shamberger, Hugh A., *Water Supply for the Comstock*, Prepared in Cooperation with Nevada Department of Conservation and Natural Resources and U.S. Geological Survey, Carson City Nevada, 1969, Statistical Summary, page xi.

91. Benson, Larry V., "Preliminary Paleolimnologic Data for the Walker Lake Sub-Basin, California and Nevada," *op. cit.*, page 1.

92. Irrigation of farmlands between Lahontan Reservoir and the Carson Diversion Dam is done through the Rock Dam Ditch, which takes off from the lower Carson River just below Lahontan Dam. [Saake, *op. cit.*]

93. *Alpine Decree, Findings of Fact, Conclusions of Law, Tabulation and Administrative Provisions, United States of America v. Alpine Land & Reservoir Company, a Corporation, et al.*, *op. cit.*

94. Benson, Larry V., "Fluctuation in the Level of Pluvial Lake Lahontan During the Last 40,000 Years," *op. cit.*, pages 303-306.

95. The Quaternary age or period covers the Pleistocene (Ice Age) and Holocene (present-day) epochs, from approximately 1.8 million years ago to the present.

96. *Reconnaissance Investigation of Water Quality, Bottom Sediment and Biota Associated with Irrigation Drainage in and near Stillwater Wildlife Management Area, Churchill County, Nevada, 1986-87*, Water-Resources Investigations Report 89-4105, U.S. Geological Survey, U.S. Department of the Interior, prepared in cooperation with the U.S. Fish and Wildlife Service and U.S. Bureau of Reclamation, Carson City, Nevada, 1990, page 7.

97. Dangberg, *Conflict on the Carson, op. cit.*, pages 2 and 70.

98. *Ibid.*, page 29.

99. The Winters Rights Decision represented the U.S. Supreme Court precedent decision (*Winters v. United States*, 207 U.S. 564 [1908]) in which the Court prohibited any uses by non-Indians that interfered with the Indian tribes' use of their reserved water. In Winters, the Court held that when reservations were established, Indian tribes and the United States implicitly reserved, along with the land, sufficient water to fulfill the purposes of the reservations. The ruling rests on the principle that Indian tribes retain all rights not explicitly relinquished. These federal reserved water rights are commonly known as "Winters Rights" as based on the "Winters Doctrine." The court recognized these rights as having a priority date coinciding with the date the reservation was established, thus providing a means to integrate federally reserved rights with appropriative water rights recognized under state law. Since reserved rights are not created by state law, Winters Rights retain their validity and seniority regardless of whether tribes have put the water to beneficial use. On-going conflicts concerning this ruling tend to involve non-Indian water users appropriating water under state law, water that previously may have been reserved for Indian tribes, though never quantified by courts or fully used on reservations. [See Horton, *WATER WORDS DICTIONARY, op. cit.*]

100. Gourley, Chad, "Historic Overview of Modifications to the Truckee River Ecosystem," *The Truckee River Times*, Volume 6, Number 2, May 1996, page 3.

101. Pyramid Lake's Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*), which were introduced into the lake from Walker Lake in the 1950's, were classified as in danger of extinction in 1970, but then reclassified as threatened in 1975 in order to allow for their management and regulated fishing. [See Horton, *Truckee River Chronology, op.*

cit.]

102. From data tabulated by Sierra Hydrotech from TCID diversion records. [USBR, Lahontan Basin Projects Office, Carson City, Nevada.]

103. This gaging station is located on the Truckee Canal, 22.94 miles upstream from the terminal weir at Lahontan Reservoir, and nearly 10 miles downstream from Derby Dam.

104. *Water Resources Data, Nevada*, *op. cit.*, various issues.

105. The U.S. Supreme Court issued its precedent-setting Winters Rights Decision (*Winters v. United States*) in 1908 by which the Court prohibited any uses by non-Indians that interfered with Indian tribes' use of their reserved water. While the Pyramid Lake Paiute Indian Tribe was granted water rights for irrigation of lands on the reservation, they have argued that their heritage is linked not to agriculture, i.e., irrigation water, but to the Pyramid Lake fishery.

106. The Endangered Species Act was an act passed by Congress in 1973 and intended to protect species and subspecies of plants and animals that are of "aesthetic, ecological, educational, historical, recreational and scientific value." It may also protect the listed species' "critical habitat", the geographic area occupied by, or essential to, the protected species. The U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) share authority to list endangered species, determine critical habitat and develop recovery plans for listed species. Currently, approximately 830 animals and 270 plants are listed as endangered or threatened nationwide at Title 50, Part 17, sections 11 and 12 of the Code of Federal Regulations. Further, under a settlement with environmental groups, USFWS has agreed to propose listing another 400 species over the next few years. The 1973 Endangered Species Act superseded and strengthened the Endangered Species Preservation Act of 1966 and the Endangered Species Conservation Act of 1969. The 1973 provisions required that the act be re-authorized by Congress every five years. [See Horton, *WATER WORDS DICTIONARY*, *op. cit.*]

107. Janik, C. Anne, and Ronald M. Anglin, "Nevada's Unique Wildlife Oasis," *Dividing Desert Waters*, Nevada Public Affairs Review, Number 1, 1992, Senator Alan Bible Center for Applied Research, University of Nevada, Reno, page 57.

108. The standard flask of mercury contains 34.5 kilograms, or 76 pounds.

109. Cooper, James J., Richard O. Thomas, S. Michael Reed, *Total Mercury in Sediment, Water, and Fishes in the Carson River Drainage, West-Central Nevada*, Nevada Division of Environmental Protection (NDEP), Department of Conservation and Natural Resources, State of Nevada, Carson City, Nevada, December 1985, page 1.

110. "Carson River Mercury Superfund Site," U.S. Environmental Protection Agency, Region IX, San Francisco, California, December 1994 and June 1995.

111. Based on its study of the Carson River Mercury Site (CRMS), the U.S. Environmental Protection Agency proposed to address six areas where mercury levels in soils were found to be of potential concern. These included five areas in Dayton on the Carson River and one area in Silver City up Sixmile Canyon. It was also proposed that the Silver City site and four of the sites in Dayton were to be addressed by the excavation alternative, i.e., removing the contaminated soil and backfilling. The sixth site was the ditch which conveys water from Gold Canyon to the Carson River. It was proposed that this area to be fenced off to limit public access. [See "Carson River Mercury Superfund Site," *op. cit.*]

112. *Reno-Gazette Journal*, October 13, 1995, page 2B.

113. As a result of the U.S. Environmental Protection Agency's designation of a much larger, 2,000 square-mile area of the Carson River Basin stretching essentially from the Carson Sink to Markleeville, California, as a "study area," it was reported that several businesses had deferred from relocating to the 800-acre Dayton Industrial Park. One of these included Connecticut-based Stanley Tool Company, which subsequently purchased property in Fernley, Nevada, and another Fortune 500 company (unnamed) which reportedly balked at locating in Dayton over this issue. U.S. Senator Richard Bryan (Nevada) subsequently met with EPA Director Carol Browner in order to encourage the EPA to more narrowly define the designated "study area" and ease these concerns. In June 1996, the EPA responded to this request and dramatically reduced the study area. [See *Nevada Appeal*, June 25, 1996.]

114. According to testimony presented in the hearing on water right Application 9330, the capacity of the Truckee Canal is actually about 1,100 cubic feet per second (cfs); however, at that level it is dangerously close to overtopping and plugging. Consequently, nominally, they try to keep the diversion at around 900 cfs. [Turnipseed, *op. cit.*]

115. De Bruyn, David, *Potential Water Conservation Measures—Newlands Project*, Prepared under the Request of the Special Assistant to the Secretary of the Interior on Matters Dealing with Public Law 101-618 [Negotiated Settlement], April 1992, page 23.

116. Horton, *WATER WORDS DICTIONARY*, *op. cit.*

117. Turnipseed, *op. cit.*

118. *Reno Gazette-Journal*, December 3, 1995, pages 1C and 4C.
119. *Reno Gazette-Journal*, December 12, 1995, page 2B, and *Lahontan Valley News*, Fallon, Nevada, December 12, 1995.
120. *Reno Gazette-Journal*, August 3, 1995, page 1B, and personal conversation with Al Olson, Lahontan Basin Projects Office, U.S. Bureau of Reclamation (USBR), Carson City Office, August 29, 1995.
121. Turnipseed, *op. cit.*, and *Nevada Appeal*, Carson City, Nevada, November 14, 1995, page A9.
122. Water right application file 9330, *op. cit.*
123. For a listing of current diversions out of the Lake Tahoe and Truckee River basins, see Horton, *Truckee River Chronology*, *op. cit.*
124. *CARSON RIVER ATLAS*, *op. cit.*, pages 95–96.
125. *Public Law 101-618*, Section 209.(a)(1)(B).
126. *California-Nevada Interstate Compact Between the State of California and Nevada*, *op. cit.*, Article VII, Paragraph E, page 20.
127. See Nevada Revised Statutes (NRS) 538.600 and Chapter 1480, California Statutes 1970.
128. The Carson River Basin also receives some inflows from the Walker River Basin (via Adrian Valley) and from the Humboldt River Basin (via the Humboldt Slough from the Humboldt Sink). While the Walker River Basin inflows are typically infrequent and inconsequential, flows from the Humboldt Sink have, on occasion, been substantial. See, for example, entry for December 1986 in Part III of this chronology.
129. *Reno Gazette-Journal*, April 30, 1996, page 3B.
130. In addition to the South Tahoe Public Utility District (STPUD), sewage treatment and transfer of effluent out of the Lake Tahoe Basin is handled by two other utilities: The North Tahoe Public Utility District and the Tahoe City Public Utility District. These entities service the sewage collection needs of the west side of Lake Tahoe from the service area of the STPUD north to the California-Nevada state line at Crystal Bay, Nevada. Sewage is transported to the Tahoe-Truckee Sewage Treatment Plant at Truckee, California, where it receives advanced tertiary treatment and then is infiltrated into the ground. Therefore, these waters remain within the Truckee River Basin.
131. The difference represents the consumptive use of the Truckee Division of the Newlands Project below the Truckee Canal, consisting of approximately 5,300 acres of primarily bench lands, as well as operational losses (evaporation, seepage, etc.). For a more recent period of record, 1988–1994, these figures showed an average of 167,760 acre-feet per year being diverted at Derby Dam into the Truckee Canal and 134,370 acre-feet per year entering Lahontan Reservoir, resulting in approximately 80 percent of total diversions reaching the Carson River.
132. The concept of “rotation” involves operating the Carson River as autonomous sections (segments) that will receive water during a given interval. In this way water rights holders along the entire reach will have an equal opportunity to use the waters virtually irrespective of the rate of flow. This concept was initially fashioned when the farmers in Carson Valley deferred all water use (diversions) during certain intervals, thereby allowing the loggers (“wood men”) to move their logs along a certain portion of the river. After that interval, the wood drive would halt and the farmers were then allowed to resume diversions for their interval.
133. Riparian rights represent the system for allocating water used in England and the eastern United States. Under the “riparian doctrine,” ownership of land along a stream or river (i.e., riparian lands) is an absolute prerequisite to a right to use water from that body of water and each such landowner has an equal right to the water (whether or not he is presently using it or not).
134. Nevada’s water law is based on statutes enacted in 1903 and 1905 and are founded on the principal of “prior appropriation.” Unlike some other states, Nevada has a statewide system for the administration of both groundwater and surface water. Appropriative water rights are based on the concept of applying water to “beneficial use” and “First in Time, First in Right.” Appropriative water rights can be lost through nonuse and abandonment and they may be sold or transferred apart from the land. Due in large part to the relative scarcity of water in Nevada and numerous competing uses, Nevada has had a active market for water transfers for a number of years. A person in Nevada who desires to place water to beneficial use must file an application with the State Engineer to initiate the process of acquiring an appropriative water right.
135. Equivalent to an annual net consumptive use of surface water for irrigation of 2.99 acre-feet per acre per year. This annual net consumptive use, or “crop water requirement,” was based on the water duty of alfalfa as it is a dominant and the highest water-using crop grown in Nevada
136. Equivalent to an annual net consumptive use of surface water for irrigation of 2.5 acre-feet per acre per year.

137. The crop irrigation requirement is amount of irrigation water in acre-feet per acre required by the crop; it is the difference between "Crop Consumptive Use," or "Crop Requirement," and the effective precipitation for plant growth. To this amount the following items, as applicable, are added: (1) irrigation applied prior to crop growth; (2) water required for leaching; (3) miscellaneous requirements of germination, frost protection, plant cooling, etc.; and (4) the decrease in soil moisture should be subtracted. [See Horton, *WATER WORDS DICTIONARY*, *op. cit.*]
138. From the time that TCID took over the operation of the Newlands Project in 1927 up until 1969, it periodically permitted the project farmers to use project waters for irrigation of lands not described in their contracts in preference to irrigation of lands described in the contracts where it had become impractical to use water beneficially or economically. In permitting these informal transfers of water rights, it was believed that Nevada's water laws did not apply to project water rights and the federal government had no procedures for formal authorization of these transfers. While seemingly innocuous at the time, these actions would eventually have important implications on the concept of the water rights "appurtenant to the land," as specified in the 1980 Alpine Decree, the potential for increasing the project's consumptive use when such transfers were permitted between bottom lands (water duty of 3.5 acre-feet per acre per year) and bench lands (water duty of 4.5 acre-feet per acre per year), the applicability of Nevada Water Law and the concepts of abandonment and forfeiture, and efforts by the Pyramid Lake Paiute Indian Tribe to invalidate some of these transfers which they claimed had been abandoned before transfers were made, hence invalidating the State Engineer's subsequent approval of these changes in place of use. Hearings are to be held in late 1996 (October and November) to resolve these disputes.
139. *Alpine Decree, Findings of Fact, Conclusions of Law, Tabulation and Administrative Provisions*, *op. cit.*, pages 3-4.
140. This adjudication of water rights of the Truckee River within Nevada arose in March 1913 when the U.S. Reclamation Service filed a "friendly lawsuit" (*U.S. v. Orr Ditch Water Company, et al.*) in order to quantify Truckee River water rights within Nevada so as to obtain its own water rights for the Truckee-Carson (Newlands) Irrigation Project. Despite the initial "friendly" intent of the lawsuit, it took over 30 years to finalize that decree.
141. Admittedly, part of this increased lake volume came from small inflows of local surface and ground water, plus precipitation falling directly on the lake's surface. It was estimated that over the period of 1929-1969, average lake surface precipitation totaled approximately 55,000 acre-feet per year.
142. The Carson River Basin snowpack water content figures produced an average of 98 percent, a standard deviation (variability about this mean or average value) of 50 percent, and *t*-value (the series mean divided by the standard deviation) of 1.95. This *t*-value figure indicates that the period average approximated the true mean (100 percent) at a level of statistical confidence of nearly 90 percent.
143. Benson, Larry V., "Preliminary Paleolimnologic Data for the Walker Lake Sub-Basin, California and Nevada," *op. cit.*, page 2.
144. See Benson, "Fluctuation in the Level of Pluvial Lake Lahontan During the Last 40,000 Years," *op. cit.*
145. See Benson, "Preliminary Paleolimnologic Data for the Walker Lake Sub-Basin, California and Nevada," *op. cit.*
146. Houghton, *op. cit.*, page 73.
147. Benson, "Fluctuation in the Level of Pluvial Lake Lahontan During the Last 40,000 Years," *op. cit.*, page 316.
148. Benson, "Preliminary Paleolimnologic Data for the Walker Lake Sub-Basin, California and Nevada," *op. cit.*, page 1.
149. *Initial Bench & Bottom Land, Map and Criteria*, *op. cit.*, page 12.
150. Benson, "Preliminary Paleolimnologic Data for the Walker Lake Sub-Basin, California and Nevada," *op. cit.*, page 1.

Carson River Chronology

Part II—Pre-Twentieth Century

1,800,000—500,000 Years Ago

It was during this Pleistocene, or glacial epoch, that an ancient fault line in the Sierra Nevada Mountains was further carved and filled by glaciers and glacial melt, thereby forming Lake Tahoe and to the east, the Carson Range. Scientific examination of Lake Tahoe's sediments indicates that at that time the lake was approximately 2,600 feet deeper than its current maximum depth of 1,645 feet.¹ The maximum prehistoric depth has been reported to have been 7,000 feet.²

75,000—10,000 Years Ago

It was during this Wisconsin age, and as recently as 12,500 years ago, that much of the area now contained within the upper Carson River Basin was covered in snowpack and glaciers, while much of the lower Carson River Basin was covered by the pre-historic Lake Lahontan. Lake Lahontan, along with Lake Bonneville, which covered northwestern Utah and parts of eastern Nevada, represented the Great Basin's major Ice Age lakes which inundated vast portions of Nevada and Utah. The cooler temperatures and far more abundant precipitation that were prevalent during this period resulted in a more lush and hospitable environment for both flora and fauna throughout this region. Now, only the Great Salt Lake remains as a reminder of the prehistoric presence of Lake Bonneville, and only Pyramid Lake and Walker Lake remain as major lake remnants of Lake Lahontan.

Lake Lahontan experienced several peaking enlargements at approximately 65,000, 45,000, 30,000, and as recently as 12,500 years ago, and at other times nearly dried up.³ At its peak surface elevation (highstand), which occurred approximately 65,000 years ago, Lake Lahontan covered an estimated 8,655 square miles in northwestern Nevada, an area equal to almost eight percent of the State of Nevada's present surface area. This Ice Age lake was fed by the flows of the Truckee, Carson, Walker, Humboldt, Susan and Quinn rivers, attained a maximum surface elevation of approximately 4,380 feet above mean sea level (MSL), and reached a maximum depth of at least 886 feet where Pyramid Lake (in the Truckee River Basin), the lowest point in the system, now remains.⁴ Lake Lahontan also covered the Lahontan Valley wetlands (Stillwater National Wildlife Refuge and the Carson Lake and Pasture in the Carson River Basin) to a depth of 500–700 feet.⁵ Also in the lower Carson River Basin, Lake Lahontan covered the site of the Fallon townsite by almost 420 feet, and in the Walker River Basin it created a pool in Walker Lake some 520 feet deep.⁶

At its peak surface elevation, the north-south extent of Lake Lahontan stretched from just below the Nevada–Oregon border in the north to just south of Walker Lake to present-day Hawthorne, Nevada, a point some eight miles past Walker Lake's present southern shoreline. Lake Lahontan also extended well up the lower Truckee River canyon towards, but not quite reaching, the Truckee Meadows and the present-day cities of Reno and Sparks, Nevada, to a

point near the present-day location of Lockwood near Lagomarsino Canyon.⁷ In the Carson River Basin, Lake Lahontan extended up the lower Carson River to a point just below the present-day community of Dayton in Lyon County. And in the Walker River Basin, Lake Lahontan extended its reach through the Adrian Pass, a low-lying valley connecting the lower Carson River Basin to the north end of Mason Valley, down the Campbell Valley to fill the Walker Lake sub-basin and then up the Walker River to a point just below the present-day city of Yerington in Mason Valley.

It was also around this time of the late glacial period that Lake Tahoe continued to be formed and filled by the movement and the melting of massive Ice Age glaciers. The outlet to Lake Tahoe was established near present-day Tahoe City, located on the lake's northwestern shore, in Placer County, California. It was at this site that in 1870 the first Tahoe dam was constructed. Eventually this regulating facility came to have important implications on the supply of the waters of the Truckee River Basin to the lower Carson River Basin, and specifically with respect to waters provided to the Newlands Irrigation Project located in Lahontan Valley in Churchill County, Nevada.

While flowing a seemingly short distance of only 184 miles from its origins in the high Sierra Nevada Mountains just north of Sonora Pass, to its terminus in the Carson Sink, the Carson River's importance to a variety of water users in this arid and water-starved region would be magnified many times. Early conflicts over competing uses of the Carson River's waters arose among agricultural interests in Carson Valley, mining and milling interests along the lower Carson River in Dayton Valley (Carson River Canyon) near Brunswick Canyon, and logging interests (mill men), who supplied essential lumber products to the mines, ore-processing mills, and railroads. It became obvious shortly after the mines' stamping mills began operations in the early 1860's that the Carson River lacked sufficient water for all users. From this time, it would take nearly 120 years for some lasting agreement to be reached through the 1980 Alpine Decree on how to divide the limited waters of the Carson River for the benefit of all users.

11,200 Years Ago

The record of man's existence in and around Lake Lahontan and in the lower Truckee and Carson River basins began at Fishbone Cave, located on the eastern shore of the dry lake bed of Winnemucca Lake. The cave's excavation produced bones of horses, camels, and marmots, as well as burned human bones. Little else was revealed about these Paleo-Indians who lived on the shores of Lake Lahontan and its remnant bodies of water towards the end of the Wisconsin period. This period of time, however, corresponded to the approximate period when the last land bridge existed between Siberia and Alaska. For extended periods during the Wisconsin Age, a period that lasted from 75,000 to 10,000 years ago, the world's oceans were approximately 300 to 330 feet lower than they are today. During certain intervals within this period, namely approximately 40,000–35,000 years ago, 28,000–23,000 years ago, and 13,000–10,000 years ago, these continents were connected by a land bridge and migrations of prey and pursuing hunter were possible along a route down the Pacific coastline, which was relatively free of ice fields and glaciers.⁸

9,500–7,000 Years Ago

As Lake Lahontan was in its final descension phase, the Lahontan Valley around Grimes Point, several miles east of the city of Fallon in Churchill County, Nevada, was home to a race of marsh-dwellers called the “Spirit Cave Man.” These people were known for their highly advanced and intricate weaving and textiles. Other than this, little else is known of the origins, existence, and ultimate demise of these people. Between 7,000 and 4,000 years ago, western Nevada became extremely arid, including a 1,000-year period commonly termed “The Big Drought.” It is thought that during this later period, the region became more or less uninhabitable for humans, and the native people living in the Lahontan Valley either died off or migrated north to wetter climates, such as the Klamath or Modoc regions.⁹

7,000–500 Years Ago

Ancient petroglyphs were drawn by an ancient people on basalt boulders at Grimes Point, located approximately ten miles east of Fallon, Nevada, in Churchill County and the Lahontan Valley in the Lower Carson River Basin. The Grimes Point site represents one of the largest and most accessible petroglyph sites in northern Nevada. It is believed that the carvings were of “magico-religious” significance in insuring the success of large game hunts and were located near seasonal migration routes. Running east and west along the ridge, on the hill above the petroglyphs, there is evidence of an aboriginal drift fence for driving deer or antelope. This would have required concentrated group action in its construction and operation.¹⁰

Pre-History

In the more recent pre-recorded history period, various tribes of Paiute (Pah Ute), Shoshone, and Washoe (Washo) Indians inhabited the area now contained within the Lake Tahoe Basin, and the Carson, Truckee, and Walker River basins. The Paiute Indians were concentrated primarily around Pyramid and Walker lakes as well as in and around the wetland areas within the Lahontan Valley. The Western Shoshone Indians tended to be located further to the east and south. The Washoe Indians occupied the more mountainous regions in an area stretching from Castle Peak and the Donner Lake area in the north, located near the present-day town of Truckee, California, to Ebbetts Pass in the south, and from Lake Tahoe in the west to the area around present-day Virginia City in the east.¹¹

Recent History

1800s (Before the White Man’s Arrival) The Washoe (Washo) Indians were the dominant people of the upper portion of the Carson River Basin. By the early 1800’s there were about 900 members of the Washoe Indian Tribe located throughout the Great Basin and within the eastern Sierra Nevada Mountains. These people moved throughout this area with the changing seasons, between its deserts and mountains, in search of food. In the early spring the Washoe Indians would leave the desert lowlands and migrate into the mountains towards the headwaters of the Carson River and to Lake Tahoe, the big lake in the sky. When the aspens came ablaze with fall colors, the Washoe would return to the

foothills and eventually to the desert basins below. Adventurous tribal members were reported to have journeyed far to the west and undertook trade with the Miwok and Maidu Indian Tribes on the Sierra's western slopes.¹²

The lower portion of the Carson River Basin in the vicinity of Stillwater Marsh was inhabited the Toidikadi, or "Cattail-eater" Northern Paiute people. These people held as their home district a large area surrounding the Carson Desert, a homeland which was bounded on the north by the West Humboldt Range and on the south by the Desert Mountains and adjacent Cocoon Mountains, on the east by Dixie and Fairview valleys and the Clan Alpine Mountains, and on the west by the Virginia Range. Their prominent food sources consisted of trout, ground squirrels, marmots, jackrabbits, water fowl, wild onions, and cattails.¹³

- 1823** Most maps of this period showed vast regions of unexplored territory in the western United States between the Rocky Mountains and the Central Valley of California. Some more imaginative cartographers also depicted the existence of the mythical San Buenaventura River, a large river which was believed to run due west from the Rocky Mountains and into San Francisco Bay.¹⁴ The seed to the existence of the San Buenaventura River was originally planted by early Spanish missionaries who had explored the area around the Great Salt Lake in 1776 and imagined a mighty inland waterway flowing out of this lake to the west across terrible deserts, through the lofty Sierra Nevada Mountains, and onward to the Pacific Ocean.¹⁵
- 1826 (Fall)** Jedediah Strong Smith, leader of a party of fifteen trappers of the Rocky Mountain Fur Company, traversed the southern tip of Nevada along the Virgin and Colorado Rivers, ending up at the San Gabriel Mission near the present site of Los Angeles. Disregarding the Mexican government's request to return the way he had come, Smith left Los Angeles in early 1827 and headed north through the San Joaquin Valley. Then, with only two other companions, he crossed the Sierra Nevada Mountains near Ebbetts Pass, crossed the Walker River and skirted Walker Lake to the south,¹⁶ coming within thirty miles of the Carson River Basin. After enduring incredible hardships while crossing the central portion of Nevada in 44 days, Smith finally returned to his Great Salt Lake trapping headquarters in early July of 1827.¹⁷
- 1828 (November)** Peter Skene Ogden, a trapper for the Hudson's Bay Company, led a party of trappers south from the Columbia River basin and first discovered the Humboldt River, arriving near the vicinity of present-day Winnemucca, located in Humboldt County, Nevada. At first the weather was accommodating and his party enjoyed a few days of trapping. However, as an introduction to this region's highly variable weather conditions at this time of year, a sudden blizzard forced a hasty evacuation eastward along the Humboldt River Valley towards the Salt Lake Valley.¹⁸ Known by many names—Ogden's River, Mary's River, Paul's River, Barren River, and Unknown River—the Humboldt River was later named by John C. Frémont after Baron Alexander von Humboldt, a German scientist whom Frémont admired, but who had never even seen the river.¹⁹ This river valley would soon become the most important transportation corridor for early emigrants traversing the Great Basin on their way to California by means of the Overland Trail and Emigrant Trail. The Carson River route traversed the Carson Sink, then went up the Carson River through Carson Valley, and over the Sierra Nevada Mountains by way

- of Luther Pass or Carson Pass.
- 1829 (Spring)** Peter Skene Ogden returned to the Humboldt River and, not pressed by adverse weather as he had been the previous November, his party followed the river along its course to the Humboldt Sink, where the remaining waters of this rapidly diminishing river disappeared completely. While camped along the Humboldt River near present-day Lovelock in Pershing County, Nevada, local Indians recounted to Ogden the first description of the rivers lying further to the west.²⁰ The lack of potential commercial trapping value probably precluded further interest in verifying the presence of these rivers (Carson and Truckee) at that time.
- 1829 (Summer-Fall)** It is believed that during Peter Ogden's second trip to the Humboldt River area in 1829, he continued beyond the Humboldt Sink, crossed the Carson Sink and Desert (i.e., the infamous Forty-Mile Desert), and discovered the Carson and Walker rivers and perhaps Walker Lake as well. Despite his early exploration of Northern Nevada, which preceded the arrival of John C. Frémont (1844) by almost 15 years, little would remain within Nevada to bear Peter Ogden's name. Later explorers would claim considerably more honor and fame than this pioneering British fur trapper, explorer, and adventurer.²¹
- 1833** Joseph Walker, chief lieutenant for Captain Benjamin Louis Eulale de Bonneville, both of whom were in the employ of the Hudson's Bay Company, led a party of explorers and trappers along Ogden's "Unknown River" (the Humboldt) all the way to California via the Humboldt River, the Humboldt Sink, the Carson Sink, and then up into the Sierra Nevada Mountains by either the Carson or Walker River.²² This represented the first recorded east-to-west passage through Nevada using the Humboldt River corridor, a route later travelers and emigrants would soon follow. It is also believed that Walker and his men were the first whites to trade directly with the Washoe Indians of this area.²³
- 1837** Washington Irving's *Adventures of Captain Bonneville in the Rocky Mountains and Far West* was published, and subsequently aroused widespread interest in the region we now call the Great Basin. This publication also led to the commissioning of Captain John Charles Frémont to explore the territory more extensively.²⁴
- 1841 (Spring)** The Bartleson-Bidwell emigrant party made the first successful crossing of the Great Basin, reportedly without even a guide or a map.²⁵ Coming down the Humboldt River, the party divided and was then reunited. Many of the party fell ill and were subsequently befriended by local Indians who gave them pine nuts and fish. After crossing the Humboldt and Carson sinks, they reached the base of the Sierra Nevada Mountains on the West Walker River in October. The party then spent the next two weeks crossing the mountains, probably at Sonora Pass.²⁶ Finally, on the last day of October 1841, six months after their trip had begun near Independence, Missouri, they reached the San Joaquin Valley in California without loss of life. Reports of their successful crossing of the Great Basin and the Sierra Nevada Mountains would inspire others to attempt the passage.
- 1842** Influential U.S. Senator Thomas H. Benton of Missouri made arrangements for his son-in-law, John Charles Frémont, to lead exploring expeditions into the little-known region beyond the Rocky Mountains. Frémont was a lieutenant in the U.S. Army Topographical Corps and had considerable experience as a surveyor and map maker.²⁷
- 1844 (January 10)** Traveling south from the Columbia River basin, John C. Frémont,

conducting an expedition for the U.S. Bureau of Topographical Engineers, became the first white man recorded to have seen Pyramid Lake²⁸ and five days later, on January 15th, Frémont reached the lower Truckee River.²⁹ Based on the large pyramid structure on Pyramid Lake's eastern side, Frémont gave the lake its present name, but his naming of the Truckee River as the Salmon Trout River would not prove enduring. Frémont's party enjoyed the hospitality of the local Paiute Indians and the munificence of the local waters which teemed with an "incredibly large" Pyramid Lake sub-species of the Lahontan cutthroat trout (*Salmo clarkii henshawi*). Some of these magnificent fish weighed well over 40 pounds and attained a length of up to four feet.³⁰ In his diary and record of his travels, Frémont commented that "Their flavor was excellent—superior, in fact, to that of any fish I have ever known. They were of extraordinary size—about as large as the Columbia River salmon—generally from two to four feet in length."³¹ The Pyramid Lake cutthroat trout relied on the Truckee River for their spawning runs in early spring, traveling up the entire river's length as far as Lake Tahoe and Donner Lake where they required the cool, pristine waters and clean gravel beds to lay their eggs.

From Pyramid Lake, the Frémont Expedition followed the Truckee River to a location near present-day Wadsworth, where the river flows from the west. As Frémont was looking for the mythical San Buenaventura River that was supposed to drain from east to west through the Sierra Nevada Mountains to the Pacific Ocean, he did not continue further up the Truckee River, but instead proceeded south into the Lahontan Valley and soon crossed the Carson River.³² Later Frémont named this river after his expedition guide, Kit Carson.

From the Carson River, Frémont continued south to the Walker River and Bridgeport Valley, then turned north and proceeded up into the foothills of the Sierra Nevada Mountains. Frémont named the Walker River for another guide who had accompanied his party, Joseph Walker, who had been through the area in 1833. After ignoring the warnings of his local Indian guides, Frémont's party persisted in their efforts to cross the mountains and suffered many hardships in the deep winter snows, eventually abandoning the howitzer they had brought with them in Deep Creek Canyon above Antelope Valley in the Walker River Basin just west of present-day Topaz Lake.³³

From Deep Creek Canyon, Frémont's party traveled northwest through the mountains, crossed over into the Carson River Basin and discovered Grover Hot Springs in Hot Springs Valley above present-day Markleeville, California.³⁴ From here his party of 39 men proceeded further up into the mountains traveling through Hope Valley and crossed the summit in the vicinity of Carson Pass. It was at this point that Frémont viewed Lake Tahoe for the first time on February 14th from Red Lake Peak (10,061 feet), located 16 miles due south of the lake. The Frémont party's difficulties only intensified as they continued down the western slope of the Sierras into the Sacramento Valley. Eventually, on March 6, 1844, they arrived at Sutter's Fort near the American River in present-day Sacramento and were formally greeted by Captain John Augustus Sutter.³⁵ Here they were able to rest their remaining livestock and replenish their supplies in anticipation of their return trip. From Sutter's Fort, Frémont headed south through the San Joaquin Valley and then re-crossed Nevada through Las Vegas, perhaps camping very near the street later named in his honor in the heart of that city.³⁶ It was Frémont who first recognized the unique geophysical structure of the Great Basin and named it so.³⁷ Interestingly, for all

- his exploration and extensive documentation of the Great Basin and Nevada, other than a street in Downtown Las Vegas and a relatively abundant species of cottonwood (*Populus fremontii*), little remains as a tribute to this individual's extensive and remarkable accomplishments.³⁸
- 1845 (December)** John C. Frémont undertook his third expedition into the west and his second into the Great Basin region.³⁹ The Third Frémont Expedition would separate at Whitton Spring (now known as Chase Spring) in Independence Valley east of the Ruby Mountains in eastern Nevada. The main group, under Theodore Talbot and guided by Joseph Walker, journeyed down the Humboldt River while a smaller party under the command of Frémont headed off to the south. Eventually both groups joined at Walker Lake some three weeks later.⁴⁰ One of the first official government reports about this area was written by Edward W. Kern, who was a member of the Talbot-Walker group that traveled past the Carson Lake in the southern Lahontan Valley. Kern specifically described the Carson Lake as a "very pretty sheet of water, about 11 miles long, bound on the west by a low range of mountains [the Dead Camel Mountain range]. About mid-way on the west side a stream enters it."⁴¹ The stream referred to could only be the Carson River and indicated that, at that time, the Carson River's major flow was through the southern portion of Lahontan Valley, through Carson Lake, and then north into the Carson Sink.
- 1848 (January 24)** Gold was discovered by James W. Marshall and a construction crew at Sutter's sawmill on the South Fork of the American River at Coloma, California. This discovery would precipitate the greatest gold rush in American history. Reports of the discovery did not begin to circulate widely in the eastern United States until late summer when it was too late to begin the long overland trip to California. In December of 1848, the discovery received widespread attention when President James K. Polk spoke of the rich gold fields in his message to Congress.⁴²
- 1848** The Treaty of Guadalupe Hidalgo was signed with Mexico, thereby ending the Mexican War and ceding to the United States what was to become the United States "Southwest," consisting of all or parts of the future states of California, Nevada, Arizona, New Mexico, Colorado, and Wyoming.⁴³
- 1848 (August)** Upon being recalled back to Zion (Salt Lake City) by Brigham Young, Henry W. Bigler and a small party of Mormons, members of the Mormon Battalion, came down the Carson River's West Fork into Carson Valley and are believed to have been the first white men to enter the valley. Bigler and his party had been commissioned at Sutter's Fort to open a wagon route over the Sierra Nevada Mountains to replace the one over Donner Pass, which was plagued by fourteen crossings of the Truckee River. It took Bigler and his party one week to cut a road through Woodfords Canyon and along the banks of the West Fork, which Bigler at that time called Pilot River. Bigler then described Carson Valley as about 12 miles wide, having plenty of grass, and home to roaming antelope.⁴⁴
- 1849** The rush to the gold fields of California began in earnest and an unprecedented era of westward migration began. In January 1849 alone, more than 50 sailing ships left East Coast ports on the extended journey to California.⁴⁵ California's population would explode from approximately 14,000 persons in 1848 to over 100,000 persons by 1850 and to 250,000 persons by late 1852.⁴⁶ Early overland travelers used the natural transportation corridor afforded along the route of the Humboldt River. At this river's terminus, the

Humboldt Sink, those travelers electing the more southern route of the Carson Pass (Carson River West Fork) and Sonora Pass (West Walker River) found that the Forty-Mile Desert, located at the western end of the Humboldt Sink, presented an imposing and forbidding barrier to their passage. Similarly, those traveling the more direct Truckee River route found that Donner Pass afforded a no less formidable impediment to overland travel through that area.⁴⁷

- 1849** (1849–1869) The Forty-Mile Desert, beginning at the Humboldt Sink and extending to the site of Ragtown and the first waters of the lower Carson River, represented the most dreaded stretch of the California Emigrant Trail. It was a barren stretch of waterless alkali wasteland which, if possible, was only traveled by night because of the great heat. It was first traveled in 1843 by the Walker–Chiles party, but between 1849 and 1869 it received its greatest traffic flow up until the completion of the Central Pacific Railroad in 1869. Starvation for men and animals stalked every mile. A survey made in 1850 showed these appalling statistics: 1,061 dead mules, almost 5,000 dead horses, 3,750 dead cattle, and 953 graves.⁴⁸
- 1849** While appearing uniformly lush and cultivated today, Carson Valley appeared somewhat differently to the original “Forty-Niners” who first used the California (Carson River) branch of the Emigrant Trail to get to the gold fields of California. Originally, the valley presented a relatively narrow strip of meadow along the banks of the river with mostly sagebrush (*Artemisia tridentata*) and rabbitbrush (*Chrysothamnus nauseosus*) elsewhere. By 1858, Carson Valley settlers extended the rich meadowlands by irrigation in order to provide hay, meat, and butter for the miners in Virginia City and neighboring towns. Beginning in 1870, German, Danish, and Swiss immigrants enlarged the area still more to supply produce to booming Bodie and, after 1905, to Tonopah and Goldfield. Good range and agricultural practices, combined with the natural fertility of the area, made Carson Valley one of Nevada’s premier agricultural areas.⁴⁹
- 1850** (Circa) Woodfords, the first white settlement in the Carson River Basin, was established as an outpost by Sam Brannan along the West Fork of the Carson River at the southern end of Carson Valley along the emigrant trail to Carson Pass. For a while it was known as Brannan’s Springs; after 1851 it was Cary’s Mills, named for a sawmill erected nearby by John Cary. Subsequently, Daniel Woodford erected a hotel at the site and later still, when a post office was opened, it was given the official name of Woodfords.⁵⁰
- 1850** Congress established the Utah Territory comprising most of what is now the State of Utah, most of Nevada, and parts of Colorado and Wyoming.⁵¹ Brigham Young, leader of the Mormon Church in Salt Lake City, became the first Territorial Governor and dispatched Mormon settlers throughout the new territory, establishing the first farming communities and trading posts.
- 1850** Members of a Mormon emigrant wagon train en route to California camped in the Dayton Valley near present-day Dayton along the lower Carson River and noted the reddish color in a ravine leading up to the north towards Mount Davidson. They named the ravine Gold Canyon and then moved on, little knowing that they had left behind one of the richest silver deposits ever to be discovered in North America. Later that same year a group of Sonoran Mexicans arrived at this location and began digging for gold.⁵²
- 1850** California became the 31st state of the Union. Eventually, California adopted the

- “California Doctrine” with respect to the administration of water rights, a doctrine consisting of a combination of both the common law doctrine of riparian water rights and the statutory “doctrine of prior appropriation” (appropriative water rights). The principles underlying these two doctrines are diametrically opposed. Riparian water rights allow persons who own land adjacent to a body of water to make “reasonable” use of those waters without regard to the time of use or to any actual use at all. Such rights cannot be sold or transferred for use on other (non-riparian) lands. In the western states where the land along and contiguous to a stream had not passed from government ownership into private ownership, no riparian rights prevailed and the appropriation doctrine would apply, but would be subject to other upper or lower riparian rights. This combination of water rights concepts would eventually provoke numerous controversies and many legal battles.⁵³
- 1850** H.S. Beatie and Abner Blackhorn set up a temporary trading post at a site which was later known as Old Mormon Station, located approximately one mile north of the present-day location of Genoa along the western edge of Carson Valley.⁵⁴
- 1850** As a grim testament of the inhospitable nature of the dreaded Forty-Mile Desert, it was estimated that during this year some 45,000 people used the Overland Trail (Humboldt River) with most of them traveling the Carson River route—Forty-Mile Desert, Dayton Valley, Eagle and Carson valleys, Woodfords Canyon, Hope Valley, and Carson Pass. In their trek across the first phase of this route, the Forty-Mile Desert, one party reported that they encountered a barren expanse of alkali desert in which previous travelers had left behind 9,771 dead animals, 3,000 abandoned wagons, and 963 graves.⁵⁵
- 1851 (June 1)** Mormon Station, the first permanent settlement by whites in Carson Valley (and in the State of Nevada, for that matter) was established along the old Carson Emigrant Trail—Pony Express—Overland Stage Road on the west side of Carson Valley by Colonel John Reese, his nephew, Stephen Kinsey, and others.⁵⁶ In 1858 its name would be changed to Genoa.⁵⁷ Genoa would later become the county seat for Douglas County, Nevada, and remain so until 1915, when the county seat was moved to Minden.⁵⁸
- 1851** By the middle of this year, approximately 100 prospectors, mostly placer miners who had drifted east over the Sierra Nevada Mountains from unsuccessful digs in California, began working their way up Gold Canyon from present-day Dayton, Nevada, towards present-day Silver City, following a thin stream of placer gold. A makeshift little community was formed in the canyon named Johntown. Pickings were slim, however; it was estimated that the average take per miner was rarely more than about five dollars a day.⁵⁹ Eventually, Silver City would be established some 3.5 miles above the Carson River in Gold Canyon. Later, Gold Hill would be founded two miles above that, and finally Virginia City was established one mile further up the canyon at the base of Mount Davidson (7,856 feet).
- 1851 (July 14)** Hiram Mott and his son Israel Mott arrived in Carson Valley with a wagon train bound for California. They decided to stay in the valley and subsequently built a house some four miles south of Mormon Station (Genoa). Here he began a community which would later be named Mottsville, located where Mott Canyon Creek entered the Carson Valley.⁶⁰ Their homestead became the site of a number of firsts in Carson Valley and Carson County, Utah Territory: (1) 1851: Israel Mott’s wife, Eliza Ann Middaugh, was the first white woman settler; (2) 1854: Mrs. Israel Mott opened the first school in her kitchen and the Mott’s second child, Louisa Beatrice, was the first white girl child to be

- born in the valley and county; (3) 1856: Judge W.W. Drummond held the first session of the U.S. District of the Third District of Utah Territory in Mott's barn; and (4) 1857: The Mott's third child died and was buried in what became the first cemetery, the only remaining landmark of the site of Mottsville.⁶¹
- 1851** Nevada's State Capital, and one of the state's oldest towns, was first established as Eagle Station, a trading post and small ranch on the Carson Branch of the California Emigrant Trail. The station and ranch were operated by Frank and W.L. Hall and George Jollenshee. The station and surrounding valley took their names from an eagle skin stretched on the trading post wall. Carson City itself would not be founded until 1858 by Abraham Curry.⁶²
- 1852** The Carson River West Fork entered the pages of recorded history several years before the East Fork due to its strategic location on the route to Carson Pass and Luther Pass. In this year traders and station keepers began to modify the West Fork's banks to allow its waters to spread across adjoining natural meadows to increase the growth of grass. It was also recorded that in this year the first 260 acres were brought under irrigation in Carson Valley using the waters of the West Fork.⁶³
- 1852** Henry Van Sickle arrived in Carson Valley. In 1855 he took up a claim about one mile south of the present site of Walley's Hot Springs, ran a way station (Van Sickle Station) for travelers and freight haulers, and served as inn keeper, trader, and blacksmith, and eventually had a house built for him there in 1857. This location proved very strategic for his business when the Kingsbury Tool Road (Kingsbury Grade) was opened in September 1860 over Daggett Pass, which was located just above his station.⁶⁴
- 1852** (December 24–30) Carson Valley was subjected to the earliest flood of record taking place after the establishment of the first white communities at Woodfords (Brannan's Springs) in 1850 and at Genoa (Mormon Station) in 1851. With these locations situated above Carson Valley's floor, there was little resultant damage to man-made structures when the valley floor became inundated. Worse-case floods in Carson Valley and along the lower reaches of the Carson River typically occurred during the winter months of December–January, and generally were characterized by excessive rains on saturated soils (wet-mantle flood), or by a sudden change in climatic conditions (rain-on-snow, or rain on frozen ground). This particular 1852 flood was caused by two days of heavy snowfall which resulted in three feet of snowpack on the floor of Carson Valley. On the third day the snowfall turned to a relatively warm rain, which lasted for four more days and completely melted the snowpack. By December 30th Carson Valley was inundated.⁶⁵
- 1853** (July 1) The first sawmill in Carson Valley was reportedly constructed by millwright Thomas Knott at the mouth of the Carson (Woodfords) Canyon on the Carson River West Fork. Knott had traveled through Carson Valley on his way to California in 1852 and noted the numerous clear streams flowing out of the mountains. In March 1853 he returned to the valley with several companions through Woodfords Canyon and found all the tools he needed to start a sawmill lying where they had been abandoned by earlier emigrants. The steepness of the West Fork at this location provided Knott with a "twenty-four foot head and fall" to power his sawmill.⁶⁶
- 1853** The Grosch brothers, Ethan and Hosea, arrived in Gold Canyon near Dayton and were immediately disappointed in their prospects of ever making a significant gold strike. They

- knew enough about geology, however, to take a special interest in the blue mud that emanated from the digging sites, recognizing it to be “silver lead.” Later they identified at least four major veins of the silver ore; preliminary assays estimated a value of silver within the troublesome “mud” at some \$3,500 a ton.⁶⁷
- 1853** The first sheep entered (and exited) Carson Valley. Kit Carson, assisted by a crew of Mexican shepherders, drove 5,000 head of sheep from New Mexico through Carson Valley and up the Carson (Woodford’s) Canyon on their way to the hungry miners in California. For many years thereafter, both sheep and sheep herders were openly abused throughout Carson Valley and in the upper alpine meadows. It was not until 1890 that the sheep’s position was articulately and logically put forth by Robert L. Fulton, land agent of the Central Pacific Railway. Subsequently, the industry began to expand and many of the valley’s largest ranchers began to raise both cattle and sheep.⁶⁸
- 1853** The area between Mormon Station (Genoa), located on the west side of Carson Valley, and Woodfords, located at the valley’s extreme southwest corner, had become settled by whites who established roadside businesses for weary emigrants traveling to California.⁶⁹ These settlements along the bench lands of the western slopes of the Carson Range would soon accommodate other communities, namely Van Sickle’s, Walley’s Hot Springs, Mottsville, Sheridan, Fairview, and Fredericksburg. While these hamlets were strategically located above the valley’s floor and the effects of periodic floods, some of them were imprudently located on the alluvial flood plains of the steep, narrow valleys of the eastern slope of the Carson Range.
- 1853 (December 31)** The first recorded dance in present-day Dayton was held at Hall’s Station on New Year’s Eve. Spafford Hall built a station and trading post on the site of Dayton in the early 1850’s and became the area’s first permanent settler, accommodating emigrants bound for California coming up the Carson River. James McMarlin bought the station in 1854 at which time it became known as McMarlin’s Station. Sometime between 1854 and 1860 Major Ormsby purchased the station, which he owned up until his death in the first battle of the Pyramid Lake Indian War on May 12, 1860.⁷⁰
- 1854** C.D. Daggett acquired land at the foot of the old Kingsbury Grade route in Carson Valley. Earlier called Georgetown Trail, the route then became Daggett Pass Trail, named for its new owner. In 1860 it was replaced by a wagon road built by Kingsbury and McDonald, for which they received a Territorial Franchise in 1861. The new Kingsbury Grade shortened the route between Sacramento and Virginia City by 15 miles. Henry Van Sickle later established a road station near the foot of the grade, eventually acquired it himself and sold it to Douglas County in 1889 for \$1,000.⁷¹
- 1854** The first permanent settlers along the lower Carson River were the family of Asa Kenyon, who took up residence at the site of Ragtown, situated approximately seven miles west of present-day Fallon in Churchill County, and at that time strategically located along the Carson River (where it turned south towards Carson Lake) and at the terminus of the Forty-Mile Desert, the most dreaded portion of the California Emigrant Trail.⁷² The Kenyons proved to be a most enterprising lot, not only selling fresh stock and supplies to the weary travelers, but reportedly also enlisting the aid of local Indians to pilfer stock from the emigrants, which was then “recovered” for a fee.⁷³
- 1854** Hot Springs Valley, which had been first “discovered” by John C. Frémont in February

- 1844 and was located 2.5 miles up the Markleeville and Hot Springs creeks from Markleeville, California, was first settled by John Hawkins, who later leased the land to C.H. Kilgore. Kilgore operated a dairy business, producing butter and cheese while making improvements to the hot springs. During the 1870's, A.M. Grover, while serving as the local deputy sheriff and tax assessor, gained title to the property, transferring his name to the hot springs located there.⁷⁴
- 1854 (June 10)** As reported in the Placerville, California, *Mountain Democrat*: "The Indians [of Carson Valley] are quiet and friendly...they are engaged in fishing for trout, large quantities of which they take from the Carson River, and exchange with the whites for bread and other provisions."⁷⁵
- 1854** The first flour mill in Carson Valley was built by millwright Thomas J. Knott for Colonel John Reese, one of the original founders of Mormon Station (Genoa). Located on Mill Street in Genoa, it used wheat brought in from Honey Lake, California, and served the needs of early immigrants to the valley. The second flour mill in the valley was built in 1857 or 1858 for Hiram Mott of Mottsville, and was situated on Mott Creek.⁷⁶
- 1855** Moses Job, who owned the principal store in Carson Valley at the time, scaled the lofty peak which towered above his establishment and planted an American flag, thereby giving this mountain its present name—Job's Peak—and providing him with a deserved degree of immortality.⁷⁷
- 1855 (Circa Mid-1850's)** Around this time camels were imported into the United States for military purposes. Lt. Edward Beale of the U.S. Army tested the animals' caravan operations in the deserts of the Southwest. The experiment was not successful and the animals were auctioned off. Some were brought to Dayton on the lower Carson River to haul wood and salt to the mines and mills of the Comstock. After being used for some ten years in this manner, they were later abandoned to fend for themselves. Few were seen in the area after the 1880's.⁷⁸
- 1856** Beginning in this year and continuing through 1864, John "Snowshoe" Thompson, a native of Norway, fashioned his own skis and volunteered to carry the mails between Placerville, ("Old Hangtown") California, and Mormon Station, Utah Territory (Genoa, Nevada), when the snows along "Hangtown Road" became too deep for normal equestrian travel.⁷⁹
- 1856** H.F. Dangberg took up his first claim in Carson Valley (which he subsequently lost to a claim jumper).⁸⁰ Dangberg and his descendants would become some of the largest and most important farmers and ranchers along the Carson River East Fork and would figure prominently in shaping the development and history of Carson Valley.
- 1856 (Spring)** From the autobiography of Richard Bentley: "I was very much pleased with the Carson [River] and surrounding valleys...mountain trout were very abundant in the river and small streams emptying into it; so much so that after the spring overflow on the bottoms had subsided, a great number of fish was left in the low places and pools on the bottom land, and the farmers turned their hogs loose and they got fat on fish..."⁸¹
- 1856** The first Chinese were brought to the present-day site of Dayton to build the "Reese" ditch from the Carson River to the entrance of Gold Canyon. The Reese Ditch was used for placer mining and when claims became abandoned by the miners, the Chinese soon began reworking the sites. So many Chinese followed (200, more or less) that the settlement was called Chinatown. It was subsequently renamed to Dayton in 1861.⁸²

- 1857** The Grosch brothers, who were the first to realize the significance of the blue mud that emanated from the digging sites in Gold Canyon near Virginia City, both died in this year: Hosea injured his foot with a pick and died of gangrene, while Ethan died from exposure in a Sierra snow storm while on his way to California to raise capital to more fully exploit the extensive silver claims they had staked out in Gold Canyon. Upon Ethan Grosch's departure for California, a Canadian miner and drifter named Henry Thompkins Paige Comstock moved into the Grosch's stone cabin and let it be known that he had been promised a share in the enterprise in return for keeping claim-jumpers away. Most historians agree that Comstock was unaware of the vast fortune in silver lying beneath the claims he was "protecting." Comstock was known throughout the area as a lazy braggart; history recorded him as having an uncanny talent for being in the right place at the right time.⁸³
- 1857** The first land was brought under irrigation along the Carson River East Fork—96 acres. From this time until the early 1900's, the development of irrigated acreage along the East Fork in Carson Valley would closely correspond to the expansion of the region's mining development, first beginning around 1858 in Gold Hill, Silver City, and Virginia City, and later in 1863 in Esmeralda County (Aurora), Nevada, and Mono County (Bodie), California.⁸⁴
- 1858** The townsite of Konigsburg (later renamed Silver Mountain City) was first settled by Scandinavian immigrants. The town was located on Silver Creek several miles upstream from its confluence with the Carson River East Fork. By 1863 it was reported that its population was between 2,500 and 3,500 persons. In 1864 it would become the first seat of government for the newly-created Alpine County when rich silver strikes brought some 16,000 persons into the area.⁸⁵
- 1858** Ira M. Luther established a sawmill in a canyon, named after him, located in Carson Valley approximately ten miles south of Genoa. The sawmill operated in Luther Canyon between 1858 and 1865. After 1865, the canyon came to be known as Horse Thief Canyon because of the "business" of John and Lute Olds, owners of a ranch just to the south of the canyon. In addition to operating a station along the Emigrant Trail for a number of years, these individuals also rustled horses from passing travelers, sending the animals up the canyon to drift over the ridge into Horse Thief Meadows. Later the animals were driven down to Woodfords Canyon and sold to other emigrants.⁸⁶
- 1858** Carson City was founded and laid out by Abraham Curry, who bought Eagle Station (established in 1851) and ranch when he found lots at Genoa too expensive. Curry named his town after the Carson River and left a plaza in its center for his predicted location of the state capitol building. In 1861, true to Curry's prediction, and aided considerably by his own shrewd maneuvers, Carson City became the Capital of Nevada Territory and then the new state's capital in 1864. In 1871, the present capitol building was constructed in the plaza Curry had reserved for it.⁸⁷
- 1858** Federal Indian agent F. Dodge visited Carson Lake, Carson Sink, and the Walker River areas as part of a general survey of western Utah Territory to determine the condition of the native Indian tribes in the region. His report showed that the native Indian population totaled some 1,625 people with a preponderance of men and children—848 men, 372 women, and 405 children—indicating either an influx of men from other areas seeking

refuge from growing difficulties with the white man's encroachment, or that the women were in hiding, a common occurrence of the day. The people were reported to be in good condition, but feeling some of the influences of the alien presence of the white man.⁸⁸

1859 (Spring and Summer) Captain James H. Simpson of the U.S. Army's Corps of Topographic Engineers explored a new route from Salt Lake City to Carson Valley. From Ruby Valley (in present-day Elko County, Nevada), he proceeded southwest on a route approximately paralleling the current route of U.S. Highway 50, passing through Churchill County via Cold Springs, Middlegate, and Sand Springs, then skirting Carson Lake to the south and then into Carson Valley. Simpson's route, which proved to be considerably shorter than the Overland Trail (Humboldt River) route, also avoided the dreaded Forty-Mile Desert of the lower Carson River Basin. This route was later improved by U.S. Army detachments that erected signs and protected springs and became the route used by the Pony Express, Union Telegraph, and the Overland Stage Company in the early 1860's.⁸⁹ While camped near Carson Lake, Simpson reported on his first encounter with the Northern Paiute people there, called "Cattail-Eaters," particularly noting their hunting techniques and their use of duck decoys. Simpson obtained two such duck decoys for display in the Smithsonian Institution.⁹⁰

1859 (June 12 or 13) Patrick McLaughlin and Peter O'Riley discovered specks of gold mixed with blue mud at the top of Sixmile Canyon near present-day Virginia City in Storey County, Nevada, a site located only about a mile away from Gold Canyon. By the end of the summer samples were sent to professional assayers in Grass Valley and Nevada City, California.⁹¹ The ore samples were found to contain high quantities of silver, valued at \$3,000 to the ton, along with quantities of gold valued at \$876 per ton.⁹² The Comstock Lode, as it would come to be called, marked one of the richest silver strikes in North American history, and began a population influx to Northern Nevada which would rapidly accelerate the demands for the region's natural resources, particularly lumber and water. Based on Philipp Deidesheimer's invention of the square set method of timbering mines, which allowed voluminous subterranean caverns of ore to be readily extracted and replaced with a rigid, interlocking timber structure, the Comstock's appetite for the region's forests became ravenous.⁹³ The development of the Comstock mines, burrowing deep into the ground and tapping scalding pockets of geothermal waters, began a process of both water diversions (for cooling spray misters) and mine dewatering (the four-mile long Sutro Tunnel) in an effort to cool the mines and drain the scalding geothermal waters from the depths. Little concern was shown for the sources of these waters and an era of interbasin water diversions began. Water supplies were initially diverted from below Hobart Creek Reservoir on Franktown Creek (Hobart Creek) in the Sierra Nevada Mountains (in the Truckee River Basin) to Virginia City (located in the Carson River Basin). Water was also diverted from Lake Tahoe and the Lake Tahoe Basin at Incline Village for flumes to float logs over to sawmills in Washoe Valley to make the square-cut timbers for shoring up the caverns carved in the deep recesses of the Comstock. Other waters were diverted to provide for the needs of the mines' workers and the steady influx of new residents. The heavy demands for timber, particularly for the mines, ore-processing mills, and railroads, began a process of extensive logging and saw mill operations throughout the Sierra Nevada Mountains. These operations quickly and severely degraded the quality of the Carson

- River's waters and in the Truckee River, sawdust choked the river's banks and bed, even creating sawdust bars at the river's terminus at Pyramid Lake forming barriers which proved impassable to native fish attempting to spawn upstream. The discovery of silver in Northern Nevada marked the beginning of an era of environmental degradation unparalleled in the state's history, denuding vast expanses of forests, eroding the now-barren hillsides, polluting rivers and streams with sawdust and logging debris, diverting waters vast distances from their natural flow, and creating the state's only "Superfund" site along a vast extent of the lower reach of the Carson River due to mercury discharges from silver ore processing.⁹⁴
- 1859 (July 9)** It was reported by the *Territorial Enterprise* (Virginia City) from Genoa that "the Indians are supplying our market with excellent trout, which are caught in [the] Carson River in great abundance."⁹⁵
- 1859** Centrally located between the first Nevada settlement at Genoa in Carson Valley to the south and the precious metal deposits of the Comstock Lode to the north, Eagle Valley and the site of Carson City became a vital link in land communications. In this year the first overland telegraph, colloquially known as "Bee's Grapevine," from F.A. Bee, its builder, was completed from Placerville to Carson City.⁹⁶
- 1859 (November 29)** To preserve Indian rights to Pyramid Lake, located approximately 30 miles northeast of Reno in the Truckee River Basin, lands around the lake were withdrawn from the public domain by the United States General Land Office. The date of withdrawal was important as it would later establish the priority date ("prior appropriation doctrine") for water rights for irrigation of agricultural lands under the "federal reservation doctrine" (Winters Rights Decision of 1908).⁹⁷ At the time of granting, water rights were intended solely for irrigation, not lake restoration or preservation.
- 1860** In a report made by the Surgeon-General of the State of California, it was estimated that during the 30-period beginning in 1860, approximately 35,000,000 board feet (5,000,000 cords) of lumber had floated down the Carson River between Alpine County and Empire City, "Nevada's Desert Port." The upper Carson River watershed had become the singular source of lumber for the mines beneath Virginia City, a demand for timber which denuded the upper basin forests and devoured wood at the rate of 20,000 board feet and 4,000 cords each day. The most common variety of cut wood supplied to the mines was the "saw log" of 12"x12"x8 feet.⁹⁸
- 1860** J.J. Cushman and Dave Wightman established ranches on the "South Branch" of the Carson River below Ragtown. In addition to their ranching activities, they also operated a freight station at Mountain Wells (a lush area in the Stillwater Range) with access to the mines in the area. Hostile encounters with local Indians were first reported by them when they were fired upon while cutting and transporting hay, a crop whose land requirements increasingly infringed upon the habitat of the local Indians' food sources.⁹⁹
- 1860 (May and June)** Based on the kidnaping of two young Paiute Indian women by three white men, who were subsequently killed by a band of rescuing Indians, the Pyramid Lake Indian War ensued. In the first major confrontation (May 12th), a poorly organized group of white miners and settlers led by Major William Ormsby was ambushed while proceeding down the Truckee River to attack the Paiute Indians, resulting in an initial Indian victory in which 76 white men were killed, including Major Ormsby. In a later confrontation

- (June 2nd) in which the Indians were badly outnumbered by better organized white troops, the attacking white men proved victorious, killing almost 160 Indians while suffering a loss of only 3 or 4 of their own number.¹⁰⁰ No further hostilities ensued; the Indians were driven off their reservation, but later allowed to return so long as they agreed to use peaceful means to settle disputes and grievances.¹⁰¹
- 1860** Based on the threat to white settlers from the recent Pyramid Lake Indian War, Fort Churchill was built on a bluff overlooking the Carson River and just across the river from the Adrian Valley. The fort's commander, Colonel F. W. Lander, soon negotiated a peace treaty with the leader of the Pyramid Lake Paiute Tribe, Chief Numaga, and officially brought the Pyramid Lake Indian War to a close.¹⁰²
- 1860** On the east shore of the Carson River near the town of Empire, the first small ore processing mill was constructed. Later it would be enlarged to become The Mexican Mill. The Comstock's milling operations, led by The Mexican, Yellow Jacket, Brunswick, Merrimac, Vivian and Santiago would produce fortunes in gold and silver over the next 40 years of their operation. At first, ore was hauled from the Comstock mines to the mills by wagon, and later by the famous Virginia & Truckee Railroad which was built in 1869.¹⁰³
- 1861 (March 2)** By an Act of Congress, signed by President James Buchanan, the region of Nevada achieved territorial status, separate from Utah. Later, President Abraham Lincoln appointed James W. Nye of New York to serve as Nevada's first Territorial Governor. The new Territorial Secretary, Orion Clemens, arrived in this year, bringing with him his brother Sam. Finding few employment opportunities in Carson City, Samuel Clemens first tried his hand at mining, then ascended to the Comstock and eventually proved far more adept as a reporter for Virginia City's *Territorial Enterprise*, whereupon he began using the pen name "Mark Twain" on his news stories.¹⁰⁴
- 1861** Virginia City journalist William Wright, who wrote for the *Territorial Enterprise* newspaper under the name Dan DeQuille, and two companions made a grand tour through the whole of the Carson Desert, including the Stillwater Mountains. Wright's account, titled *Washoe Rambles*, reportedly provided the best description of the location and the culture of the native American people living in and around the Stillwater Marsh, a group of Northern Paiute Indians called Cattail-eaters.¹⁰⁵
- 1861** The Territory of Nevada was created with nine original counties consisting of Churchill, Douglas, Esmeralda, Humboldt, Lyon, Ormsby, Storey, Washoe, and Lake. Lake County would later be renamed Roop County (1863), and even later (1883) incorporated into Washoe County when the state line was finalized between Nevada and California and showed that the Honey Lake and Susanville areas were actually in California.¹⁰⁶
- 1861** A small herd of Bactrian camels from the Gobi Desert in China was driven over Ebbetts and Monitor passes and into Nevada. These animals proved somewhat ill-suited to the region due to injuries to their hooves. Further, local stock of oxen, horses, and mules were found to be terrified of these strange creatures.¹⁰⁷
- 1861** The Allerman Ditch (Canal) was constructed on the Carson River East Fork in order to irrigate approximately 600 acres. In 1876 H.F. Dangberg acquired an interest in this canal and lengthened it about a mile and a half.¹⁰⁸ The Allerman Canal would take off from a point 0.4 miles upstream from the confluence of Long Creek and head off towards the

- north where (ultimately) it would be used to fill three reservoirs—Allerman No. 1, 2, and 4—located along the east side of Carson Valley. This canal would also be used to intercept Pine Nut Creek and Buckeye Creek, which flow out of the Pine Nut Mountain range.
- 1861** The first of many Cradlebaugh Bridges was built by William Cradlebaugh across the Carson River as part of a toll road that he operated known as the Cradlebaugh Toll Road.¹⁰⁹ A station house was constructed at the bridge site and during wood drives the site would attract numerous wood drivers as well as curious resident spectators. Uncle Billy, as William Cradlebaugh came to be called, kept the station's horse water troughs filled to capacity by means of a "flutter wheel," a device which lifted the water from the Carson River. The lifting device was of particular interest to curious local youths, one of which was George Washington Gale Ferris, who went on to design the famous Ferris wheel of the 1893 Chicago World's Fair.¹¹⁰
- 1861** Jacob Marklee built a cabin on the present site of the Alpine County Courthouse in present-day Markleeville, California. Marklee built a bridge across Markleeville Creek and derived most of his income from tolls charged for its use. The town grew rapidly and by 1864 its population was recorded at 2,620 persons. In that same year Jacob Marklee was shot to death. The Alpine County seat of government was moved here in 1875 from Silver Mountain City when that community lost virtually all of its residents due to the decline in mining activity there. In 1886, Markleeville experienced a disastrous fire and was never fully rebuilt.¹¹¹
- 1861** (August 14) While settlers were busily filing claims and constructing the first ditches in the upper Carson River Basin for lands for agricultural development, other interests were equally aggressive in filing claims for mill sites in the canyon of the Carson River at Empire City (at the head of Dayton Canyon). As noted by the Deputy Surveyor of Nevada Territory, Butler Ives, the "Carson River passes through a deep rocky canyon and has from 30 to 40 feet fall in a few miles and is valuable for its mill power, most of it being appropriated to that purpose. There being five quartz mills in operation in this township..." In his letter of this date, Survey General John North added that "The mill privileges on the Carson River are very valuable and eagerly sought after as owing to the scarcity of fuel. Water power must necessarily remain almost the sole dependence for crushing and reducing the mineral products of the region."¹¹²
- 1861** Dayton, located along the Carson River at the mouth of Gold Canyon and previously known as Chinatown (1856), was officially renamed in honor of John Day, who laid out the town and later became Surveyor General of Nevada. Dayton, one of the earliest settlements in Nevada, was first known as a stopping place on the river for California-bound pioneers. Coming in from the desert they rested here before continuing westward. Dayton would later be the county seat of Lyon County until 1911 when it was moved to Yerington.¹¹³
- 1861** By this year, around the general store established by Moses Job (Job's Peak) prior to 1855, had grown up the village of Sheridan. Located on the western side of Carson Valley some eight miles south of Genoa, Sheridan consisted of a blacksmith shop, a store, a boarding house, and two saloons. The Surveyor General, in his 1889-90 biennial report, stated that Sheridan was the metropolis of the Carson River West Fork farmers. Today, the Sheridan House, built sometime before 1875, is all that remains of this once-thriving "metropolis."¹¹⁴

- 1861 (November 21)** C.H. Hobbes, J.C. Russell, David Smith, and J.C. Pennell secured a franchise from the Nevada Territorial Legislature to improve the Carson River East Fork's channel in order to float logs down to the saw mills located at Empire City. These "log drives," which began the following spring (March 1, 1862), would take place over the next 40 years in order to satisfy the increasing needs of the mines, mills, and railroads.¹¹⁵
- 1861 (November 21)** The first Nevada Territorial Legislature made it "unlawful to catch fish in any of the waters within the Territory of Nevada by the use of any drag, or any kind of net, or any fish basket, or pot, pond or weir, or by any poison or by any deleterious substance, or by obstructing, in any manner, the natural transit of fish."¹¹⁶
- 1861 (December 20–January 2, 1862)** The earliest flood in Carson Valley occurred for which there was a record of property damage. A heavy, wet snow fell the week before Christmas and accumulated to a depth of about two feet. Extremely cold temperatures froze the snow. On Christmas day, a warm rain began falling which lasted for three days. At first, the rainwater flowed across the snow, then melted it and carried it away. Both forks of the Carson River, as well as the ephemeral streams on the valley's east side (primarily Buckeye Creek and Pine Nut Creek) flooded and turned the valley into a lake. While not specifically reported, it may be assumed that the twin Cradlebaugh Bridges over the Carson River on the Cradlebaugh Toll Road (present-day U.S. Highway 395) were also washed out, as they were in practically every recorded winter wet-mantle, rain-on-snow, or frozen ground flood event since that time.¹¹⁷
- 1862** In addition to the damage wrought in Carson Valley, the flood of 1861–1862 also produced substantial changes to the Carson River's channel in the lower basin in Lahontan Valley. Prior to this time the Carson River flowed from Ragtown south to Carson Lake by a single major channel and several small sloughs. From Carson Lake's outlet it then flowed into Stillwater Slough and thence to the Carson Sink. After the flooding of 1862, however, the river divided below Ragtown and reopened an abandoned channel called Old River, which flowed to the northeast directly into the Carson Sink.¹¹⁸ A portion of the river's flow remained in the South Branch that continued to flow into Carson Lake. Subsequent floods further established this new drainage pattern which remained throughout the 19th century¹¹⁹ and hastened the rapid contraction of Carson Lake, which was once described as being between 11 and 12 miles long.¹²⁰
- 1862 (March 1)** With the commencement of log and wood drives on the Carson River East Fork (see entry under November 21, 1861), the ranchers of Carson Valley were confronted with a new obstacle to their normal occupation of growing hay: floating logs and saw wood. The saw wood was particularly detrimental to the ranchers as it was smaller and lighter and frequently floated over the woodmen's booms positioned across the dammed sloughs and ditches and clogged them completely, forcing the water to flow over the fields spreading bark, logging debris, and sand over an extensive area.¹²¹
- 1862 (March 3)** Congress passed a bill establishing a branch mint in the Territory of Nevada at Carson City. The output of the Comstock Lode in Virginia City, coupled with the high bullion transportation costs to San Francisco, proved the necessity of a branch in Nevada. From its opening in 1870 to the closing of its coin operations in 1893, the U.S. Mint at Carson City produced \$49,274,434.30 in coins.¹²²
- 1862** Walley's Hot Springs was founded adjacent to the Carson branch of the Emigrant Trail and

- the route of the Pony Express. The spa, built for \$100,000, contained 11 baths, a ballroom, and extensive gardens. In 1896 it was sold for a mere \$5,000 and in 1935 the original structure burned down.¹²³ The springs, with water temperatures ranging between 155° and 165° Fahrenheit, were formed naturally along the fault line break that forms the Eastern Front (Carson Range) of the Sierra Nevada Mountains. Before David and Harriet Walley established the first spa, the springs had been a regular stopping place along the trail where weary travelers could bathe and wash their clothes. In its heyday, Mark Twain and Ulysses S. Grant came to “take the waters.”¹²⁴
- 1862 (May 20)** As a means for the federal government to encourage the settlement of the Western states and territories and promote the spread of small farms in the sparsely settled West, President Abraham Lincoln signed the Homestead Act. This law, which was amended several times and finally repealed in 1977, provided that anyone who was either the head of a family, 21 years old, or a veteran of 14 days of active service in the U.S. armed forces, and who was a citizen (or had filed a declaration of intent to become a citizen), could acquire 160 acres of land in the public domain¹²⁵ and acquire title to it after residing on the land for a period of five years and completing certain requirements as to cultivation. The period of residence was later reduced to 14 months, and entry by anyone already owning 160 acres of other lands was prohibited. The act contained no water-development requirements or restrictions.¹²⁶ Later federal homestead laws were essentially modifications of the 1862 act. The subsequent opening of federal property under this act, and the 1877 Desert Land Entry Act (Desert Land Act), created land rushes as immigrants and existing citizens alike were lured by the prospects of owning their own land on very reasonable terms.¹²⁷
- 1862** It was reported that by this year there were 23 ore-processing mills on the Carson River which were being run by water power; it was also reported that there were nearly 100 mills in the four counties of Washoe, Ormsby (Carson City), Storey, and Lyon.¹²⁸ Thus arrived in the basin another competing user for the Carson River’s waters, in addition to the growing agricultural interests upstream in Carson Valley and the loggers of the upper basin. Conflicts between primarily the Dayton Valley mill men and the Carson Valley farmers over the limited waters of the Carson River would become the dominant issue of contention within the basin for nearly the next 40 years.
- 1862** The town of Stillwater, named for large pools of tranquil water nearby, originated as an overland stage station. The community, located near the Carson River’s terminus in the Lahontan Valley, was granted a post office in 1865 and became Churchill County’s third county seat in 1868. Stillwater farmers developed one of the state’s first irrigation systems to supply nearby booming mining camps with produce. The community’s population peaked in 1880, and when the county seat was removed to Fallon in 1904, barely three dozen residents remained.¹²⁹
- 1862** As an inducement to the builders of the transcontinental railroads, President Abraham Lincoln signed into law the Land Grant Act which gave the rail companies every other section (one square mile or 640 acres) of land for 20 miles on each side of the rail line.¹³⁰
- 1862 (Fall)** The Carson River Lumbering Company became the first such enterprise to organize a wood drive down the East Fork of the Carson River. The “log drives” began near Herrick’s Landing, located approximately two miles below Markleeville, California, and

ended at Empire City, Nevada, located at the upper end of Dayton Valley, where the logs would be taken out of the river, cut, and hauled up to the Comstock. By the mid-1860's more than 45 portable circular saws were eating their way through the forested hillsides in the upper Carson River Basin. Probably the biggest lumber drive was recorded at about 250,000 cords and consisted of logs stacked eight feet high and extending upstream for nearly four miles. By the mid-1870's, the once-plentiful forests of the upper Carson River Basin were reduced to isolated stands of timber cut entirely back from the Carson River for at least one mile.¹³¹

- 1862 (December 19)** The second Nevada Territorial Legislature made it unlawful for "any sawmill, slaughterhouse, brewery or tannery to obstruct the natural flow of water of any stream, or to allow any sawdust, chips, shavings, slabs, offal, refuse, tan bark, or other offensive matter to enter the stream so as to damage the purity of the water." The law was intended to protect irrigation water and agricultural land rather than fish and wildlife, and, interestingly, the mines were exempt from its provisions.¹³²
- 1863** Having made his first trip to the Comstock in 1859, Adolph Sutro¹³³ returned to the region and established a reducing mill on the Carson River at Dayton consisting of eight stamps and 20 amalgamating pans. It was during this time that Sutro's thoughts developed pertaining to the construction of a long tunnel to drain the mines of the Comstock.¹³⁴
- 1863** The town of Monitor (renamed Loope), located approximately 1.5 miles up Monitor Creek off the Carson River East Fork, was incorporated when more than 50 silver ore-bearing ledges were discovered nearby. By the following year the town consisted of more than 100 buildings. By 1873 the town's Tarshish Mine had become too expensive to work and most of the population moved on to Bodie, California. What remained of the town after this was virtually destroyed by an avalanche during the great "White Winter" of 1889-90.¹³⁵
- 1863** Comstock miners first discovered the Leviathan Mine site, located approximately nine miles up Bryant Creek and then Leviathan Creek off the East Fork of the Carson River. A tunnel (adit) was driven some 400 feet into the hillside in search of copper sulfate for processing silver sulfide ore in Virginia City, Nevada. Copper sulfate was found, but not in sufficient quantities to continue the operation.¹³⁶
- 1863** Having risen in importance due to its strategic location on the immigrant trail to California, and later on the road between Placerville, California, and Virginia City, Nevada, via the Carson Pass, Genoa was relegated to relative obscurity with the opening of the King's Canyon Toll Road up from Carson City, a route which significantly shortened the trip to Placerville.¹³⁷
- 1863** The (Old) Virginia Ditch (Canal) was constructed in order to irrigate approximately 2,500 acres of land beneath it. In 1876 the New Virginia Ditch would be constructed to by-pass a portion of the old ditch due to a loss of "carrying capacity."¹³⁸ The original Virginia Ditch takes off from the East Fork of the Carson River less than one-half mile downstream from the Dressler Indian Reservation.
- 1863 (October 22)** Attesting to the bounty of the Carson River system, it was reported in the *Virginia Evening Bulletin* (Virginia City) that "a man arrived in town this morning from the Carson River near Carson City, who brought with him from that place a whole load of wild ducks and geese, which he sold 'like hot cakes' at from \$1 to \$2.50 per pair. He sold his whole load, of several hundred pairs, in less than an hour." And from the *Gold*

- Hill News* (October 28, 1863): "Game must be very plenty on [the] Carson River, if the large lots arriving daily at Virginia [City] prove that source as any indication. Ducks, geese, fat and lucious [sic] are found in proniscuous [sic] profusion about our markets."¹³⁹
- 1864 (May 14)** As reprinted in the *Lyon County Sentinel* (Como): "A.M. Crow, of the Carson River Lumbering Company is busy driving logs down the East Fork of the Carson River, for the mill of the company at Empire City...There are forty men at work. The timber is cut on the mountains of Alpine County...Huge dams are constructed, which are allowed to fill with water...Flood gates are opened and the logs sent bounding...a distance of eighty miles. It is the calculation to drive 2,000,000 [board] feet before the river gets too low...capable of sawing 30,000 feet of lumber every twenty-four hours."¹⁴⁰
- 1864** Alfalfa seed, also known as "Chile clover," which had been grown in California since the 1850's, was first introduced into Carson Valley and became an intensive forage crop covering the expanding agricultural fields along the Carson, Truckee, and Walker rivers. Alfalfa was found to tolerate salt saturation in soils, variable climates, drought, and insects. As a legume, it actually adds fertility to soils while producing three to six cuttings of hay during the average growing season. Once planted it needs little cultivation for six to ten years, although now the rotation of alfalfa fields is becoming more frequent.¹⁴¹ Ervin Crane, a pioneer Steamboat rancher in the Truckee Meadows (Truckee River Basin), located near Reno, Nevada, proved that alfalfa thrived best on sagebrush bench lands plowed and irrigated. By the mid-1870's, alfalfa was the reigning staple crop of the agricultural areas along the eastern Sierra Nevada Mountains.¹⁴²
- 1864** Alpine County, which contains nearly the entire portion of the upper Carson River Basin located in California, was created from parts of Amador, Calaveras, El Dorado, Mono, and Tuolumne counties. Silver Mountain City, originally known as Konigsberg, became the county seat and boasted a population of nearly 3,500 persons along with a post office, telegraph office, Wells Fargo express office, two newspapers, numerous saloons, a school, and several hotels.¹⁴³
- 1864** In this year, W.C. Ralston founded the Bank of California in San Francisco and sent William Sharon to the Comstock.¹⁴⁴ This began a period of highly questionable lending practices and financial arrangements, even by Virginia City's riotous standards. Through the practice of generous loan advances, depriving business, and subsequent foreclosures, the Bank of California quickly became a major stakeholder in the fortunes of this area. By 1869, the bank would come to own all the major mines of the Comstock and 17 of its ore-processing mills along the Carson River. The bank also built the Virginia and Truckee (V&T) Railroad, soon to be known as "the crookedest railroad in the world," and not necessarily for its winding tracks.¹⁴⁵
- 1864 (August 22)** Henry Yerington, one of the owners of the Merrimac Mill located two miles below Empire City, brought suit against East Fork Carson Valley ranchers—Dangberg, Madison, Nesmith, and others—to limit their water usage. The action was settled by a stipulation which showed that the defendants had free use of the waters of the East Fork to irrigate lands acquired between 1857 and 1860, i.e., lands which had been irrigated prior to the arrival of the mills.¹⁴⁶ This action represented the first recorded enforcement of the right of "prior appropriation" on the Carson River. But this would not be the last such suit filed by the mill owners and reflected their growing frustration over inconsistent

- rates of flow in the lower Carson River through Dayton Valley. In reality, the situation reflected a combination of the seasonal volatility of the Carson River's flows, the recurrent drought conditions along the eastern slope of the Sierra Nevada Mountains, and new ditch construction and the increased irrigation of newly developed agricultural lands.
- 1864 (October 31)** Nevada was admitted to the Union as the 36th state. Ultimately, in 1885, by a decision of the Nevada Supreme Court, the state adopted the "prior appropriation doctrine" with respect to the state's administration of water rights. Under this doctrine, the first person to take a quantity of surface water (and later groundwater) and put it to beneficial use has a higher priority of right than a subsequent user. Under drought conditions, the demands of higher priority users are satisfied before junior users receive water.¹⁴⁷ This statutory doctrine of prior appropriation used exclusively in Nevada would come into conflict with the common law doctrine of riparian water rights in use in the State of California regarding the diversion and use of the waters shared between these two states, specifically, Lake Tahoe and the Truckee, Carson, and Walker rivers.
- 1865 (February 4)** The Sutro Tunnel Company was incorporated by an act of the Nevada Legislature. The act granted the company and its superintendent, Adolph Sutro, an exclusive franchise to construct and operate a tunnel to drain the mines of the Comstock for a period of 50 years. Provisions stipulated that the mouth of the tunnel was to be located between Corral Canyon and Webber Canyon, that shafts were to be sunk along the course of the tunnel, and that the tunnel was to be started within one year from the passage of the act and completed within eight years. Neither of these provisions were met.¹⁴⁸
- 1865 (June 25)** As reported in the *Virginia Daily Union* (Virginia City): "A singular sight is presented just now in the immense amount of fish passing from the Lower to the Upper Sink of the Carson. This last spring the two sinks became so low by evaporation that the slough between them dried up entirely...The Lower sink soon became so strongly alkaline by evaporation that the fish in it have died by millions. Within a short time past, the river having raised, the Upper Sink is now flowing through the slough into the lower one. The poor alkaliied [sic] fish, as soon as they got a scent of the fresh water, started after it...An eye witness informs us that in the slough there is a solid streak of fish constantly passing up it two feet thick and four or five feet wide."¹⁴⁹
- 1865 (November)** Construction was begun on the Monitor Consolidated Mining Company Dam, located on the Carson River East Fork about 0.2 mile downstream from its confluence with Monitor Creek. The dam was constructed on 3-foot X 3-foot X 12-foot local timbers packed with earth fill and fed a 100-yard flume that developed a 24-foot fall. At its peak, the power generated by this dam ran a mill capable of reducing 50 tones of ore in 2.5 hours, an Alpine record at that time. The dam was later washed out by floods.¹⁵⁰
- 1866 (March 3)** The Nevada Legislature made its first attempt to obtain a record of water diversions in the state by approving Chapter 100 of the Nevada Revised Statutes. This act required any person intending to construct a ditch or flume to file a certificate with the county recorder setting forth the name by which the ditch would be known and the description of the place or places of use. The act also allowed for the "appointment of appraisers" to assess land through which ditches were to run when the consent of existing owners could not be obtained.¹⁵¹
- 1866 (March 15)** Maggie Ferris, older sister of George Washington Gale Ferris, married noted

- Carson Valley rancher H.F. Dangberg. Younger brother George Ferris became a distinguished bridge builder in the 1890's and the inventor of the Ferris wheel which became a sensational attraction of the 1893 Chicago World's Fair. H.F. Dangberg provided the tuition to send George to school in Oakland and then for George's further education at Rensselaer Polytechnic School in Troy, New York. It was reported that the inspiration for the Ferris wheel came to the youth as he watched the flutter wheel at Cradlebaugh's Bridge near the present location where U.S. Highway 395 crosses the Carson River at the north end of Carson Valley.¹⁵²
- 1866 (May)** The Bank of California acquired its first mill property, the Swansea Mill in Lyon County, Nevada. Within twelve months the bank had acquired a total of seven mills¹⁵³ through the highly questionable practice of extending loans, depriving business and subsequently foreclosing.¹⁵⁴
- 1866 (June 16)** In the *Territorial Enterprise* (Virginia City) it was reported that "at Russell & Crowe's Mill, Empire City, thirty-four thousand [board] feet of lumber, mostly plank, was sawed within the space of twelve hours... This same mill has turned out since last July [1865] upwards of six million feet of lumber..."¹⁵⁵
- 1866** Lahontan Valley ranchers began extensive cuttings of natural stands of tules and cattails in order to enlarge the meadows and improve grazing. In the previous year it was reported that some 30,000 acres of native hay had been harvested in the area. These activities directly affected the subsistence resources of the native Indians, called Cattail-eaters, and set in motion significant pressures for cultural change among these native people.¹⁵⁶
- 1867** As a somewhat imaginative proposal, Nevada's surveyor-general proposed to the 1867 Nevada Legislature that a canal be constructed for barge traffic from Lake Tahoe to Pyramid Lake. On a more realistic and prophetic note, however, he also warned against allowing California from piping water from Lake Tahoe to San Francisco, as Nevada "...has, or will soon have, use for every particle of water now possessed, or which can be obtained."¹⁵⁷
- 1867 (June)** Based on the Bank of California's growing investment in the Comstock and its ownership of numerous foreclosed properties, upon Mr. Sharon's advice the bank organized the Union Mill & Mining Company in order to purchase and manage its accumulation of holdings. Within two years of its formation, the new company would own 17 mills as well as the Comstock's major mines, as the trustees of the mills were also the owners of the mines.¹⁵⁸
- 1867 (August 12)** The *Gold Hill News* reported on flood damages on the lower Carson River stating that "The storm of yesterday afternoon washed away Carpenter & Dirdsall's Dam, at Dayton, and the Ophir Mill Dam, and did the same job for the Kelsey Mill. A large number of tailing sluices, in the [Sixmile] canyon, from Devil's Gate to Dayton, were washed out..."¹⁵⁹
- 1867 (December 20–January 2, 1868)** Carson Valley and the lower Carson River were subjected to two severe winter storms and extensive flooding. It was reported that some 2,000 cords of logs which had been floated down to Empire City (at the head of Dayton Valley) were washed away and that every dam and bridge on the river had been swept away.¹⁶⁰ The log booms on the Carson River East Fork were torn from their moorings and some \$100,000 of logs and cordwood were launched on a premature and chaotic trip down

- the East Fork and thence down the Carson River itself, no doubt adding to the destructive potential of the flood. The rebuilt Cradlebaugh Bridge over the Carson River was washed out, as it probably was in the previous 1861–1862 flood, as well as the bridges on Boyd’s (Genoa) Lane, which joined the east and west sections of Carson Valley. The flooding resulted from a prolonged wet-mantle storm in the valley in which rain fell for six days on already saturated soil, and rain-on-snow storm conditions in the upper basin. The second storm struck with heavy rains on December 30th and continued until January 2nd, turning Carson Valley into an area of “watery desolation.” By this time the Carson River had crested well above the high-water mark of the 1861–1862 flood.¹⁶¹
- 1867 (December 12)** The *Carson Daily Appeal* (Carson City) reported on the high water in the Carson River near Empire stating that “yesterday morning the Mexican dams were carried away...”¹⁶² The major flooding in the Carson River Basin continued to redefine the lower Carson River’s new flow patterns below Ragtown in Lahontan Valley. During the 1862 flood, a major channel, previously abandoned, was re-opened below Ragtown that led the river northward directly to the Carson Sink, beginning the process of diverting waters from the southern flow into Carson Lake. In this year the Carson River’s flood waters opened an additional channel that cut almost due east and emptied into Stillwater Slough, the connecting link between Carson Lake, Stillwater Marsh, and Carson Sink. This new channel became known as New River.¹⁶³
- 1868 (January 16)** It was reported in the *Carson Daily Appeal* (Carson City) that “During the late storm the water in the sinks of the Carson and Humboldt rose above the land usually intervening and formed one immense lake.”¹⁶⁴ This is the only record found thus far reporting on a joining of the lower Humboldt River Basin with the lower Carson River Basin into one contiguous body of water.
- 1868 (February)** Construction was begun by Joseph Coulter on the Mount Bullion Tunnel Company Dam and Mill. The dam was located on the Carson River East Fork just above its confluence with Monitor Creek. The mill was ready in May 1869 and on the 15th of that month a flood weakened the structure. In December 1871 the dam failed completely and washed into the Monitor & Northwestern Company Dam located just downstream. The dam was never replaced.¹⁶⁵
- 1869** Mining interest was renewed at the Leviathan Mine site located off the Carson River East Fork approximately nine miles up Bryant and Leviathan creeks. Whereas during initial exploration in 1863 the miners were interested in copper sulfate to process the silver sulfide ore from the Comstock, this time they were after the copper itself. By the following year, the miners had extracted some 500 tones of 30 to 50 percent copper ore from two tunnels (adits). It was at this time that the miners noticed that their excavations were “bottoming” in an immense sulfur deposit.¹⁶⁶
- 1869 (May 10)** The Central Pacific Railroad met the Union Pacific Railroad at Promontory Summit, just south of Promontory, Utah.¹⁶⁷ The nation had now been connected by rail lines and overland migration westward would no longer be the hazardous and daunting task it was.
- 1869 (September 29)** Having largely fulfilled its purpose of protecting the area’s settlers and travelers, and the Overland mail route and the Pony Express Route, Fort Churchill was officially abandoned. The fort had been established in late 1860 on the northern bank of

- the Carson River across from the Adrian Valley after an Indian uprising (the 1860 Pyramid Lake Indian War) among the Pyramid Lake Paiute Indians.¹⁶⁸
- 1869 (October 19)** Work began on the "Sutro Tunnel," a mine de-watering project which had been commissioned by the Nevada Legislature in 1865 through the incorporation of the Sutro Tunnel Company. In April 1866, Adolph Sutro, the company's founder and superintendent, secured contracts with 23 of the principal Comstock mining companies, which represented 95 percent of the stock-market value of the Comstock Lode at that time. By these contracts, the Sutro Tunnel would intersect the mines at about the 1,600 foot (vertical depth) level and drain away unwanted waters into the lower Carson River. In return, the mines agreed to pay Sutro's company the sum of \$2 for every ton of ore extracted after the extension of the tunnel and its lateral drifts had reached designated points.¹⁶⁹
- 1870** Located on the south edge of Carson City at the terminus of a 12-mile "V" flume running from Spooner Summit in the Sierra Nevada Mountains lay the immense lumberyard of the Carson-Tahoe Lumber and Fluming Company. This company was the greatest of the Comstock lumbering combines operating in the Lake Tahoe Basin during 1870-1898. The lumberyard was approximately one mile long and one-half mile wide. A spur line of the Virginia & Truckee Railroad served the lumberyard and carried rough lumber to the company's planing mill and box factory, which was located one-half mile north on Stewart Street. The railroad also carried timbers and cordwood to the Carson Yards to be hauled to the Comstock mines and mills.¹⁷⁰
- 1870 (November)** A suit was filed by Peter W. Van Sickle against James W. Haines (*Van Sickle v. Haines, et al.*), concerning the prior appropriation of the waters of Daggett Creek, a small tributary of the Carson River flowing down alongside Kingsbury Grade in Haines Canyon. The suit claimed that Haines had diverted away from Van Sickle the one-half of the flow of the creek which had been his from "time immemorial." Haines, who had recently acquired land over which the creek flowed, claimed a riparian right to the "reasonable use" of its waters. The U.S. District Court, however, ruled in favor of the prior appropriative right of Van Sickle.¹⁷¹
- 1871 (March 2)** Legislation was passed by the Nevada Legislature making it unlawful for any person between the first day of January and the first day of September to catch any trout in any of the waters of Nevada with any seine, gillnet, or any spear, weir, fence, baskets, trap, explosive material or other substance or implements, or in any manner except by hook and line; and it was made unlawful at any time for any person to catch fish by any poisonous deleterious or stupefying drug, explosive material or other substance. The law also provided that fish ladders needed to be constructed at mill dams, except that the Carson River (with its preponderance of hydro powered ore-stamping mills, each with its own dam and diversion structure) was exempt from this provision. All other acts relating to fish were repealed.¹⁷²
- 1871** Williams and Charles Kaiser began importing sheep for their ranches near Stillwater in Lahontan Valley in the lower Carson River Basin. Soon herds and herdsman were spread across the valley and into the Clan Alpine Mountains and Stillwater Range. These activities further impacted and restricted the native habitat and traditional food sources of the local Indian people.¹⁷³

- 1871 (June 3) In a note to the efficiency by which the loggers denuded the forests of the Sierra Nevada Mountain ranges, it was reported in the *Gold Hill News* that “the wood-choppers have cleaned the eastern slope of the eastern range of the Sierras [the Carson Range], from base to summit, from a point northwest of Carson City to a point one mile south of where the King’s Canyon road [U.S. Highway 50 and Spooner Summit] crosses the summit, and are extending their operations still further southward and down the western slope toward Glenbrook, southwest, and toward Delicone Bay, north. At a rough guess there must be cut and corded up within one mile of the line of the Clear Creek flume 140,000 cords of wood. For miles the side of the mountain, where dense forests of great pines once grew, is treeless as a prairie...”¹⁷⁴
- 1871 Mound House, located approximately six miles east of Carson City and down the Carson River, was established as a station and siding on the Virginia & Truckee Railroad, serving as a wood and water stop. The site grew rapidly after 1880 when the V&T Railroad built a narrow gauge railroad from Mound House to the mining camps of western Nevada and the Owens Valley region of California. The new railroad, named the Carson & Colorado, turned Mound House into a booming shipping point. In 1934 the narrow gauge line was abandoned from Mound House and the site virtually disappeared.¹⁷⁵
- 1871 Nevada’s Victorian capitol in Carson City was completed with sandstone from the quarry of the town’s founder, Abe Curry. The octagon annex was added in 1907 and the north and south wings were completed in 1915. Notable features included its Alaskan marble walls, French crystal windows, and elegant interior.¹⁷⁶
- 1871 (November–December) The case of *Van Sickle v. Haines, et al.*, which appeared to have firmly established the case for the concept of prior appropriation with respect to the waters of the Carson River, was reversed on Haines’ appeal to the Nevada Supreme Court.¹⁷⁷ The reaction of the press was swift and vocal in its condemnation of the Supreme Court’s decision. In the *Reno Crescent* (predecessor of the *Reno Gazette–Journal*) it was noted that “The principle of law laid down is subversive of all preconceived ideas on the subject in dispute...the transitory character and limited number of running streams on the Pacific Coast suggested at an early day the inapplicability of the common law [riparian] doctrine touching water rights to our case...”¹⁷⁸
- 1872 While the dispute over riparian versus appropriative water rights continued in Nevada, substantive changes took effect in the composition of the Nevada Supreme Court which were destined to establish the prior appropriation doctrine as the law of the land (and waters). In 1872 Justice Garber resigned and in that same year T.P. Hawley was elected to succeed Justice Lewis. Later, in 1874, the term of Justice Whitman expired. But it was the election of Justice Hawley that proved of greatest importance. During his tenure from 1872 through 1890 he heard several important water-related cases and introduced the concept of universal “custom” and a system already established by custom, i.e., the doctrine of “prior appropriation,” and the inapplicability of the doctrine of riparian rights.¹⁷⁹
- 1873 Silver was demonetized nationally and the nation adopted the gold standard alone. This action effectively brought to an end the silver “boom” in Alpine County that had begun in the late 1850’s. While silver production would continue in the Comstock in and around Virginia City for at least another 10 years, the relatively smaller claims of lower-grade ore

- in the upper Carson River Basin began to rapidly close down. After this, Alpine County's population declined from a peak of more than 11,600 persons in 1864 to 1,200 persons in 1875, 680 persons in 1890, and only 500 persons by 1910.¹⁸⁰
- 1873 (May)** A.W. Von Schmidt, working under a U.S. government contract to resolve the boundary issue between California and Nevada, surveyed his way through the upper Carson River Basin during this period. Von Schmidt's survey, however, mistakenly placed the border several hundred yards to the west, awarding Nevada a million or so extra acres rightfully belonging to the State of California. The error was noted by the California Legislature which eventually got the land returned, but not until the boundary had been resurveyed and the issue finally settled in 1899.¹⁸¹
- 1873 (August)** The first waters from the Truckee River Basin reached Gold Hill and Virginia City, located in the Carson River Basin. The water system, certainly an engineering marvel of its day, was over 21 miles in length and capable of delivering 2.2 million gallons of water in 24 hours (6.75 acre-feet per day or almost 2,500 acre-feet per year).¹⁸² The system consisted of a diversion dam below Hobart Creek Reservoir on Franktown Creek (Hobart Creek),¹⁸³ which flows into Washoe Lake from the eastern slope of the Carson Range. From this point of diversion, the water flowed through four miles of box flumes to a pressure pipe almost eight miles in length that transported the water across the Washoe depression (Washoe Valley) to Five-Mile Reservoir in the Virginia Range, and finally through a 5.66-mile flume which took the waters to Gold Hill and Virginia City.
- 1874 (January 20–29)** The entire eastern front of the Sierra Nevada Mountains were subjected to heavy precipitation resulting in extensive flooding in the valleys below. A heavy, wet snowstorm began on January 20th and lasted for three days. On January 27th a warm chinook wind began an early thaw, which was followed on the 28th and 29th by a heavy, warm rain which melted the remaining snow, flooding Carson Valley and causing considerable damage throughout Carson Valley and Eagle Valley (Carson City) to the north, as well as at Empire City and the ore reduction mills in Carson River Canyon (Dayton Valley) below Eagle Valley all the way to Dayton.¹⁸⁴
- 1875 (January 16–21)** Less than a year after the 1874 flood, the Carson River flooded again. Heavy snow began falling on January 6th and quickly accumulated to a depth of some two feet in both Carson and Eagle valleys. On the morning of January 18th, the falling snow turned to a warm rain and by the next day the rain had transformed the considerable mass of accumulated snow into running water. Between noon on the 19th and 7:00 a.m. on the 20th, the Carson River through Carson and Eagle valleys rose by approximately six feet, inundating both these valleys and causing considerable damage to infrastructure, as well as eroding stream banks and channels throughout Carson Valley.¹⁸⁵
- 1875** Based on the declining gold and silver fortunes of Silver Mountain City, the county seat of Alpine County was moved to Markleeville, California, where it remains.¹⁸⁶
- 1875** Recognition of the doctrine of riparian ownership of water rights in Nevada was provided in the State of Nevada through the early court case of *Barnes v. Sabron*. Subsequently, in 1885 the Nevada Supreme Court would reject this concept and formally approve and adopt the prior appropriation doctrine for all the state's water supplies.¹⁸⁷
- 1875 (March 23)** By Executive Order, retroactive to November 29, 1859 when lands were first set aside for this purpose, President Ulysses S. Grant formally proclaimed the creation of

- the Pyramid Lake Indian Reservation for the Pyramid Lake Paiute Indian Tribe.¹⁸⁸ The reservation occupied almost 477,000 acres with its dominant feature being Pyramid Lake, located at the terminus of the Truckee River.¹⁸⁹ At that time, before diversions began at Derby Dam to convey Truckee River water to Lahontan Valley farmlands, Pyramid Lake's surface area was estimated to be between 140,000 and 150,000 acres. This area corresponds approximately to a lake surface elevation of 3,884 feet MSL and a total volume of 32,580,000 acre-feet.¹⁹⁰ By comparison, today (April 30, 1996) the lake has a surface elevation of 3,798.94 feet MSL, an area of approximately 111,000 acres, and a volume of approximately 21,610,000 acre-feet.¹⁹¹
- 1875** H.F. Dangberg constructed the Pinenut Creek Ditch in order to take advantage of the intermittent flows of that "flash" stream.¹⁹² This ditch system lies to the east of the Virginia Ditch on the east side of Carson Valley and is interconnected with several reservoirs (Allerman No. 1, 2, and 4) located near that location and which are fed by the Allerman Canal as well as inflows from Buckeye Creek, another intermittent stream flowing out of the Pinenut Mountain range.
- 1875** A second flume and pipe system, diverting waters from the Truckee River Basin to the Carson River Basin, was constructed from Franktown Creek (a tributary of Washoe Lake and eventually Steamboat Creek) below Hobart Creek Reservoir, across Washoe Valley to Five-Mile Reservoir in the Virginia Range to serve the water needs of Gold Hill and Virginia City. Like the first system installed in 1873, the capacity of this system was also 2.2 million gallons per day.¹⁹³
- 1875 (July)** A drought year occurred in the Carson River Basin following heavy floods earlier in January, again demonstrating the volatile conditions in this region. An article in the *Carson Valley News* (Genoa) noted that frustrated quartz mill owners on the lower Carson River had proposed the acquisition of some large valleys at the head of the main branches of the Carson River in order to construct dams and impound water for use by the mills during the dry season.¹⁹⁴
- 1875 (August)** Following up on the idea proposed by the mill owners the previous month, the Comstock mine owners, who had a vested interest in the operations of the mills, put forth a new proposal to increase the water available to the mills. This proposal was for the construction of a tunnel through the Carson Range of the Sierra Nevada Mountains to tap the waters of Marlette Lake (with a volume of about 380 acre-feet), which drains directly into Lake Tahoe.¹⁹⁵
- 1875 (August 28)** The situation in the mills on the lower Carson River became critical. Half the stamps at the mills were without sufficient water power and were hung up, leading to the closing of the mines and extensive layoffs of workers in Virginia City and throughout the Comstock.¹⁹⁶
- 1875 (October 26)** To compound their troubles during a particularly dry year, Virginia City was overwhelmed by the most devastating fire in its relatively young but riotous history. The conflagration reportedly began when a drunken tenant at the boarding home of "Crazy" Kate Shay knocked over a kerosene heater, igniting the one-story structure located at 19 "A" Street. In the resulting inferno, some 400 businesses and 1,000 homes were engulfed, including the courthouse, Catholic, Methodist and Episcopal churches, Piper's Opera House, Consolidated Virginia Hoisting Works, Consolidated Virginia and Ophir mines,

- and the freight and passenger depots of the Virginia & Truckee Railroad. The flames reached so high that people in Carson Valley reported that they could see “orange-colored claws reaching for the sky.”¹⁹⁷
- 1876 (June)** Just as conflict over the previous year’s drought was beginning to come to a head, the Carson River experienced a severe flood in the spring and summer. By June ranches on the West Fork were flooded by the East Fork which, as it had done previously in 1861, rolled over from its own bed into that of the West Fork near the head (south end) of Carson Valley.¹⁹⁸
- 1876** As the water diversions from Franktown Creek and Hobart Creek Reservoir soon proved insufficient for the growing needs of the Comstock, the Virginia and Gold Hill Water Company received permission to draw water from Marlette Lake, a 380 acre-foot body of water located in the Carson Range and which drained into Lake Tahoe.¹⁹⁹ This action would directly divert the waters from Lake Tahoe Basin to Virginia City and the Carson River Basin. This would not be an easy task, however, as Marlette Lake lay on the western slope of the Carson Range and the water would have to be transported around (or through) to the eastern slope where the Franktown Creek flume and pipe system was already in place.
- 1876** Due to a loss of “carrying capacity,” the (Upper) New Virginia Ditch (Canal) was constructed along the East Fork of the Carson River, by-passing a portion of the original Virginia Ditch (Canal) for a distance of approximately 1.8 miles. The original Virginia Ditch was constructed in 1863. Also in this year, the Allerman Ditch (Canal) was lengthened and H.F. Dangberg constructed the Ezell Ditch leading from a branch of the East Fork called the Cottonwood Slough.²⁰⁰
- 1876 (August 7)** The *Gold Hill News* reported that “The fish in the lake known as the Lower sink of the Carson [River] are dying, and are floating to the shores in thousands.”²⁰¹
- 1876 (November 31)** It was reported in the *Carson Valley News* (Genoa) that “The Genoa Flume Company have done Genoa Canyon. They commenced operations three years ago, and during the intervening time have flumed 52,700 cords of wood from the mountain gorge down the Carson River to Empire [City].”²⁰²
- 1877 (March 3)** The Desert Land Entry Act (Desert Land Act) was passed by Congress in recognition of the limited application of the 1862 Homestead Act. As first approved, it provided that title to 640 acres (one section) of arid land could be procured by conducting water to the land and reclaiming 20 percent of it. In 1890, the acreage was reduced to 320 acres. In order to receive a patent, at least 40 acres had to be irrigated.²⁰³
- 1877 (July)** A low water year ensued for the Carson River, greatly complicating the “wood drives” whereby logs (and in later years, cord wood) were floated down the river to the sawmills at Empire City. At this time, due to the particularly low flow of the river through the Carson Valley, the farmers and the woodmen agreed that during the drought the woodmen would use the entire flow of the river during the day and the farmers would use it only at night until the drive was completed.²⁰⁴ Thus came into being the custom of “rotation” on the Carson River to more effectively and completely use its limited waters.
- 1877 (October 27)** The *Sutro Independent* (Town of Sutro) reported that one “Paiute Captain Breckinridge reports that the Carson Sink never was so low as at present. The main channel of the river is completely destitute of water for more than twenty miles from the

- sink and lake [Carson Lake], and has been so for over two months."²⁰⁵
- 1877 (November 23)** An article in the *Carson Valley News* (Genoa) about the planting of catfish in the Carson River added some insights into the disappearance of the more sensitive trout species in this river. It was reported that "From Empire to its source the crystal waters of the Carson have not yet been polluted with "mud" and probably never will until there is a change of management in the mining affairs in Alpine; and were it not for the wood-driving business, trout would be as plentiful in the river today as they were twenty years ago. The water becomes impregnated by filtering through the "jams" of fresh pine wood as it lies in the river for weeks at a time, which is quite as distasteful and unhealthy to the fish as the much complained of sawdust in the Truckee and other streams."²⁰⁶
- 1878** The Buckeye Creek Ditch was constructed to capture the intermittent "flash" waters of this stream originating in the Pinenut Hills.²⁰⁷ Buckeye Creek enters Carson Valley about 3.5 miles north of Pinenut Creek and empties into the Allerman Canal, where a similar flood retaining canal was constructed in 1875 for that creek as well.
- 1878** In a risky move with respect to its exposure to periodic flooding, John Gardner established the settlement of Gardnerville in the middle of Carson Valley on the banks of the Carson River's East Fork. Up to this time, settlements in the valley (i.e., Van Sickle's, Walley's Hot Springs, Mottsville, Sheridan, Fairview, and Fredericksburg) had been concentrated on the west side of the valley, generally above the floodplain, between Genoa in the north and Woodfords in the south. Only three years prior (January 1875), Carson Valley had been inundated by flood waters with significant damage to roads, bridges, and farmlands.²⁰⁸
- 1878 (July 8)** After a total construction period of eight years, eight months, and nineteen days, the Sutro Tunnel was completed through to the Savage mine. The length of the final tunnel was 20,498 feet (3.88 miles), and for the greater part of the distance the tunnel, inside of the supporting timbering, was 7–7.5 feet in height, 8 feet wide across the top, and 9–9.5 feet wide across the bottom. Lateral tunnels to drain the various other mines along the Comstock Lode were then begun. Over the course of the next several years, the north lateral, at 4,403 feet in length, reached the Union mine shaft, and the south lateral was extended 8,423 feet to the Alta mine shaft.²⁰⁹ Total cost of the project, including lateral branches constructed up to March 1, 1881, was estimated at \$5,069,801.²¹⁰ By one source, it was estimated that in 1880 the Sutro Tunnel drained some 3.5 million gallons of water daily and that during the year 1,277.5 million gallons (3,920 acre-feet) of water, or 4,752,605 tons, drained through the tunnel. Even more drainage was expected after the laterals were fully completed.²¹¹ While admittedly an engineering wonder, the Sutro Tunnel turned out to be largely an economic failure.²¹² Contributing to the failure of the Sutro Tunnel was the fact that by the time it was completed, a number of the Comstock mines had already gone below its 1,600 foot drainage level.
- 1878 (October 1)** Reported in the *Gold Hill News*: "Two large boxes of salmon eggs arrived at the freight depot in Virginia [City] yesterday, consigned to Fish Commissioner Parker... when hatched the young salmon will be placed in the Carson River, the Truckee, and other of our rivers and lakes. A few will also be placed in the large reservoirs of the Virginia and Gold Hill Water Company, by way of experiment."²¹³
- 1879 (January 2)** Nevada Fish Commissioner H.G. Parker reported in his First Biennial Report

- that on August 10, 1878 he had placed in the Carson River, about four miles from Carson City and above the Mexican dam site, in a slough connected with the main river, and protected from the disturbances of the “wood drives”, two thousand cat-fish, of the variety herein named [Schuykill River variety from the Sacramento River].²¹⁴
- 1879** Beginning in this year the mill men began to try to allocate the waters of the Carson River in Carson Valley by the use of “water men,” who would undertake to divide the waters of the river equitably for both farmers and the mill operators. Between 1879 and 1882 a Mr. L.M. Coffin, acting on behalf of the Union Mill & Mining Company, performed this task without incident.²¹⁵ This represented to first effort to create a “watermaster” to control the Carson River’s operation and enforce water rights.
- 1879** J.W. Marsh, along with his sons Wilbur and William, introduced pedigreed, registered, short-horned Durham dairy cattle into Carson Valley, significantly improving the quality of the valley’s dairy herds. The original foundation stock of a great many of the valley’s present dairy herds came from the Marsh herd of Durham short-horns.²¹⁶
- 1879** Congress created the U.S. Geological Survey (USGS) as part of the U.S. Department of the Interior to undertake extensive exploration, mapping, and scientific study of the nation’s resources, particularly water resources of the arid West.²¹⁷
- 1880 (November 9)** The *Gold Hill News* reported that the daily flow of water from the Sutro Tunnel (completed in July 1878), in standard gallons, was 3,593,272.²¹⁸
- 1881 (January 17)** H.G. Parker, Nevada Fish Commissioner, reported in his Biennial Report that of the catfish planted above Carson City in August 1878, several have been caught at Woodford’s, thirty miles up the river and others have been found sixty miles down the river, the latter “having passed through all the poisonous substances flowing into the river from mining operations.”²¹⁹
- 1881 (February)** The Nevada Fish Commissioner made the first introduction of carp into the Carson River, although this was not reported until the Biennial Report of December 29, 1884.²²⁰
- 1881** Major John Wesley Powell was appointed Director of the U.S. Geological Survey. For the next six years, until 1887, he would lobby Congress on the possibilities for the irrigation of the West, emphasizing the appalling economic loss that was being permitted by not realizing to the full extent all possible returns on the nation’s undeveloped but presumably irrigable lands in the western states. His efforts were largely ignored, however, until early January 1887 and the arrival in Congress of the newly elected senator from Nevada, William M. Stewart.²²¹
- 1881** With the waning of fortunes at the Comstock mines, Nevada’s Twenty-Year Depression began.²²² Eventually, this depression (1881–1900) caused Nevada’s population to fall by 32 percent from 62,266 persons in 1880 to only 42,355 persons by 1900. Storey County’s population (Virginia City) fell from a peak of 19,528 persons in 1875 to only 3,673 persons by the turn of the century. Carson City’s (Ormsby County) population declined from 5,412 persons in 1880 to 4,883 persons in 1890, and then fell even more dramatically to only 2,893 persons by 1900. Agriculture proved more enduring, however, stabilizing Douglas County’s (Carson Valley) population at 1,581 persons in 1880, 1,551 persons in 1890, and 1,534 persons in 1900. Churchill County, situated at the basin’s terminal end, remained largely undiscovered until the 1902 Reclamation Act, with its population

- recorded at only 479 persons in 1880, 703 persons in 1890, and 803 persons by 1900.²²³
- 1882 (August–September)** Israel Cook Russell surveyed Pyramid Lake. Records of this and earlier visits (Frémont in 1844 and King in 1878) indicated that the under natural conditions the lake covered approximately 140,000 acres (220 square miles) and its lake level fluctuated as much as 20 feet between wet and dry periods. This surface area corresponded to a lake surface level of nearly 3,863 feet above mean sea level (MSL) and a volume of almost 29,600,000 acre-feet.²²⁴
- 1882** A sample of Pyramid Lake water recorded a total dissolved solids (TDS) content of 3,500 milligrams per liter (mg/l). By comparison, TDS concentration of seawater is about 35,000 mg/l while TDS concentrations in the Truckee River just below the Lake Tahoe dam are typically 100 mg/l.²²⁵
- 1883 (January 4)** In his Biennial Report, Nevada Fish Commissioner H.G. Parker reported that “From the poisonous substances used in quartz mills on the upper Carson [River] much injury must result, particularly to the young fish, as the spawning beds are in this locality, but as it is within the boundary of California, the Fish Commissioner of Nevada is powerless in suppressing the evil, and can only report its existence. Other than this no complaints against deleterious substances have been made.”²²⁶
- 1883 (July 22)** Another water shortage loomed in the Carson River Basin. It was reported that the low waters on the lower Carson River had forced the Brunswick and Mexican mills to virtually shut down; the latter mill was operating at only one-quarter of its capacity and the mines supplying these stamping mills were beginning to lay off miners. It was also alleged that at this same time the ranchers in Carson Valley were spreading the river’s waters over waste lands to grow grass or wash the alkali out of the soil.²²⁷ Further, the miners and mill owners were becoming increasingly alarmed by the expansion of upstream ditches and the accompanying new lands being brought under cultivation.²²⁸
- 1883 (August)** As the drought conditions intensified and rumors of upstream water wasting persisted, the owners of Union Mill & Mining Company, which owned many of the mills along the lower Carson River, felt a more aggressive approach was needed to obtain a guaranteed water supply. An examination of the events of this period showed that since the early 1860’s, the mills had suffered water shortages in virtually every year except high water years, that is, even “normal” year flows were generally insufficient to satisfy both the operations of the mills and the needs of agriculture. This shortage typically became acute by late summer. In fact, in prior court decisions, for example, 1864 and 1872, it had been noted that the water shortage problems on the Carson River were largely problems precipitating from the vagaries of nature and not of man.²²⁹
- 1883 (Summer–Fall)** This marked a period of increasing hostility in the Carson River Basin between the upstream ranchers and farmers and the downstream mill men. In this drought year, Union Mill and Mining Company put a particularly aggressive “water man” on the river, a John D. Ludwig, replacing L.M. Coffin, who had ably served in that capacity since 1879. Mr. Ludwig effectively, if not ruthlessly, divided the waters of the Carson River through the irrigating seasons of 1884, 1886, and 1888. His method was to either block the diversion of the water into the ditches, tear down the diversion dam, fill up a portion of the diversion ditch, or, in extreme circumstances, to cut up the ditch entirely.²³⁰ These efforts were not intended to entirely deny water to the farmers, but to limit

- diversions for only those lands which had a right (prior appropriation) and for only those periods needed to grow the crops, thereby preventing continuous diversions. Out of these actions came scheduled irrigation periods whereby the farmers would be allowed to take water from the river for two weeks, after which all the water would flow to the mills, except what the farmers would need for their stock.
- 1884 (August 1)** As a clear indication of the Carson River's use in commerce as a transportation system, in the *Genoa Weekly Courier* it was reported that "The rear of Hanson & Campbell's wood drive is gradually making its way through the [Carson] valley. Sam Longabaugh has the contract for delivering it at the different points of destination along the river. Eleven thousand cords of wood started from Markleeville; 500 cords will be taken out at Empire, 1,500 cords at the Brunswick mill, 1,000 cords at the Eureka mill, and 1,000 cords at the Woodworth mill. The balance of the wood is to be taken out at Dayton. There are also 1,000 cords of Bryant's wood in the drive for Stevenson's mill."²³¹
- 1885 (March 6)** The *Genoa Weekly Courier* reported that they had been "informed that about 12,000 cords of wood will be driven down the Carson River during the coming season. This is about the average drive of late years, but in the flush times as high as 180,000 cords were sent down in one season."²³²
- 1885** The Nevada Supreme Court formally approved the doctrine of prior appropriation for all the state's water supplies, although an earlier (1875) lower court decision had given recognition to the doctrine of riparian ownership.²³³
- 1886 (January 20–26)** Carson Valley, and particularly its western slopes [Carson Range], was subjected to another severe flood event. Unlike most storm events which flooded Carson Valley prior to this time (e.g., wet-mantle storms, rain-on-snow, or rain on frozen ground), this flood event was caused by an intense downpour and resultant flash flooding out of the narrow, steep valleys of the Carson Range. Light rain began falling on January 20th and turned into a torrential downpour by the morning of the 23rd, continuing through until 4:00 a.m. of the following day. By the morning of the 24th, the *Genoa Courier* reported that Carson Valley "presented the appearance of an inland sea." By January 26th the rains had ceased. The most severe damage from this storm was caused by the flash flooding out of the narrow, steep valleys on the western side of Carson Valley. It was along this stretch from Genoa in the north to Woodfords in the south, a number of small hamlets (Van Sickle's, Walley's Hot Springs, Mottsville, Sheridan, Fairview, and Fredericksburg) were situated along the old Carson Emigrant Trail–Pony Express Route–Overland Stage Road above the valley floor and, up until this time, out of the reach of periodic rising floodwaters. As was noted in the *Genoa Courier*, "Every mountain gorge sent out a torrent of water, and scarcely any piece of property in Genoa escaped without more or less damage."²³⁴
- 1886** Silver Mountain City, located approximately 3.5 miles up Silver Creek from its confluence with the Carson River's East Fork, ceased to exist. In 1864, Silver Mountain City had become the county seat for Alpine County and contained a population of nearly 3,500 persons. Subsequently, the population had declined rapidly along with the activity in the gold and silver mines. By 1868 only 200 residents remained and by 1872 there were only 30 persons left in this once bustling mining town.²³⁵
- 1887 (January 12)** William M. Stewart was elected to the U.S. Senate by the senate of the

- Nevada Legislature. Senator Stewart had retired from politics and the U.S. Senate in 1875 and practiced law in San Francisco. In 1886, Stewart was induced to return to Nevada and seek his old senate seat which had been held by William Sharon from 1875–1881, and by James Fair from 1881–1887. His arrival in Washington, D.C., would begin a new era in the development of western water reclamation projects, eventually culminating in the Reclamation Act of 1902.²³⁶
- 1887 (February 8)** The Fallon Paiute–Shoshone Indian Reservation was officially established in Churchill County, Nevada, when land allotments were granted from the public domain to certain Paiute and Shoshone Indians pursuant to the General Allotment Act, as amended. Originally, 50 allotments of 160 acres each (8,000 total acres) were granted to individual Indians.²³⁷
- 1887** Tapping the waters of Marlette Lake in the Lake Tahoe Basin,²³⁸ a third pressure pipe was installed across Washoe Valley in essentially the same location as the first two (see entries under 1873 and 1875).²³⁹ When completed, the water system constituted the most extensive interbasin transfer of water within the state. The completed system, serving the municipal and mining water needs of Virginia City and Gold Hill with waters from the Lake Tahoe Basin and a Truckee River tributary (the outflow of Hobart Creek Reservoir enters Franktown Creek, which eventually flows to the Truckee River via Washoe Lake and Steamboat Creek), consisted of three reservoirs (Marlette Lake, Hobart Creek Reservoir, and Five–Mile Reservoir), over 21 miles of pressure pipes across the Washoe depression (Washoe Valley), approximately 46 miles of covered box flume, and a tunnel 3,994 feet in length.²⁴⁰
- 1887 (July 1)** It was reported in the *Genoa Weekly Courier* that Nevada “Fish Commissioner W.M. Cary, on Monday, deposited sixteen mud turtles on the bank of the Carson River, near Wally’s [Hot] Springs, where it is thought, they will thrive and multiply. They came from Sacramento Valley and are said to be the large kind. When full grown they will dress from ten to fifteen pounds, and the meat is very tender and toothsome.”²⁴¹
- 1887** It is generally believed that in this year H.H. Bence, a Nevada land surveyor, first located a possible canal route to link the Truckee and Carson River basins when he was surveying government land in the Carson and Humboldt sinks.²⁴²
- 1887** The Nevada and Lake Tahoe Water and Manufacturing Company proposed a four-mile tunnel through the Carson Range of the Sierra Nevada Mountains to connect Lake Tahoe and Carson Valley to the east. Rivalries among potential water users in Nevada prevented any effective cooperative efforts on this project.²⁴³
- 1888 (March 29)** Congress passed the Irrigation Act of 1888. By this act, Congress tasked the Secretary of the Interior, through the Director of the U.S. Geological Survey, to make an investigation of the arid regions of the West where agriculture is carried on by means of irrigation. On October 2, 1888, \$100,000 was appropriated to pursue such investigations. On March 2, 1889, Congress appropriated an additional \$250,000 to conduct the irrigation survey and authorized a committee—Select Committee on Irrigation and Reclamation—to investigate arid lands of the West. U.S. Senator William M. Stewart (Nevada) was made the committee’s chairman.²⁴⁴
- 1888 (August 3)** In a newspaper article in the *Genoa Weekly Courier*, the District Attorney of Douglas County expressed his desire “to call the attention of the ranchers who take water

- from the Carson River and its tributaries to the necessity of placing screens in their irrigating ditches to keep the fish from leaving the river, as many thousands of fish are yearly destroyed by this neglect on their part, and prosecutions may follow any omission to attend to this matter."²⁴⁵
- 1888 (August 4)** During a drought year and in an attempt to secure a more reliable source of water, the Douglas County Artesian Well Company was incorporated by H.H. Springmeyer, H. Fulstone, D.B. Park, A.J. Ruckman, L.G. Sprague, and Laurence Frey.²⁴⁶
- 1889 (March 9)** The Nevada Legislature enacted Chapter 113 of the Nevada Revised Statutes, a very lengthy and comprehensive act designed to regulate the use of water for irrigation and other purposes, to settle the priority of water rights, to provide for the condemnation of land for reservoirs, to record claims to water rights, and to appoint water commissioners.²⁴⁷ The act, which contained 33 sections, clearly indicated the state's increased interest in enhancing the control and use of water for irrigation purposes brought about by the great expansion of irrigated lands along the Carson, Walker, Truckee, Humboldt, and Muddy rivers, their tributaries, and many smaller streams. Of importance was Section 9 which required that any water user make a filing prior to September 1, 1889, under oath, with the proper county recorder, giving the pertinent data regarding his diversion and use of water. The county recorders were required to prepare an index book of such water claims.²⁴⁸ This chapter was repealed (Chapter 127) by the 1893 Nevada Legislature.²⁴⁹
- 1889 (April)** The concept of riparian water rights received further condemnation in the Nevada press when the *Territorial Enterprise* (Virginia City) wrote further comment on the long-remembered (and subsequently reversed in April 1885) Nevada Supreme Court decision of *Van Sickle v. Haines, et al.* According to the author, believed to be the editor, Dan DeQuille: "Water, in some countries, is a nuisance, and in others it is a jewel. We have drain ditches in the East and irrigation ditches in the West. We have riparians in the East and appropriationists in the West."²⁵⁰
- 1889 (June–July)** The U.S. Geological Survey commenced the first federally-funded hydrologic watershed investigations in the Truckee and Carson River basins. These studies would continue intermittently until the newly organized U.S. Reclamation Service (USRS, renamed the U.S. Bureau of Reclamation, USBR, in 1923) commenced its investigations in the summer of 1902, just after its creation. One of the USGS team's engineers, a Colonel Lyman Bridges, claimed that 500,000 acres could be reclaimed [for irrigation purposes] on the Truckee River alone.²⁵¹
- 1889 (July)** U.S. Senator William M. Stewart (Nevada), who had recently been appointed as Chairman of the Congressional Select Committee on Irrigation and Reclamation, and Colonel Lyman Bridges of the U.S. Geological Survey, visited Nevada counties to determine water-related needs. Colonel Bridges noted a number of reservoir sites on the Carson River, to include Hope Valley (West Fork), Long Valley, and the Horseshoe Bend site (East Fork).²⁵² Other potential sites included Wolf Creek and several sites along Silver Creek, both being tributaries to the East Fork. Finally, Colonel Bridges announced that with these projects, what existed "here in the Carson Valley [was] the foundation for an empire of 50,000 people."²⁵³

- 1889 (July) The Union Mill & Mining Company published a formal notice of its intent to strictly enforce its rights “to all of the waters of the Carson River or so much thereof as may be required for the purpose of using the same for motive power in running our mills and other machinery on said Carson River.”²⁵⁴ In this same issue of the *Genoa Courier*, its owner and editor, George M. Smith, said of the *Territorial Enterprise* (Virginia City) that “from its high perch on Mount Davidson, [they] should be able to see that there is no snow in the mountains and that the country to the southward is extremely dry...”
- 1889 (July–August) The first signs of an internal rift among Carson Valley farmers appeared. In these months, meetings were held in Gardnerville to discuss recent threats made by the Union Mill and Mining Company. Carson River West Fork farmers took exception to a meeting of East Fork farmers and noted that “...West Fork water ditches were constructed to take care of return flow of water, that the shortage of water in the Carson was caused by water being taken out through ditches of recent date and used at great distances with no attempt being made to return waste water to the river.” This was an obvious reference to recent new ditches along the East Fork [particularly the Allerman Canal] and the consequent expansion of adjoining newly irrigated lands there.²⁵⁵
- 1889 (August) The Carson River Basin experienced its worst drought until the basin’s record drought year of 1931.²⁵⁶ In a meeting of interested parties held in Virginia City, it was reported that there was only 5,000 miners inches of water in the East Fork (equivalent to a rate of flow about 125 cubic feet per second) and that most of this was being used in upstream ditches constructed long after the mills had begun operation. From this meeting a resolution was adopted alleging: (1) that the use of the Carson River’s water by the mills long antedated that by Carson Valley farmers (false as to 4,700 acres on the East Fork and 3,900 acres on the West Fork which were under irrigation before 1861); (2) that suits and court decisions had been in favor of the mills (partly true); (3) that the ranchers continued to increase the acreage under cultivation (true); (4) that the farmers were flooding sagebrush land and growing second crops of alfalfa (true); and (5) that 15,000 people were being adversely affected by these actions which benefitted a community of only 700 persons (true with respect to the relative populations of Virginia City and Carson Valley at that time). The group was resolved that if the farmers in Carson Valley persisted in these actions the community [Virginia City] would immediately institute legal proceedings.²⁵⁷
- 1889 (August 21) It was reported in the *Nevada State Journal* (Reno) that only six weeks after the U.S. Geological Survey team had begun its study of the Truckee and Carson River basins, a USGS spokesman informed the Reno press that “the Truckee River will be turned above Wadsworth to the plains and plateaus southeast of Wadsworth [i.e., Lahontan Valley].” It was astutely noted by the writer that six weeks did not appear to be sufficient time for USGS survey crews to map a connection between the Truckee and Carson rivers. It was therefore suggested that the USGS engineers were merely verifying a route that was already known locally,²⁵⁸ and very possibly the same route noted by the land surveyor H.H. Bence in 1887.
- 1889 The possibility of constructing an irrigation canal from the lower Truckee River to the Carson Sink (Lahontan Valley) was reported in the *U.S. Geological Survey Annual Report, 1889–90; Part II, Irrigation*. This report also sounded the first note of caution regarding

- any proposed such reclamation irrigation project by recognizing that while the water would be utilized primarily within Nevada, any comprehensive system of water use from these river sources was made more complex by differences in jurisdiction and water privileges between the states of California and Nevada²⁵⁹ [i.e., riparian water rights of the lakeshore property owners at Lake Tahoe versus the appropriative water rights of the federal government and project farmers in the Lahontan Valley.] This represented the first official warning that the water stored in Lake Tahoe, in particular, may not be readily available for a proposed irrigation project in the Nevada desert.
- 1889 (September 11)** Controversy over the allocation of the Carson River's waters came to a head. A Bill of Complaint (*Union Mill & Mining Company v. H.F. Dangberg, et al.*) was filed by the Union Mill & Mining Company in the Ninth Circuit Court of the United States. Some 120 defendants were named in the suit. Further adding to the discord among farmers and ranchers was that twelve Carson Valley ranchers had signed a stipulation with the mills in return for recognition of their claimed rights and for certain guarantees of water. Otherwise, a close association formed among the defendants, who were determined "...to fight for their rights..."²⁶⁰ According to the Union Mill's spokesman, Francis G. Newlands,²⁶¹ the mills were demanding a perpetual right to 6,000 [miner's] inches of water at Cradlebaugh's Bridge²⁶² (equivalent to a rate of flow of 150 cubic feet per second, or 108,600 acre-feet per year). The farmers, on the other hand, rightly claimed that that much water typically did not exist in the river during the summer season.²⁶³ Of particular interest is that by 1902, as a U.S. Representative to Congress (1892) and later as U.S. Senator (1903) from Nevada, Francis Newlands, once the champion the interests of the mines and mills, would make claim to having championed the Reclamation Act in support of this area's agricultural interests.
- 1889 (December 24)** In a highly revealing and confidential letter to a Mr. Robert L. Fulton, Francis G. Newlands expressed his intention to purchase land for three reservoir sites in the Carson River Basin ostensibly for use by the mills. Mr. Newlands, in conjunction with these proposed reservoirs, was also in the process of purchasing land for agricultural purposes. One parcel of land, which Mr. H.H. Bence (see 1887 H.H. Bence entry) was acquiring for Mr. Newlands, consisted of about 7,000 acres downstream from Dayton (probably around the present site of Lahontan Reservoir) that would use the Carson River's waters after they passed the mill sites. More interestingly, the second parcel of land Mr. Newlands was seeking included some seven or eight thousand acres further downstream in Churchill County,²⁶⁴ a location which would ultimately become the site of the Newlands Irrigation Project.
- 1890** H.H. Bence, a Nevada land surveyor (see entry under 1887 and 1889), was employed by Francis G. Newlands to survey a possible canal route and estimate the quantity of potentially irrigable land in the Lahontan Valley near Fallon, Nevada.²⁶⁵ His reports to Newlands recommended that the lower Carson area (Lahontan Valley) could support a reclamation project of 100,000 acres, a figure which ultimately proved far more realistic than the more grandiose plans supported by the U.S. Reclamation Service a decade later.²⁶⁶
- 1890 (January 15–February 1) and (March 1–June 15)** The effects of the great "White Winter" of 1889–90 caused extensive flooding in Carson Valley and the upper Carson River Basin. Unlike past floods which were typically a combination of a single severe event (i.e., wet-

mantle storm, rain-on-snow or rain on frozen ground), these floods were the result of the rapid break-up of a most severe winter. The Sierra Nevada Mountains had been subjected to severe, practically continuous snow storms from mid-November 1889 through the latter part of January 1890. A sudden chinook period set in on January 25, 1890, and in a few days had reduced the deep snows in Carson Valley and lower foothills to a roaring torrent of floodwaters. An ice jam on the East Fork sent a 50-foot wall of broken cakes of ice, boom timbers, logs, cordwood and other debris out into the Carson Valley. Near Gardnerville, blocks of ice one foot thick and the size of the side of a house were turned on edge, forming a dam 20 feet high and sending the river's waters spreading out over the valley floor. By January 28th, dynamite had to be used on the ice dam in an attempt to get the river back into its channel. Most bridges on both the East and West forks were washed away. After the January thaw, icy weather returned to the Sierra and new snow accumulations formed huge drifts. It was around this time that most of the town of Monitor (renamed Loope), located above Markleeville, California, was destroyed by an avalanche. The effects of the harsh winter weather on the local population were only exacerbated by the outbreak of an influenza epidemic (commonly known as "la grippe" in those days). By February 24th the last of the blizzards had blown itself out and the weather warmed rapidly, beginning a second thawing phase for the winter snowpack. By early March streams flowing into Carson Valley were flooding and the entire valley north and east of Genoa was a large lake. Through the southern portion of Carson Valley the East Fork was up to one mile wide in places. By late May, the East Fork levee ruptured, allowing its waters to spread over the southern portion of Carson Valley towards the West Fork. Ore processing mills on the lower Carson River through the Carson Canyon (Dayton Valley) were forced to suspend operations when their water wheels became submerged and diversion dams were swept away. The shutdown of the mills caused certain mines at Gold Hill and Virginia City supplying them with ore to shut down as well. This flood represented the first flood event of this area for which relatively detailed damage assessment information was compiled.²⁶⁷

- 1890** After touring western states as the Chairman of the Congressional Select Committee on Irrigation and Reclamation, U.S. Senator William M. Stewart (Nevada) made a strong attack on the Director of the U.S. Geological Survey, John Wesley Powell. Powell had been a strong advocate for a national approach to western irrigation projects, and in late 1889 his staff had identified and withdrawn 9 million acres from public entry of the most irrigable acreage, thereby preventing state development.²⁶⁸ Stewart's actions resulted in the repeal of that portion of the Irrigation Act of 1888 which authorized the reservation of land for reservoirs, ditches or canals, and the withdrawal from sale of all lands susceptible of irrigation below these sites. By 1894, Senator Stewart's continued attacks on Powell would force Powell to resign as USGS Director, a position he had held since 1881.²⁶⁹
- 1890 (August)** In a publication printed by the *Reno Gazette* and distributed by the Nevada State Board of Trade titled *An Address to the People of Nevada on Water Storage and Irrigation*, Francis G. Newlands singled out and named ranchers in Carson Valley who were also owners of unimproved land which he complained they had acquired at a down payment of only twenty-five cents per acre. According to Mr. Newlands: "Unfortunately for Nevada, under our too generous laws very many acres of our best irrigable lands are controlled by

- applicants who have paid twenty-five cents an acre and hold these lands to reap the benefit resulting from the public-spirited action of others, or from a liberal policy of public works on the part of the State."²⁷⁰ [Ironically, by the early 1900's, this very same Francis Newlands would become the self-proclaimed champion of public largesse for federal reclamation projects and irrigation of arid western lands.]
- 1890** Francis G. Newlands, who was quickly assuming a prominent role in western water matters, proposed a network of reservoirs in the Sierra Nevada Mountains to serve the future development of Nevada. According to Newlands, Lake Tahoe afforded the "cheapest reservoir space known in the West."²⁷¹
- 1890** (June) Nevada's 1889 Water Law (see March 9, 1889 entry) was declared unconstitutional by Judge Fitzgerald of the District Court in Humboldt County (Winnemucca). In a petition of constitutionality filed before the Nevada Supreme Court on behalf of water users on the Humboldt, Truckee, and Carson rivers, the law's validity was questioned on several grounds, the primary one being that it was a special law in a case where a general law can be made applicable.²⁷²
- 1891** (January 14) In a letter to John W. Mackay (after whom the University of Nevada, Reno, Mackay School of Mines building was named), Francis G. Newlands expressed his first realization of the futility of pursuing the Union Mill & Mining Company's suit (*Union Mill & Mining Company v. H.F. Dangberg, et al.*) against Carson Valley farmers stating that "I gave our attorneys instructions some time ago not to press the suit..." and for justification he added "...protecting the interests of the farmers, and promoting the cause of irrigation, upon which I am satisfied the future of Nevada depends; for the mining industry will gradually wane, as it has in California, and the agricultural, fruit and cattle interest will take its place."²⁷³
- 1891** Annual National Irrigation Congresses began to be held in major western cities as a recognition that irrigation projects represented the salvation for the settlement of arid lands in the West. These meetings typically ended with a petition to the federal government to provide assistance in this reclamation effort, in a manner similar to the various Homestead Acts. It was strongly suggested that it was the federal government's obligation to provide water to arid Western lands so that they could be settled and farmed on the same advantageous basis.²⁷⁴
- 1891** Pyramid Lake's maximum surface elevation in recent history was recorded at 3,877.9 feet above mean sea level (MSL).²⁷⁵ According the bathometric tables of the lake,²⁷⁶ this surface elevation corresponded to a lake volume of approximately 31,730,000 acre-feet, a surface area of 144,000 acres (225 square miles), and a maximum lake depth of 419 feet. By comparison, Pyramid Lakes lowest point (nadir) was reached on February 6, and March 6, 1967, when it attained a surface elevation of 3783.9 feet MSL, corresponding to a volume of approximately 19,980,000 acre-feet (down 11,750,000 acre-feet from 1891), a surface area of 106,800 acres (167 square miles, down 37,200 acres, or 58 square miles from 1891), and a maximum lake depth of 325 feet (down 94 feet from 1891).
- 1891** (August 14) The *Genoa Weekly Courier* reported that one Mr. Ab. Fray "came up from Reno a short time ago, bringing with him twelve dozen frogs, imported from Paris [France]. He turned them loose in the swamp and springs about the [Carson Valley] fields and expects to harvest a good crop next year..."²⁷⁷

- 1891 (August 29) As was reported in the *Lyon County Times* (Dayton): “Last spring and this summer, when the water in the [Carson] river was quite high, the sloughs along its banks were full of catfish. When the water began to lower many fish were caught in the sloughs, while the smaller ones got out into the river and into the ditches on the Italian ranches. Thousands of the small fish were drawn off onto the potato fields in irrigating and now there are rows of fish two to three inches deep on some of the lower ranches, and the stench is terrific. It is rough on the fish, but the finest thing in the world for enriching the land.”²⁷⁸
- 1892 Francis G. Newlands of Nevada was elected to the U.S. House of Representatives. There was some question surrounding the legality of the election, particularly in Storey County where it was said that Newlands’ supporters, both alive and otherwise, “...voted often, voted early...”²⁷⁹
- 1893 (May 15) Testimony began to be taken in the case of *Union Mill & Mining Company v. H.F. Dangberg, et al.* in U.S. Circuit Court before Judge Thomas P. Hawley. The defendants included some 120 Carson Valley farmers and ranchers. The Court’s final opinion would not be handed down until four years later on May 24, 1897.
- 1893 A severe national recession, lasting from 1893 through 1897, precluded serious efforts by the federal government to undertake new spending programs, particularly reclamation irrigation projects in the arid West.²⁸⁰
- 1893 (June 24) In a news article in the *Lyon County Times* (Dayton) it was noted that “Since the mills have shut down on the Carson River trout have come down as far as this place. Many have been caught at the Rock Point dam. When the mills were running the acids and slimes poured into the river [and] killed the fish that came down as far as this.”²⁸¹
- 1894 As a testament to the quality of dairy products being produced in Carson Valley, butter from the Douglas County Creamery, incorporated on May 24, 1893, was awarded the gold medal at the Mid-Winter Fair in San Francisco, California. Contracts were regularly secured with the Palace Hotel in San Francisco and other high-class establishments for the valley’s agricultural produce.²⁸²
- 1894 Another 146 land allotments of 160 acres each (23,360 acres total) were granted to the Fallon Paiute-Shoshone Indian Reservation near the present-day city of Fallon in Churchill County, Nevada. Reservation acreage now totaled 31,360 acres.²⁸³
- 1894 (August 18) Congress approved what was commonly called the “Carey Act,” which was expected to be a major milestone in the reclamation of desert lands in the western states. The act’s purpose was to aid the public-land states in the reclamation of desert lands, provide for the granting to each of the states containing desert lands an amount not to exceed one million acres, and direct that the states cause these lands to be reclaimed, occupied, and irrigated. It was further provided that 20 acres out of each 160 acres be cultivated by settlers within 10 years after passage of the act. With few exceptions, the Carey Act did not measure up to initial expectations.²⁸⁴
- 1894 Jim Richards moved his store from Stillwater, which had been established along the Stillwater Slough in 1862 and became the county seat for Churchill County in 1868, to a small crossroads on New River at Mike Fallon’s ranch. At first the site was called “Jimtown” by local Indians in his honor. Later, a townsite was laid out and in 1903, as work began on the Truckee-Carson (Newlands) Irrigation Project, Fallon became the

- official county seat.²⁸⁵
- 1895 (May 25)** As noted in the *Lyon County Times* (Dayton): "Fishing in the Carson River in this vicinity is now very fair. Catfish, chubs and succors [sic] are plentiful, and occasionally a fine trout, weighing from one to three pounds, is caught. While fishing in the Carson River, above the mills, has always been good, below the mills, when running, the fish could not live on account of the water being so strongly impregnated with the chemicals which came from the mills. Of late years the fish have had a chance because nearly all the mills have been shut down and the water in the river has become moderately clear. It would be the proper thing for the Fish Commissioner now to plant some trout in the river in this vicinity."²⁸⁶
- 1895 (August 17)** To note how quickly river conditions can change (see May 25, 1895 entry), it was reported in the *Lyon County Times* (Dayton) that "For the past two weeks the water in the Carson River...has been so low it has also been very filthy. It is thick with some sediment that makes it look almost white as milk...probably comes from the Eureka Mill...unfit for drinking or irrigating purposes."²⁸⁷
- 1896 (June 3)** The Alpine Land and Reservoir Company was incorporated. Two days after filing articles of incorporation, the new company purchased fifteen reservoir sites in Alpine County, California, from individual owners who were the incorporators of the new company. As described in its certificate of incorporation, the purpose of the corporations was "...to purchase, acquire, own, hold in its own right and name and to deal in lands of all description and character, reservoirs, reservoir sites, dams, water, water rights, water courses, water ways, ditches and flumes for string, gathering, accumulating, and holding water for domestic, mining, mechanical irrigation and other useful purposes in the States of California and Nevada, and particularly in Alpine County, California, and Douglas and Ormsby Counties, Nevada."²⁸⁸
- 1896 (June 13)** As reported in the *Lyon County Times* (Dayton): "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. Since the Eureka Mill shut down there is not so much slime in the water, and the fish can live this far down in the stream."²⁸⁹
- 1897** At a time when western interest in annual Irrigation Congresses had reached a nadir, Captain Hiram M. Chittenden of the U.S. Army Corps of Engineers released a lengthy report recommending that if the federal government wanted its homestead policy to be effective, it would need to build and operate a comprehensive series of reservoirs and irrigation districts in the West. The report called for a federal reclamation program.²⁹⁰
- 1897 (May 24)** Judge Thomas P. Hawley of the U.S. Circuit Court rendered his final decision in the case of *Union Mill & Mining Company v. H.F. Dangberg, et al.* According to one water rights expert,²⁹¹ the judgement led to the best judicial summary of the principles of prior appropriation that we have and became the very foundation of the livelihood of the ranchers in Carson Valley and, whether or not perfectly understood by all, have come to form the matrix of opinion that underlies all questions concerning the use of water. Judge Hawley's decision embodied the concepts of: (1) prior appropriation; (2) beneficial use; (3) economical use; and in particular regard to the Carson River, (4) the concept of a "broken stream" in years of low water.²⁹² Of particular importance to the operation of the Carson River, this lawsuit demonstrated the inestimable service performed by Union Mill

and Mining Company's water men in allocating the limited waters of the river to the advantage of all users. This practice came to be known as "rotation."²⁹³ While opinion varied as to precisely who "won" this lawsuit, it appeared that the farmers held the upper hand. While the resulting decree gave certain rights to the mills (i.e., 6,000 miner inches under a four-inch pressure), it excluded this right during the July 1 to October 1 time frame, exactly when the Carson River would typically be at its lowest rates of flow. Further, the farmers were allowed to take sufficient water at all times for household and domestic purposes and for watering their stock. Therefore, the victory seemed to be with the farmers as they may take waters before July 1 when the river generally has sufficient flow for both, and after July 1st when flows drop dramatically. Sometime later, Union Mill and Mining Company removed its mills from the river and apparently lost its rights under this decision by abandonment. In any case, available evidence indicates that the terms of the decree were never actually enforced to any great extent.²⁹⁴

- 1897** To reverse the tide of waning interest in western state reclamation projects, George H. Maxwell, a California attorney, gave up his law practice, opened an office in Washington, D.C., and became a highly enthusiastic and persuasive lobbyist for the reclamation effort. Much of his financial support came from the transcontinental railroads. With these funds, and releases written by members of the U.S. Geological Survey's staff of engineers and hydrologists, Maxwell was able to conduct a highly effective national publication campaign to make the nation "reclamation-conscious." Soon Wyoming's Senator Francis Warren and Nevada's U.S. Representative Francis G. Newlands were meeting frequently with Mr. Maxwell. Progress on appropriating funds for reclamation projects was stymied, however, due to an eastern agriculture power bloc in the House of Representatives which feared both the costs of such programs and the competition it would produce for their home states.²⁹⁵
- 1898** By this year it was reported that Spanish and French Basque shepherds were tending approximately 13,000 sheep in Carson Valley. This number increased to some 25,000 sheep by 1925, when the Basques began acquiring their own sheep and land. After 1918, several Basques in Gardnerville opened inns which flourished during the Prohibition years.²⁹⁶
- 1898** (**August 27**) The *Lyon County Times* (Dayton) began reporting the presence of cyanide in the Carson River. In one such article it was noted that "The cyanide which escapes into the Carson River from the plant at the Eureka Mill has been fatal to a number of animals about Dayton. Many chickens have died from drinking the water; several dogs and cats have keeled over after quenching their thirst with river water, and several horses have been made quite sick by drinking from the river. Again the *Tines* would caution the residents of this place to drink none but well water during the low stage of water in the river."²⁹⁷
- 1898** (**November 12**) Ranchers of Carson Valley met and organized the Carson Valley Water Storage, Irrigation and Canal Company. The purpose of this organization was essentially the same as that of the Alpine Land and Reservoir Company formed in 1896.²⁹⁸
- 1899** The John Wesley Powell U.S. Geological Survey irrigation investigation established stream-gaging stations on the Truckee River and its tributaries. This constituted one of the first steps towards a comprehensive, quantitative investigation of the overall water supply potential of this basin. These studies became crucial in the approval and subsequent development of the Truckee-Carson Irrigation Project in 1902 and located in Lahontan

- Valley in the lower Carson River Basin.
- 1899** The general belief that Carson Valley farmers had won the lawsuit filed against them by the Union Mill and Mining Company was reinforced in this year when Occidental Land and Improvement Company, a company which Francis G. Newlands had specifically formed to begin buying land in the upper and lower Carson River Basin, disposed of 5,076.22 acres of desert land. This land, along with a Long Valley reservoir site, had been purchased for Francis Newlands in 1889 and 1890 by H.H. Springmeyer, who was one of the defendants in the Union Mill and Mining Company lawsuit.²⁹⁹
- 1899** Based upon a complaint filed in the 1870's by the California Legislature as to the placement of the California–Nevada border (the “Von Schmidt Line”), which had been surveyed by A.W. Von Schmidt through Alpine County and the upper portions of the Carson River Basin in May 1873, a six-year U.S. Coast and Geodetic Survey was completed in this year and established the border at its present location, returning to the State of California approximately one million acres.³⁰⁰
- 1899 (July 18)** The rancher trustees of Carson Valley Water Storage, Irrigation and Canal Company entered into an agreement with the Alpine Land and Reservoir Company for the purchase of the issued and unissued stock of the Alpine Company and for nine of its original reservoir sites and for two others acquired following its incorporation in 1896. The Carson Valley Company subsequently took on the name of the Alpine Land and Reservoir Company.³⁰¹
- 1899** Colonel Emmet D. Boyle, who would later become Nevada's governor, asked the Nevada Legislature for a franchise to tap the waters of Lake Tahoe with a tunnel draining into Washoe Valley. The water would be used to drive generators and then released for irrigation.³⁰²
- 1899 (December)** After two seasons of drought, the users of water on the Carson River's West Fork in Douglas County (primarily Carson Valley farmers in Nevada) filed a suit (*Anderson v. Bassman*) against West Fork water users in Alpine County, California (primarily farmers in Diamond Valley and the upper watershed valleys). The suit was heard in the Ninth Circuit Court of the United States, Northern District of California, and a final judgement would not be rendered until 1905.³⁰³

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1. Houghton, Samuel G., *A Trace of Desert Waters: The Great Basin Story*, University of Nevada Press, Reno, Nevada, 1994, page 52.
2. Hyne, N.J., et al., *Quaternary History of Lake Tahoe, California–Nevada: Geological Society America Bulletin*, Volume 83, 1972, page 1435.
3. Benson, Larry V., "Preliminary Paleolimnologic Data for the Walker Lake Sub-Basin, California and Nevada," *Water Resources Investigations Report 87–4258*, U.S. Geological Survey, U.S. Department of the Interior, Denver, Colorado, 1988, page 1. Also see Houghton, *op. cit.*, page 63.
4. Houghton, *op. cit.*, page 73.
5. *Initial Bench & Bottom Land, Map and Criteria*, Newlands Project, Nevada, Division of Water and Power Resources Management, Water Operation and Maintenance Branch, Irrigation Section, Bureau of Reclamation, U.S. Department of the Interior, Sacramento, California, September 1990, Revised January 1992, page 11, and Strickland, Rose, "Stillwater: Its Friends and Neighbors," *Dividing Desert Waters*, Nevada Public Affairs Review, Number 1, 1992, Senator Alan Bible Center for Applied Research, University of Nevada, Reno, page 68.
6. Computed from information presented in Horne, Alex J., Ph.D., James C. Roth, Ph.D., and Nicola J. Barratt, M.S., *Walker Lake—Nevada, State of the Lake, 1992–94*, Report to the Nevada Division of Environmental Protection, Department of Civil and Environmental Engineering, University of California, Berkeley and the Environmental Engineering and Health Sciences Laboratory, Richmond, California, December, 1994, page 17.
7. Houghton, *op. cit.*, page 63.
8. *Ibid.*, pages 26-27 and 78-79.
9. *Reno Gazette–Journal*, April 25, 1996, pages 1A and 5A.
10. Nevada Historical Marker 27, "Grimes Point (Prehistoric Rock Art Site)."
11. Murphy, Shane, *The Lore and Legend of the East Fork—A Historical Guide for Floating the East Carson River*, The Carson River Conservation Fund, Zephyr Cove, Nevada, 1982, page 18.
12. *Ibid.*, pages 18–20.
13. Fowler, Catherine S., *In the Shadow of Fox Peak—An Ethnography of the Cattail-Eater Northern Paiute People of Stillwater Marsh*, Cultural Resource Series Number 5, U.S. Department of the Interior, Fish and Wildlife Service, Region 1, Stillwater National Wildlife Refuge, 1992, page 9.
14. Land, Barbara and Myrick, *A Short History of Reno*, University of Nevada Press, Reno, Nevada, 1995, page 8.
15. Murphy, *op. cit.*, page 21.
16. Houghton, *op. cit.*, page 104.
17. Hulse, James W., *The Nevada Adventure*, Sixth Edition, University of Nevada Press, Reno, Nevada, 1990, pages 34–36.
18. *Ibid.*, pages 34–35.
19. *Ibid.*, page 47.
20. Townley, John M., *Tough Little Town on the Truckee*, History of Reno Series, Volume One, Great Basin Studies Center, Reno, Nevada, 1983, page 24.
21. Hulse, *op. cit.*, pages 36–37.
22. *Ibid.*, page 37.
23. Murphy, *op. cit.*, page 22.
24. Houghton, *op. cit.*, page 29.
25. Hulse, *op. cit.*, pages 49–52.
26. Houghton, *op. cit.*, page 105.
27. Hulse, *op. cit.*, page 40.
28. When first viewed by Frémont, it was noted that Pyramid Lake was some 50 miles long and 12 miles wide (as compared to some 30 miles long and about 8 miles wide today), although this length seems to have been highly exaggerated. In his journal he reported that the lake "broke upon our eyes like the ocean" and was "set like a gem in the mountains."
29. Houghton, *op. cit.*, page 63.

30. *Ibid.*, page 81.
31. Frémont, John Charles, *Report of the Exploring Expedition to the Rocky Mountains, 1842, and to Oregon and North California, 1843–44*, Washington, D.C., Gales & Seaton, 1845.
32. Townley, John M., *The Truckee Basin Fishery, 1844–1944*, Water Resources Center Publication 43008, Desert Research Institute, University of Nevada System, November 1980, page 1.
33. *WALKER RIVER ATLAS*, Department of Water Resources, The Resource Agency, State of California, Sacramento, California, June 1992, page 8. In 1861 the “lost” cannon was eventually discovered and taken to Virginia City where it was put on display. Then sometime during World War I it disappeared, presumably sold for its scrap metal value. [See Houghton, *op. cit.*, page 105.]
34. Murphy, *op. cit.*, page 22.
35. John Augustus Sutter, a Swiss emigrant, first arrived in California on July 1, 1839, and became a naturalized citizen of Mexico on August 29, 1840. In September of 1840, he was appointed Justice of the Peace and official representative of the Mexican government. The New Helvetia (New Switzerland) land grant, consisting of some 47,827 acres around the fort he had constructed near the confluence of the Sacramento and American rivers, was given to Sutter by Governor Alvarado in 1841. Another land grant of an additional 96,800 acres was made in 1844. While Sutter and his fort became well known for their hospitality to weary travelers during the early 1840’s, his dream of establishing a new empire in California began to unravel with the discovery of gold in 1848 at his own sawmill on the American River at Coloma, California. After a number of business set-backs, Sutter left California in 1865, never to return. He journeyed to Washington, D.C., to pursue his rights to the land grants made to him by the Mexican government. After fourteen years of frustration and disappointment, Sutter died in a hotel in the nation’s capitol on June 18, 1880. [See “Sutter’s Fort State Historic Park” (Pamphlet), State of California, The Resources Agency, Department of Parks and Recreation, April 1989, pages 3–7.]
36. Horton, Gary A., *Nevada: A Historical Perspective of the State’s Socioeconomic, Resource, Environmental, and Casino Gaming Development*, Business & Economic Research Associates, Reno, Nevada, July 1995, page 5.
37. Houghton, *op. cit.*, page 23.
38. While Frémont has certainly lacked visible notoriety in Nevada except as noted, he has been remembered through a number of plant species patronyms in California and the Great Basin. Some of these include the flannelbush (*Fremontodendron*), freckled milkvetch (*Astragalus lentiginosus fremontii*), pigweed or goosefoot (*Chenopodium fremontii*), silk tassel bush (*Garrya fremontii*), peppergrass (*Lepidium fremontii*), box thorn (*Lycium fremontii*), bush mallow (*Malacothamnus fremontii*), phacelia (*Phacelia fremontii*), polycytenium (*Polycytenium fremontii*), and psorothamnus (*Psorothamnus fremontii*), to name the most commonly recorded. [Information provided courtesy of Glenn Clemmer, Administrator, Nevada Natural Heritage Program, Department of Conservation and Natural Resources, Carson City, Nevada.]
39. Frémont’s first expedition west was conducted in 1842 and left from St. Louis, Missouri, but only got just beyond South Pass in the northern Rocky Mountains of Wyoming. [See Donald K. Grayson, *The Desert’s Past: A Natural Prehistory of The Great Basin*, Smithsonian Institution Press, Washington, D.C., 1993, pages 3–4.]
40. Houghton, *op. cit.*, page 105.
41. Simpson, Captain James H., *Report of Explorations Across the Great Basin in 1859*, U.S. Army Engineering Department, Washington, D.C., page 479.
42. *Ibid.*
43. Hulse, *op. cit.*, page 59.
44. Dangberg, Grace, *Carson Valley—Historical Sketches of Nevada’s First Settlement*, Carson Valley Historical Society, Minden, Nevada, November 1972, page 1.
45. *Ibid.*
46. *Multimedia Encyclopedia*, (Electronic Encyclopedia), The Software Toolworks.
47. The site of Ragtown, located at the upper end of the Lahontan Valley where the Carson River enters, became a welcome rest stop for early emigrants using the Humboldt Trail after the arduous trek across the Carson Sink and Desert (Forty-Mile Desert). It was here that these early travelers first encountered the Carson River and took advantage of the water and available forage and rested and washed their alkali-covered clothing. With newly washed clothing hanging on virtually every available bush, tree, and shrub, the naming of the site became obvious. Up until the spring flood of 1862, the Carson River’s course turned south at Ragtown and flowed into Carson Lake, a substantial body of water located at the southern end of Lahontan Valley. The floods of 1862, however, turned the river into an old stream channel leading directly to the east and the Carson Sink, thereby by-passing Carson Lake, which subsequently began to diminish in size.

48. Nevada Historical Marker 26, "Forty-Mile Desert."
49. Nevada Historical Marker 207, "Carson Valley."
50. *Mines and Mineral Resources of Alpine County, California*, County Report 8, Division of Mines and Geology, Department of Conservation, The Resources Agency, State of California, Sacramento, California, 1977, page 4.
51. Hulse, *op. cit.*, page 68.
52. Land, *op. cit.*, page 21.
53. The doctrine of riparian rights to the use of water has been completely abrogated in the states of Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming. The Pacific Coast states of Washington, Oregon, and California and the tier of six states, starting with North Dakota on the north and extending southward to Texas, recognize to varying degrees both the appropriation and the riparian doctrines. The effect of court decisions and statutes has made the existence of the riparian doctrine of minor significance in Washington, Oregon, and Kansas. [See Hugh A. Shamberger, *Evolution of Nevada's Water Laws, as Related to the Development and Evolution of the State's Water Resources, From 1866 to About 1960*, Water Resources Bulletin 46, Prepared by the U.S. Department of the Interior, Geological Survey in cooperation with the Nevada Division of Water Resources, Department of Conservation and Natural Resources, State of Nevada, Carson City, Nevada, 1991, page 4.]
54. Dangberg, *Carson Valley—Historical Sketches of Nevada's First Settlement*, *op. cit.*, page 8.
55. Fowler, *op. cit.*, page 16.
56. Dangberg, *Carson Valley—Historical Sketches of Nevada's First Settlement*, *op. cit.*, page 8.
57. *History of Flooding—Carson Valley and Carson City Watershed*, USDA Special Report on Water and Related Land Resources, Central Lahontan Basin, Carson River Sub-Basin, Soil Conservation Service, U.S. Department of Agriculture, Carson City, Nevada, November 1973, page 4.
58. *Soil Survey of Douglas County Area, Nevada*, Soil Conservation Service, U.S. Department of Agriculture, page 1.
59. Land, *op. cit.*, page 21.
60. Dangberg, *Carson Valley—Historical Sketches of Nevada's First Settlement*, *op. cit.*, page 8.
61. Nevada Historical Marker 121, "Mottsville."
62. Nevada Historical Marker 44, "Carson City."
63. Dangberg, Grace, *Conflict on the Carson*, Carson Valley Historical Society, Minden, Nevada, November 1975, page 2.
64. Dangberg, *Carson Valley—Historical Sketches of Nevada's First Settlement*, *op. cit.*, page 40.
65. *History of Flooding—Carson Valley and Carson City Watershed*, *op. cit.*, page 4.
66. Dangberg, *Carson Valley—Historical Sketches of Nevada's First Settlement*, *op. cit.*, page 51.
67. Land, *op. cit.*, pages 21–22.
68. In response to "scurrilous attacks" on sheep by the (Virginia City) *Territorial Enterprise*, Mr. Fulton pointed out that eight or ten sheep will thrive where one cow will live, that a sheep will produce two crops a year—wool and meat—that, in contrast to cattle, a sheep will provide these two crops in one third of the time that it takes to put meat on a beef animal that can go to market, and, finally, that the time taken to replace lost, dead, or sold sheep is one third of that required for cattle. Mr. Fulton also sagely observed that to operate an outfit owning 5,000 sheep required the boss, two herders and a packer, all four of whom, in contrast to the one man required to utilize the same area with 500 cattle, were free spenders in the community. [See Dangberg, *Carson Valley—Historical Sketches of Nevada's First Settlement*, *op. cit.*, page 127.]
69. Murphy, *op. cit.*, page 22.
70. Nevada Historical Marker 200, "Hall's Station."
71. Nevada Historical Marker 117, "Kingsbury Grade."
72. Nevada Historical Marker 19, "Ragtown."
73. Fowler, *op. cit.*, page 18.
74. *Ibid.*, page 41.
75. McQuivey, Robert, "Nevada Habitat and Fisheries Historical Media File," Habitat Bureau, Nevada Division of Wildlife, Department of Conservation and Natural Resources, State of Nevada, Reno, Nevada, 1996.
76. Dangberg, *Carson Valley—Historical Sketches of Nevada's First Settlement*, *op. cit.*, page 48.

77. *Ibid.*, page 3.
78. Nevada Historical Marker 199, "Camels in Dayton."
79. John "Snowshoe" Thompson was born in Prestijeld, Norway, in 1827 and emigrated to America with his family when he was ten years old. By 1850, his family was working a farm in the Sacramento Valley. Upon hearing of the periodic closure of the "Hangtown Road" over the Sierra Nevada Mountains, he began to carry the mails on skis fashioned by himself. In the 1860's, he retired to a small farm in Diamond Valley, southeast of Woodfords, California, just off the Carson River West Fork. He died in 1876 from a common cold, reportedly the first of his life. Although Thompson was never paid for his services, after his death Congress fulfilled a long-standing request from the U.S. Postal Service and paid \$6,000 to Thompson's widow, Agness Scossa, the daughter of John Scossa, one of Carson Valley's earliest settlers, who homesteaded a ranch in Diamond Valley. [See Murphy, *op. cit.*, page 45.]
80. Dangberg, *Carson Valley—Historical Sketches of Nevada's First Settlement*, *op. cit.*, page 8.
81. McQuivey, *op. cit.*
82. Nevada Historical Marker 163, "Chinatown (Early Name of Dayton)."
83. Land, *op. cit.*, pages 22–23.
84. Dangberg, *Conflict on the Carson*, *op. cit.*, page 2.
85. Murphy, *op. cit.*, page 27. Another source (*Mines and Mineral Resources of Alpine County, California*, *op. cit.*, page 4) reported that this town was not established until 1862.
86. Nevada Historical Marker 118, "Luther Canyon (Fay Canyon)."
87. Nevada Historic Marker 44, "Carson City."
88. Fowler, *op. cit.*, pages 18–19.
89. Townley, John M., *Turn this Water into Gold: The Story of the Newlands Project*, Nevada Historical Society, Reno, Nevada, 1977, pages 3–4.
90. Fowler, *op. cit.*, page 18.
91. *Ibid.*, page 25.
92. Land, *op. cit.*, page 25.
93. Murphy, *op. cit.*, pages 22–24.
94. Horton, *Nevada: A Historical Perspective of the State's Socioeconomic, Resource, Environmental, and Casino Gaming Development*, *op. cit.*, pages 9–10.
95. McQuivey, *op. cit.*
96. Nevada Historic Marker 76, "Eagle Valley."
97. *A Study of Water Rights and Their Enforcement [in the] Lake Tahoe, Truckee and Carson River Basins*, Prepared by Water Rights Study Group, Pyramid Lake Task Force, [for the] U.S. Department of the Interior, Office of the Solicitor, Sacramento Region, Sacramento, California, August 1971, pages 116–117.
98. Murphy, *op. cit.*, pages 41–43.
99. Fowler, *op. cit.*, page 19.
100. Hulse, *op. cit.*, pages 89–91.
101. Townley, *Tough Little Town on the Truckee*, *op. cit.*, page 54.
102. Houghton, *op. cit.*, page 80.
103. State Historic Marker 1, "Empire and the Carson River Mills."
104. Horton, *Nevada: A Historical Perspective of the State's Socioeconomic, Resource, Environmental, and Casino Gaming Development*, *op. cit.*, pages 8–9.
105. Fowler, *op. cit.*, page 19.
106. From the original nine counties, reduced to eight with the incorporation of Lake County (renamed Roop County in 1863) into Washoe County in 1883, there followed the creation of Lander County in 1862 (out of Esmeralda County), Nye County in 1864 (out of Esmeralda County), Lincoln County in 1866 (out of Nye County), Elko and White Pine counties in 1869 (both out of Lander County), Eureka County in 1873 (out of Lander County), Clark County in 1909 (out of Lincoln County), Mineral County in 1911 (out of Esmeralda County), and Pershing County in 1919 (out of Humboldt County). Carson City and Ormsby County incorporated in 1969 and Bullfrog County was created out of Nye County in 1987, and then returned to that county in 1989. County creations were also accompanied

by additions to Nevada's Territorial and State boundaries: 1862 (from 116° west longitude eastward to 115° west longitude); 1866 (from 115° west longitude eastward to 114° west longitude); and 1867 (from 37° north latitude southward to 35° north latitude). These expansions came at the expense of Utah and Arizona. [See *Political History of Nevada*, 9th Edition, Secretary of State, State of Nevada, Carson City, Nevada, 1990.]

107. *Mines and Mineral Resources of Alpine County, California, op. cit.*, page 6.
108. Dangberg, *Conflict on the Carson, op. cit.*, page 28.
109. Nevada Historical Marker 123, "Cradlebaugh Bridge."
110. Dangberg, *Carson Valley—Historical Sketches of Nevada's First Settlement, op. cit.*, pages 105–106.
111. *Mines and Mineral Resources of Alpine County, California, op. cit.*, pages 4–5.
112. Dangberg, *Conflict on the Carson, op. cit.*, pages 4–5.
113. Nevada Historical Marker 7, "Dayton."
114. Nevada Historical Marker 122, "Sheridan."
115. Dangberg, *Carson Valley—Historical Sketches of Nevada's First Settlement, op. cit.*, page 78.
116. McQuivey, *op. cit.*
117. *History of Flooding—Carson Valley and Carson City Watershed, op. cit.*, pages 4–5.
118. It was also reported that local area farmers re-routed the river's main course back towards the Carson Lake. [Personal communication, Norm Saake, Statewide Waterfowl Specialist, Game Bureau, Nevada Division of Wildlife (NDOW), Department of Conservation and Natural Resources, Fallon, Nevada, May 1996.]
119. Townley, *Turn this Water into Gold: The Story of the Newlands Project, op. cit.*, page 9.
120. Edward M. Kern, who led a detachment of John C. Frémont's 1845 expedition past Carson Lake, described it as a "very pretty sheet of water, about 11 miles long..." Also, *Thompson & West's History of Nevada, 1881*, had a description of the lake which stated "...is about 12 miles in diameter, and is about 50 feet deep at the utmost." [See Robert Stewart, "Carson Lake Navigability," unpublished technical paper, Nevada Division of State Lands, Department of Conservation and Natural Resources, Carson City, Nevada, 1995.] These descriptions would indicate a lake of approximately 90 square miles (it was neither round nor square), or 58,000 acres, considerably larger than the 1,400 acres reported by the U.S. Fish and Wildlife Service in 1994.
121. Dangberg, *Carson Valley—Historical Sketches of Nevada's First Settlement, op. cit.*, page 78.
122. Nevada Historical Marker 196, "The United States Mint at Carson City, Nevada."
123. Nevada Historical Marker 120, "Walley's Hot Springs."
124. *Reno-Gazette Journal*, February 16, 1996, pages 1E and 3E.
125. The public domain, or federally owned land, presently includes land in all states except the original 13 and Maine, Vermont, West Virginia, Kentucky, Tennessee, and Texas. [The Funk & Wagnalls New Encyclopedia.]
126. Shamberger, Hugh A., *Evolution of Nevada's Water Laws, as Related to the Development and Evolution of the State's Water Resources, From 1866 to About 1960*, Water Resources Bulletin 46, Prepared by the U.S. Department of the Interior, Geological Survey in cooperation with the Nevada Division of Water Resources, Department of Conservation and Natural Resources, Carson City, Nevada, 1991. page 90.
127. *WALKER RIVER ATLAS, op. cit.*, pages 52–54.
128. Dangberg, *Conflict on the Carson, op. cit.*, page 7.
129. Nevada Historical Marker 216, "Stillwater."
130. *Reno Gazette-Journal*, February 23, 1996, page 3B.
131. Murphy, *op. cit.*, pages 41–43.
132. McQuivey, *op. cit.*
133. Born Adolph Heinrich Joseph Sutro on April 29, 1830, in Aachen, Prussia, Sutro emigrated to the United States at the age of 20 along with his family. After several months in New York City, Sutro left his family and sailed for San Francisco, California, arriving there on November 21, 1850. Within several years he owned several stores, mostly dealing in imported tobaccos. In 1859, Sutro made his first trip to the "Washoe country" and was greatly impressed by the happenings at the Comstock, then in its infancy. Sutro soon demonstrated attributes highly useful in this new and evolving land: limitless energy, a great promoter, a proficient speaker, and a tenacious fighter. [See Shamberger, Hugh A., *Water Supply for the Comstock*, Prepared in Cooperation with Nevada Department of Conservation and Natural Resources and U.S. Geological Survey, Carson City Nevada, 1969, page 32.]

134. Shamberger, Hugh A., *Water Supply for the Comstock*, Prepared in Cooperation with Nevada Department of Conservation and Natural Resources and U.S. Geological Survey, Carson City Nevada, 1969, page 32.
135. Murphy, *op. cit.*, pages 28–29.
136. *Leviathan Mine 5-Year Workplan*, California Regional Water Quality Control Board, Lahontan Region, California Environmental Protection Agency, State of California, Sacramento, California, July 1995, page 5.
137. Dangberg, *Carson Valley—Historical Sketches of Nevada’s First Settlement*, *op. cit.*, page 11.
138. Dangberg, *Conflict on the Carson*, *op. cit.*, page 28.
139. McQuivey, *op. cit.*
140. *Ibid.*
141. Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, page 95.
142. Townley, *Tough Little Town on the Truckee*, *op. cit.*, pages 116–120.
143. *Mines and Mineral Resources of Alpine County, California*, *op. cit.*, page 4.
144. Dangberg, *Conflict on the Carson*, *op. cit.*, page 7.
145. Horton, *Nevada: A Historical Perspective of the State’s Socioeconomic, Resource, Environmental, and Casino Gaming Development*, *op. cit.*, page 11.
146. Dangberg, *Conflict on the Carson*, *op. cit.*, page 10.
147. The prior appropriation principle, or doctrine, in the form in which it is recognized throughout the west, originated from the requirements of a mining region for protection in the use of water supplies needed to work mining claims on lands not contiguous to streams or other sources of water. The appropriation doctrine is recognized on surface waters in all states west of the 100th Meridian (100 degrees west longitude); however, only eight of the western states—Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming—are exclusively (prior) appropriation states. [See Shamberger, *Evolution of Nevada’s Water Laws*, *op. cit.*, pages 4–5.]
148. Shamberger, *Water Supply for the Comstock*, *op. cit.*, page 33.
149. McQuivey, *op. cit.*
150. Murphy, *op. cit.*, page 29.
151. Shamberger, *Evolution of Nevada’s Water Laws*, *op. cit.*, page 5.
152. Dangberg, *Carson Valley—Historical Sketches of Nevada’s First Settlement*, *op. cit.*, page 104.
153. Dangberg, *Conflict on the Carson*, *op. cit.*, page 7.
154. Horton, *Nevada: A Historical Perspective of the State’s Socioeconomic, Resource, Environmental, and Casino Gaming Development*, *op. cit.*, page 11.
155. McQuivey, *op. cit.*
156. Fowler, *op. cit.*, page 21.
157. Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, page 47.
158. *Ibid.*, pages 7–10.
159. McQuivey, *op. cit.*
160. *Carson Daily Appeal*, December 28, 1867.
161. *History of Flooding—Carson Valley and Carson City Watershed*, *op. cit.*, pages 5–6.
162. McQuivey, *op. cit.*
163. Fowler, *op. cit.*, page 11.
164. McQuivey, *op. cit.*
165. Murphy, *op. cit.*, page 28.
166. *Leviathan Mine 5-Year Workplan*, *op. cit.*, page 5.
167. Hulse, *op. cit.*, page 125, and Houghton, *op. cit.*, page 233. According to Houghton, the Promontory Summit site where the Golden Spike ceremony actually took place is located about 28 miles from Promontory Point, where many historians have erroneously placed it. He goes on to add that there were actually four spikes used in the brief ceremony, not two as noted by many writers. There were two gold spikes from California, a silver spike from Nevada, and another spike from Arizona made of gold, silver, and iron. The silver spike and one of the gold spikes from California are in the Stanford University Museum, but the other two spikes have disappeared..

168. "Lyon County Reflections," The Mason Valley News, Inc., and the *Fernley Leader-Dayton Courier*, 1966, pages 21–23.
169. Shamberger, *Water Supply for the Comstock*, *op. cit.*, page 33.
170. Nevada Historical Marker 193, "Historic Flume and Lumberyard."
171. Dangberg, *Conflict on the Carson*, *op. cit.*, pages 13–14.
172. McQuivey, *op. cit.*
173. Fowler, *op. cit.*, page 21.
174. McQuivey, *op. cit.*
175. Nevada Historical Marker 61, "Mound House."
176. Nevada Historical Marker 25, "Nevada's Capitol."
177. Dangberg, *Conflict on the Carson*, *op. cit.*, page 14.
178. *Reno Crescent*, December 9, 1871.
179. Dangberg, *Conflict on the Carson*, *op. cit.*, pages 16–17.
180. *Mines and Mineral Resources of Alpine County, California*, *op. cit.*, page 6.
181. Murphy, *op. cit.*, pages 48–49.
182. *The Marlette Lake Water System*, A Report on the Feasibility and Desirability of Its Retention, Bulletin No. 79, Legislative Commission of the Legislative Counsel Bureau, State of Nevada, Carson City, Nevada, February 1969, page 15.
183. Several names have been attached to this stream. It was first known as Dall Creek after a Mr. Dall who had a lumber mill in Long [Little] Valley. Later it was known as Hobart Creek and when the diversion points for the Virginia City water system were established below Hobart Creek Reservoir at Red House, the reach below Red House was known as Franktown Creek and the reach above Red House was known as Hobart Creek. [See Shamberger, *Water Supply for the Comstock*, *op. cit.*, page 8.]
184. *History of Flooding—Carson Valley and Carson City Watershed*, *op. cit.*, page 7.
185. *Ibid.*, page 7–8.
186. *Mines and Mineral Resources of Alpine County, California*, *op. cit.*, page 6.
187. Shamberger, *Evolution of Nevada's Water Laws*, *op. cit.*, page 5.
188. Janik, C. Anne, and Ronald M. Anglin, "Nevada's Unique Wildlife Oasis," *Dividing Desert Waters*, Nevada Public Affairs Review, Number 1, 1992, Senator Alan Bible Center for Applied Research, University of Nevada, Reno, page 55.
189. Briefing Document, Public Law 101–618, Bureau of Indian Affairs, U.S. Department of the Interior, Carson City Office, Carson City, Nevada, February 1994.
190. Extrapolated from tables contained in Harris, E.E., "Reconnaissance Bathymetry of Pyramid Lake, Washoe County, Nevada," Water Resources–Information Series, Report 20, Prepared Cooperatively by the Geological Survey, U.S. Department of the Interior, and the Division of Water Resources, Department of Conservation and Natural Resources, State of Nevada, Carson City, Nevada, 1974.
191. From Pyramid Lake gaging station records obtained from the U.S. Geological Survey, Water Resources Division, Carson City, Nevada.
192. Dangberg, *Conflict on the Carson*, *op. cit.*, page 28.
193. *The Marlette Lake Water System*, *op. cit.*, page 16.
194. *The Carson Valley News*, July 31, 1875.
195. *Territorial Enterprise*, August 28, 1875.
196. Dangberg, *Conflict on the Carson*, *op. cit.*, page 22.
197. *Reno Gazette–Journal*, October 26, 1995, page 2B.
198. Dangberg, *Conflict on the Carson*, *op. cit.*, page 25.
199. *Ibid.*
200. *Ibid.*, pages 28–29.
201. McQuivey, *op. cit.*
202. *Ibid.*

203. Shamberger, *Evolution of Nevada's Water Laws*, *op. cit.*, page 90.
204. Dangberg, *Conflict on the Carson*, *op. cit.*, pages 21–22.
205. McQuivey, *op. cit.*
206. *Ibid.*
207. *Ibid.*, page 29.
208. *History of Flooding—Carson Valley and Carson City Watershed*, *op. cit.*, pages 7–8.
209. Shamberger, *Water Supply for the Comstock*, *op. cit.*, pages 33–34.
210. Thompson and West, *History of Nevada*, Howell–North Press, pages 504–505.
211. Lord, Eliot, *Comstock Mining and Miners*, 1883, page 259.
212. In addition to the Sutro Tunnel, Sutro also built a stamping and processing mill to process his own ore, laid out a complete town site (Town of Sutro), and built himself a mansion (at company expense) at the mouth of the tunnel. Shortly after the completion of the project, however, a dispute arose with the mine owners and the royalty fee was reduced from \$2 per ton to \$1 per ton. In 1879 Adolph Sutro resigned his position as Superintendent of the Sutro Tunnel Company, sold his stock for \$709,012 (reportedly the only person to make much money on the project), moved to San Francisco and invested in real estate. In 1894, Sutro was elected the mayor of that city. Adolph Sutro died in San Francisco in 1898. Sutro's mansion at his town site along the Carson River burned in the 1940's, and the processing mill was destroyed by fire in 1967. [See Shamberger, *Water Supply for the Comstock*, *op. cit.*, pages 34–36.]
213. McQuivey, *op. cit.*
214. *Ibid.*
215. Dangberg, *Conflict on the Carson*, *op. cit.*, page 29.
216. Dangberg, *Carson Valley—Historical Sketches of Nevada's First Settlement*, *op. cit.*, page 110.
217. Houghton, *op. cit.*, page 119.
218. McQuivey, *op. cit.*
219. *Ibid.*
220. *Ibid.*
221. Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, page 19.
222. Hulse, *op. cit.*, page 153.
223. *Population of Nevada Counties and Communities, 1860–1980*, compiled by Waller H. Reed, RSVP Volunteer, Nevada Historical Society, Reno, Nevada, Winter 1983–1984.
224. Harris, *op. cit.* The last recorded Pyramid Lake surface elevation taken before diversion began at Derby Dam was 3,861.80, recorded on September 1, 1904. After diversions began at Derby Dam in 1905, Pyramid Lake would reach its recorded low point (nadir) in 1967 at a surface elevation of 3,783.9 feet MSL, corresponding to a surface area of 106,800 acres (170 square miles) and a volume of 19,980,000 acre-feet, a volume loss of 9,620,000 acre-feet, or 32.5 percent.
225. By the mid-1990's, Pyramid Lake TDS concentrations had risen to approximately 5,000 mg/l, indicative of the combination of effects from high levels of evaporation from the lake's and reduced Truckee River inflows. [TRUCKEE RIVER ATLAS, Department of Water Resources, The Resources Agency, State of California, Sacramento, California, June 1991, page 27.]
226. McQuivey, *op. cit.*
227. *Territorial Enterprise*, July 22, 1883, and Dangberg, *Conflict on the Carson*, *op. cit.*, page 25.
228. This concern was not without justification. The 1860's and 1870's represented a period of considerable expansion of irrigation ditches in Carson Valley and new lands being brought under cultivation. Most of these additions came about after the first milling operations began in 1860–1861 and included the Allerman Ditch (1861), the (Old) Virginia Ditch (1863), the Pinenut Creek Ditch (1875), the Allerman Ditch (Canal) extension (1876), the New Virginia Ditch (1876), the Ezell Ditch (1876), and the Buckeye Creek Ditch (1878). With each ditch came new irrigated lands and appropriations of water after that of the mills.
229. Dangberg, *Conflict on the Carson*, *op. cit.*, pages 25–26.
230. *Ibid.*, pages 29–39.
231. McQuivey, *op. cit.*

232. *Ibid.*
233. Shamberger, *Evolution of Nevada's Water Laws*, *op. cit.*, page 5.
234. *History of Flooding—Carson Valley and Carson City Watershed*, *op. cit.*, pages 8–10.
235. *Mines and Mineral Resources of Alpine County, California*, *op. cit.*, page 6.
236. Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, page 19.
237. Briefing Document, Public Law 101-618, *op. cit.*
238. In order to transport the waters of Marlette Lake, located at an elevation of 7,823 feet MSL on the west side of the Carson Range within the Lake Tahoe Basin, to the eastern slope of the Carson Range for transport across Washoe Valley, a flume was constructed from Marlette Lake due north along the ridge line for nearly 4.5 miles to Tunnel Creek Station where it entered a tunnel running for about 0.7 mile through the crest of the Carson Range to another flume on the eastern slope which ran for almost 2.5 miles to Franktown Creek at the location of existing two diversions (located 0.8 and 1.0 mile downstream from Hobart Creek Reservoir, located at an elevation of 7,440 feet MSL).
239. *The Marlette Lake Water System*, *op. cit.*, page 19.
240. In 1963 the State of Nevada purchased this water system from the Marlette Lake Company for \$1,650,000, to include some 5,378 acres of land, easements, pipelines, flumes and other fixtures and appurtenances used for their water operations in Washoe, Ormsby (Carson City), and Storey Counties. [See *The Marlette Lake Water System*, *op. cit.*, page 21.]
241. McQuivey, *op. cit.*
242. Townley, John M., *The Orr Ditch Case, 1913–1944*, Water Resources Center Publication 43007, Desert Research Institute, University of Nevada System, October 1980, page 16.
243. Strong, Douglas H., *Tahoe: An Environmental History*, University of Nebraska Press, Lincoln, Nebraska, 1984, page 97.
244. Dangberg, *Conflict on the Carson*, *op. cit.*, pages 111–112.
245. McQuivey, *op. cit.*
246. Dangberg, *Conflict on the Carson*, *op. cit.*, page 134.
247. Actually, the year 1889 saw the Nevada Legislature take action on six water-related bills, none of which had significant impact on the control or use of water in Nevada. Chapter 15 prohibited the throwing and deposit of sawdust in or on the water of any lake, river, or running stream in Nevada. Chapter 48 was aimed at preventing the unlawful diversion or waste of water during the irrigation season. Chapter 78 established fines for any owner or superintendent of any water ditch or artificial water course who allowed the water from such ditch or water course to run uncontrolled upon any public road. Chapter 104 amended Section 3 of the 1866 Act providing that any person maintaining a ditch would have the undisputed right of flowing water through it to the full extent of its capacity for mining, milling, manufacturing, agriculture, and other domestic purposes, but not to the extent of interfering with existing water rights. Chapter 112 provided for the storage of water, to reclaim the arable lands of the state, to develop the state's agricultural resources, and to provide the necessary funds. Chapter 113 was intended to regulate the use of water for irrigation and other purposes. Both Chapters 112 and 113 were repealed shortly thereafter. [See Shamberger, *Evolution of Nevada's Water Laws*, *op. cit.*, pages 11–13.]
248. Shamberger, *Evolution of Nevada's Water Laws*, *op. cit.*, page 13.
249. *Ibid.*, page 7.
250. Dangberg, *Conflict on the Carson*, *op. cit.*, pages 17–18.
251. Townley, *The Orr Ditch Case*, *op. cit.*, page 16.
252. This would become the future site of the Watasheamu Dam and Reservoir, which became part of the U.S. Bureau of Reclamation's "Washoe Project" proposed in the 1950's.
253. Dangberg, *Conflict on the Carson*, *op. cit.*, pages 69–70.
254. *Genoa Weekly Courier*, July 19, 1889.
255. Dangberg, *Conflict on the Carson*, *op. cit.*, pages 72–73.
256. *Ibid.*, page 70.
257. *Territorial Enterprise*, August 17, 1889, and Dangberg, *Conflict on the Carson*, *op. cit.*, pages 70–71.
258. Dangberg, *Conflict on the Carson*, *op. cit.*, pages 70–71.
259. Townley, *The Orr Ditch Case*, *op. cit.*, page 17.

260. Dangberg, *Conflict on the Carson*, *op. cit.*, page 73.
261. Francis Newlands became involved with the action of the Union Mill and Mining Company through his relationship with William Sharon, who served as U.S. Senator from Nevada from 1875–1881. Mr. Sharon was sent to the Comstock in 1864 by W.C. Ralston of the Bank of California, and began the acquisition and the consolidation of the mines and mills and, upon Mr. Sharon's advice, initiated the formation of the Union Mill and Mining Company. Francis Newlands married William Sharon's daughter, Ada, and upon Mr. Sharon's death in 1886, Mr. Newlands became the trustee of Sharon's estate. [See Dangberg, *Conflict on the Carson*, *op. cit.*, pages 7–10 and pages 74–75.]
262. The Cradlebaugh Bridge site was located near where the present U.S. Highway 395 crosses the Carson River in the northern portion of the Carson Valley.
263. *Genoa Weekly Courier*, October 18, 1889.
264. This letter is particularly revealing as it clearly described Newlands' goal to use the Union Mill and Mining Company's lawsuit to isolate the Carson Valley's principal farmers and ranchers and obtain virtual control of the Carson River "to the advantage of both the agricultural and the milling interests." Newlands also discussed his relationships with H.H. Springmeyer, one of the defendants in this lawsuit, who was, at the same time, acquiring land in the upper basin for Newlands, and with H.H. Bence, who was acquiring land downstream for Newlands for future agricultural development. One can only wonder, therefore, whose "agricultural interests" Newlands had in mind when he proposed to gain control for both the advantage of the ranchers and the mill men. [See Dangberg, *Conflict on the Carson*, *op. cit.*, pages 79–81.]
265. Townley, *The Orr Ditch Case*, *op. cit.*, page 16.
266. Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, page 23.
267. *History of Flooding—Carson Valley and Carson City Watershed*, *op. cit.*, pages 10–14.
268. Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, page 19.
269. Dangberg, *Conflict on the Carson*, *op. cit.*, pages 59 and 112.
270. The ranchers Mr. Newlands referred to were H.F. Dangberg, R.P. Greeley, W.C. Noteware, and H.H. Springmeyer. More revealing still, in acquiring his lands, Mr. Springmeyer was, in fact, acting as the agent of Mr. Newlands. [See Dangberg, *Conflict on the Carson*, *op. cit.*, pages 78–79.]
271. Strong, *op. cit.*, page 97.
272. The primary contentions questioning the law's constitutionality were first, that as a special law it applied to only particular rights to the use of water and embraces only a part of the territory of the State. Second, it took away vested rights of property without due process of law and without giving the owner an opportunity to be heard. Third, it granted rights and imposed burdens upon some of the citizens of the State, which are not granted to or imposed upon others. And fourth, it delegated the law-making power to the Governor and clothed him with power to create water districts and the discretion to extend to or withhold from the people of the State the provisions of a statute law. [See Dangberg, *Conflict on the Carson*, *op. cit.*, pages 90–91.]
273. Dangberg, *Conflict on the Carson*, *op. cit.*, pages 91–92.
274. Rowley, William D., "The Newlands Project: Crime or National Commitment," *Dividing Desert Waters*, Nevada Public Affairs Review, Number 1, 1992, Senator Alan Bible Center for Applied Research, University of Nevada, Reno, page 39.
275. *Water Resources Data, Nevada, Water Year 1994*, U.S. Geological Survey Water-Data Report NV-94-1, Nevada District Office, Water Resources Division, U.S. Geological Survey, U.S. Department of the Interior, Carson City, Nevada, 1995, page 314.
276. Harris, *op. cit.*
277. McQuivey, *op. cit.*
278. *Ibid.*
279. As was written in poem so eloquently by Sam Davis pertaining to the election "irregularities" in Storey County, and appeared in the *Carson Daily Appeal*: "On yonder hillside, bleak and barren, Lies many a friend of William Sharon, Who in election's hurly-burly Voted often, voted early. But since old Sharon went to glory, The younger Billy bosses Storey, And at his beck those sons of witches Rise, to vote without their britches. To take a hand in the election And hustle back without detection. As we recall those mem'ries hoary, Let's bless the graveyard vote of Storey." [See Dangberg, *Conflict on the Carson*, *op. cit.*, pages 112–113.]
280. Rowley, *op. cit.*, page 39.
281. McQuivey, *op. cit.*

282. Dangberg, *Carson Valley—Historical Sketches of Nevada's First Settlement*, *op. cit.*, pages 111–112.
283. Briefing Document, Public Law 101-618, *op. cit.*
284. Shamberger, *Evolution of Nevada's Water Laws*, *op. cit.*, page 85.
285. Fowler, *op. cit.*, page 23.
286. McQuivey, *op. cit.*
287. *Ibid.*
288. The incorporators included William Thornburg and H.F. Musser of Alpine County, California, and George Lamy, George Keith, Mrs. Elizabeth Jones, Reinhold Sadler, and A. Livingston of Carson City, Nevada. [See Dangberg, *Conflict on the Carson*, *op. cit.*, page 106.]
289. McQuivey, *op. cit.*
290. Townley, John M., *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, page 24.
291. A.E. Chandler, who was the first State Engineer of Nevada (1903–1905) and later professor of Irrigation Law at the University of California.
292. Dangberg, *Conflict on the Carson*, *op. cit.*, page 96.
293. *Ibid.*, pages 101–102.
294. *Ibid.*, pages 100–101.
295. Townley, John M., *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, pages 24–25.
296. Nevada Historical Marker 129, "Gardnerville."
297. McQuivey, *op. cit.*
298. Dangberg, *Conflict on the Carson*, *op. cit.*, page 106.
299. *Ibid.*, page 101.
300. Murphy, *op. cit.*, pages 48–49.
301. Dangberg, *Conflict on the Carson*, *op. cit.*, pages 106–107.
302. Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, page 47.
303. *Ibid.*, pages 134–135.

Carson River Chronology

Part III—Twentieth Century

- 1900** The annual Irrigation Congress of western states met in Chicago, Illinois. This was the first time that such a meeting was held outside of a western state and represented a lobbying effort by westerners to win over Mid-West agricultural interests which, along with Eastern agricultural interests, had effectively blocked reclamation appropriations in Congress. Due to an illness in the designated key-note speaker (Spanish-American war hero General Nelson A. Miles), U.S. Congressman Francis G. Newlands¹ gave a speech which symbolized his rise to national prominence within the reclamation movement.²
- 1901** Dr. James E. Church, Professor of Classics at the University of Nevada, Reno, and an enthusiastic outdoorsman, began studies and measurements of snowpack water content on Mr. Rose's summit (10,778 feet MSL) near Reno, Nevada, and thereby pioneered the science of snow surveying. His research showed that figures showing the water content of snow over a wide melting area could be used to forecast with considerable accuracy the likelihood and degree of flood or drought in the drainage area below during the following season of runoff. Dr. Church formulated a simple mathematical expression, which he called the "Percentage Method," involving water content measurements taken over a snow course annually on April 1st and weighted for both soil moisture on that date and precipitation on the snowfield during the period of melting. While new techniques and more modern equipment have been implemented since that time, the fundamental relationships developed by this imaginative scientist remain accepted to this day.³
- 1901** Upon the assassination of President William McKinley in September 1901, Theodore ("Teddy") Roosevelt became the 26th President of the United States (1901–1909) and ushered in a new era of Populism, a democratic movement supporting "the greatest good for the greatest number" and, among other things, public ownership of utilities, an income tax, and support of labor and agriculture. On behalf of the western states, Roosevelt committed himself to the stalled reclamation movement and applied the powers of his office to charm, plead, or coerce eastern Republican legislators into support for, or at least the tolerance of, a national reclamation act which challenged the vested interests of eastern and mid-western agriculturalists.⁴ From these initial efforts came some of the most significant spending programs for water projects and dam building in the history of the United States.
- 1902** Carson Valley's "One Third Agreement" came into existence around this time after H.F. Dangberg's purchase of the Van Sickle and Cohn ranches. Prior to this time, reduced flows of the Carson River East Fork after July 15th meant that those ranchers with water rights prior to 1860 (approximately 4,800 acres along the East Fork) typically received only a portion of their rights, while others with later water rights would be deprived of water altogether. With the purchase of some 3,500 acres with 1858–1859 water rights, Dangberg was entitled to 80 percent of the East Fork's flow during the low water period. By the "One Third Agreement," however, Dangberg exchanged his right to 80 percent of the East Fork's flow during this typically low-flow period for one-third of the river's flow whenever he required it for the improvement and expansion of the irrigated acreage of his

- desert land. This agreement became widely supported by custom alone and was not written down, noted, or recognized by state officials or the courts.⁵
- 1902** Work began by H.F. Dangberg and his sons in Carson Valley to use the surplus waters of the Carson River East Fork to bring 5,000–7,000 acres of desert land under cultivation in the eastern portion of Carson Valley. Eventually completed in 1906, the project included the extension and enlargement of the Allerman Canal on the east side of the valley and the construction of three holding reservoirs—Allerman No. 1, 2, and 4. The reservoirs were designed to impound excess spring run-off and the steady flow of one third (based on the “One Third Agreement”) of the East Fork after the middle of July of each year when its rate of flow dropped to 200 cubic feet per second (cfs). As a result of this project, over 5,000 acres of additional cultivated fields were brought into production.⁶
- 1902 (June 17)** Congress passed the National Reclamation Act, which created the U.S. Reclamation Service (USRS, renamed the U.S. Bureau of Reclamation, USBR, in 1923) as a separate entity within the U.S. Department of the Interior (USDI), apart from the U.S. Geological Survey (USGS). This act committed the federal government to construct irrigation projects in the West and reclaim arid lands for cultivation and settlement. The Truckee–Carson Irrigation Project, located in the lower Carson River Basin in Churchill County, Nevada, became the first reclamation irrigation project completed under this act.⁷ In 1919 it would be renamed the Newlands Project in honor of one of the bill’s sponsors, Nevada’s U.S. Senator Francis G. Newlands.
- 1902** By one source, the U.S. Reclamation Service and others had initially estimated the irrigation of up to 500,000 acres of farmland in Churchill County associated with the Truckee–Carson Irrigation Project.⁸ As the project progressed, however, the initial figures would be reduced successively from as much as 450,000–500,000 acres of potential irrigable land (1889), to 232,800 acres in 1902, to 210,000 acres in 1904, to 172,000 acres in 1910, to 97,400 acres in 1925, and finally, in 1926, to 73,301 acres. Much later, in 1985, the USRS’s successor, the USBR, estimated that 63,100 acres were actually being irrigated, of which 57,518 acres had legal project water rights.⁹ Needless to say, many figures and much confusion surrounded this project’s early development potential. Initially, it was not so much the amount of land that could be irrigated as it was the amount of water available for irrigation that so dramatically altered these estimates over time. After irrigation had actually begun, it was also found that much of the project farmlands were highly alkaline and subject to extensive waterlogging.¹⁰
- 1902 (August 20)** While several noted individuals claimed sponsorship of the National Reclamation Act of 1902, President Roosevelt had his own views on the matter. In a letter to a Mr. Charles Fletcher Lummis of the magazine *Out West*, President Roosevelt wrote: “One word confidentially. I do not like your paper to be used to boom [Congressman Francis G.] Newlands, as in your last piece about irrigation. The bill is not the Newlands’ bill at all. He had for instance, far less to do with preparing it than Senator [William] Stewart of Nevada, or Congressman Mondell of Wyoming; and I consulted him far less than I did Senator Gibson of Montana and especially Senator Warren of Wyoming.”¹¹
- 1902 (October)** Only months before selecting the Truckee–Carson Irrigation Project as one of the first projects to be funded under the National Reclamation Act of 1902, the Director of the U.S. Geological Survey alerted the U.S. Secretary of the Interior that serious

- complications could arise without the availability of the waters of Lake Tahoe for any consequent irrigation project. According to the USGS Director, "Without control of the Lake Tahoe Dam very little can be done, but with it at least 100,000 acres can be put under irrigation."¹²
- 1903 (February 16)** The Nevada Legislature passed the Irrigation Law of 1903 which, among other things, created the Office of State Engineer to solve water problems, to protect existing water rights, to bring about a better method to utilize the state's water resources, and was the first step made by the state in providing a speedy and inexpensive method of adjudicating existing (vested) water rights.¹³ According to this act, "All natural water courses and natural lakes, and the waters thereof which are not held in private ownership, belong to the public, and are subject to appropriation for a beneficial use..." Notably absent from this legislation was any provision to control new appropriations for water as well as wording as to the appropriation of underground water.¹⁴ This act also provided for the cooperation of the State of Nevada with the U.S. Secretary of the Interior in the construction and administration of irrigation works for the reclamation of arid lands in the state under the recently passed National Reclamation Act of 1902. State Engineer offices in Western states were an essential corollary to the Reclamation Act. Implied in the Reclamation Act was the primacy of the U.S. Department of the Interior and its U.S. Reclamation Service over water development projects. In fact, with respect to water, individual state sovereignty was so limited that candidates to the office of State Engineer had to be approved by the USDI before appointment by the governor.¹⁵
- 1903 (March 14)** The U.S. Secretary of the Interior authorized the Truckee–Carson Irrigation Project on reclamation land in Churchill County, Nevada, near the City of Fallon. Originally, it was believed that some 450,000–500,000 acres could be brought under cultivation by the combined flows of the Truckee and Carson Rivers. This figure was reduced successively to approximately 73,000 acres when it was found, after much legal controversy, that the full use of the waters of Lake Tahoe would not be available.¹⁶
- 1903 (April)** The U.S. Reclamation Service, requiring water for its Truckee–Carson Irrigation Project facilities located in Churchill County, Nevada, rejected an offer to purchase the Lake Tahoe Dam for \$100,000 and decided to condemn the structure and obtain rights to water flowing into and stored in Lake Tahoe by action through the federal courts.¹⁷ However, without control of the dam at Tahoe City, which was owned and operated by the Truckee River General Electric Company, reliability of the irrigation project's water supply was uncertain. At this time four industrial users of water power had built plants on the river: (1) Floriston Pulp and Paper Company; (2) Truckee River General Electric Company; (3) Washoe Power and Development Company; and (4) Reno Power, Light and Water Company. All these water users held superior priorities (prior appropriations) to the river which had to be satisfied before the USRS could begin to store irrigation water in Lake Tahoe for the Truckee–Carson Irrigation Project. At one point, a frustrated USRS Director Newell told U.S. Senator Newlands that, had he known of the difficulties in turning Lake Tahoe into a reservoir, this project never would have been authorized.¹⁸
- 1903 (May 29)** The first State Engineer for Nevada, A.E. Chandler, appointed by Governor John Sparks, took office.¹⁹
- 1903** By executive order, President Theodore Roosevelt established the first federal wildlife

- refuge on Pelican Island in the Indian River in Florida. This action was intended to protect resident Brown Pelicans and would eventually lead to the Migratory Bird Conservation Act of 1929, which provided the authority for purchasing land for refuges for migratory birds, and to the Fish and Wildlife Act of 1956, which authorized the U.S. Fish and Wildlife Service (USFWS) to acquire land for refuges for all kinds of wildlife.²⁰
- 1903** Based on the Irrigation Act of 1903, beginning in this year the first State Engineer of the State of Nevada, A.E. Chandler, began adjudicating existing water rights for the Carson River and its East and West forks. By June 1905, all vested (existing) water rights had been determined and adjudicated and certificates issued. The majority of these, totaling 376 in number for the Carson River system down to Churchill Canyon (Dayton Valley), were located in Carson Valley.²¹
- 1903 (October 2)** After being authorized for construction on March 14, 1903 by U.S. Secretary of the Interior E.A. Hitchcock, Charles A. Warren & Company of San Francisco began work on the construction of the Truckee-Carson Diversion Dam (Derby Dam) located on the lower Truckee River approximately 11 miles above Wadsworth, Nevada, in Washoe County. The dam was completed on May 20, 1905 and operational water diversions began in 1906. Subsequently named Derby Dam, it took its name from a nearby Southern Pacific Railroad station of the day.²²
- 1903** The town of Hazen was established and named for William Babcock Hazen, who served under General Sherman in his "march to the sea." The town, located between Fernley and Fallon in Churchill County, was used to house laborers working on the Truckee-Carson Irrigation Project to the south and included hotels, saloons, brothels, churches and schools. In 1905 the new routing of the Southern Pacific Railroad to Tonopah fostered the growth of a large roundhouse and a fine depot. Hazen established a well-deserved reputation as a tough town; Nevada's last lynching occurred in Hazen when "Red" Wood was taken from the wooden jail and hanged on February 28, 1905.²³
- 1904** A water well on the Douglass Ranch near Soda Lakes in the Lahontan Valley revealed traces of oil and caused a brief flurry of excitement throughout the area. Old timers had insisted that "oil springs" had been found around the shoreline of Big Soda Lake as far back as 1865; however, with the arrival of the Truckee-Carson Irrigation Project in 1903 rising lake waters had submerged the springs and blocked their flow. Even so, oil exploration in the Lahontan Valley persisted, particularly during the years of World War I. While oil never proved to be a boon to the county, during such drilling operations continual problems were encountered with hot artesian water that made drilling difficult and oftentimes dangerous, and frequently forced the abandonment of wells altogether.²⁴ Later, these geothermal waters would create a new form of "mineral" wealth for Churchill County.²⁵
- 1905 (February 2)** Construction of the Truckee Canal (begun in 1903), which linked the lower Truckee River with the lower Carson River, was completed in this year,²⁶ although certain structural members (a discharge chute for permitting the discharge of its waters into the Carson River) had not yet been finished.
- 1905 (March 1)** The Nevada Legislature amended the Irrigation Act of 1903 requiring that any person desiring to appropriate water file an application with the State Engineer for a permit to appropriate. The application form was to contain information as to the source

- of water, location of proposed works, amount of water needed, purpose for which the water was to be used, and other information. If the State Engineer found that there existed unappropriated water, he could grant a permit. Within six months following such approval the applicant was required to file a map in support of such application. Upon satisfactory proof that the application had been "perfected," the State Engineer could issue a certificate of appropriation. The act also provided a method to adjudicate existing water rights.²⁷
- 1905 (June 17)** The Derby Diversion Dam (originally named the Truckee River Diversion Dam), located on the lower Truckee River approximately 20 miles east of Reno, was completed and a congressional delegation, headed by U.S. Senator Francis G. Newlands of Nevada, opened the gates to the Truckee Canal.²⁸ As part of the Truckee-Carson Irrigation Project, this diversion structure would divert Truckee River waters into a canal, then under construction, to take the waters 32.5 miles to the Carson River. This was the first structure to be finished by the U.S. Reclamation Service for any reclamation project under the National Reclamation Act of 1902.²⁹
- 1905 (July)** The first, albeit "informal," irrigation year for the Truckee-Carson Irrigation Project proved to be less than a complete success. In this month the Carson River went dry and the Truckee Canal remained unfinished due to a failure of timber contractors to supply structural members for the chute discharging the canal's waters into the Carson River. Consequently, the project engineer had no water to divert onto awaiting fields.³⁰
- 1905** The town of Minden was established in Carson Valley just to the north of Gardnerville to provide terminal railroad facilities for the Virginia & Truckee Railroad, which was then extending a branch line southward from Carson City. Principal promoter of the town and its related development was H.F. Dangberg, Jr., secretary of the H.F. Dangberg Land and Live Stock Company and son of the company's founder. The town was named for a town in Westphalia, Germany, where H.F. Dangberg (senior) was born.³¹
- 1905** Judgement was rendered in the 1899 suit of *Anderson v. Bassman*, which pertained to water rights on the Carson River West Fork. While there was some confusion and conflict in the various provisions, in essence, the plaintiffs (Carson Valley West Fork farmers) were awarded the continued use of all waters theretofore actually diverted to their lands for irrigation and for stock and domestic purposes. The defendants (primarily West Fork water users in Diamond Valley and upper watershed valleys in Alpine County, California) were given the right to make reasonable and economical use of water for irrigation of their lands, and for other purposes from November 1st to the first Monday of June each year. From the first Monday of June to November 1st, provision was made for 7-day periods of "rotation" between plaintiffs on one side and defendants on the other.³²
- 1906 (April 6)** After much talk and many false starts dating as far back as 1876, the laying of railway track in Carson Valley was finally begun. The extension of the Virginia & Truckee Railroad was completed on August 1, 1906 between Carson City and the newly founded town of Minden, located just north of Gardnerville.³³
- 1906 (August)** All parts of the Truckee Canal were completed. While most of the work had been completed in 1905, a shortage of lumber for the flume to discharge the canal's waters into the Carson River held up its operation.³⁴ The Truckee Canal, with a nominal flow capacity of approximately 900 cubic feet per second (cfs), or 1,785 acre-feet per day, would run 32.5 miles from the lower Truckee River to the Carson River. Later, this canal

- would empty into the U.S. Reclamation Service's Lahontan Reservoir (completed in 1915) located on the Carson River just above the Truckee-Carson Irrigation Project farmlands. For the first time, waters from the Truckee River Basin were diverted to the Carson River Basin for use by Lahontan Valley farmers.
- 1906** An agreement was effected whereby the Fallon Paiute and Shoshone Indians of the Fallon Paiute-Shoshone Indian Reservation (initially established on February 8, 1887) would release their original 160-acre allotments of non-irrigable land and receive instead 10-acre allotments of irrigable land with paid up water rights. Of the original 196 allottees on the public domain, 189 consented to the exchange. Accordingly, this resulted in a reduction of the reservation acreage from 31,360 acres to 3,010 acres.³⁵
- 1907 (February 26)** The Nevada Legislature repealed the Irrigation Law of 1903 and provided a statutory method to determine existing water rights. The 1907 act, creating a new water law, did not differ in any essential particulars from the act of 1903, as amended in 1905.³⁶
- 1907 (March 16-20)** A combination of rain-on-snow, rain on frozen ground, and wet-mantle (saturated soils) flood events precipitated the first major flood of the twentieth century in Carson Valley. It was also considered to be one of the most destructive floods on record. It has been estimated that under similar conditions of settlement and development, this flood event most likely would have at least equaled the devastating floods of 1950 and 1955 and exceeded the recorded damage of the flood of December 1937. The event began with a heavy snowfall on March 16th, turning to a heavy downpour across the entire Sierra Nevada Mountain range up to the highest elevations, which continued through March 20th. By March 17th Carson Valley lowlands were completely flooded and many valley ranchers were forced to remove their families and seek shelter in safer places. Bridges throughout Carson Valley were washed from their foundations and the flood waters carved deep channels through agricultural fields and removed considerable quantities of valuable topsoil. The Cradlebaugh Bridge, located at the northern end of the valley near the site where present-day U.S. Highway 395 crosses the Carson River, was washed away despite the fact it had been rebuilt and strengthened after it had been washed away in the floods of 1890. Much of the roadbed of the Virginia & Truckee Railroad, which had just been completed through from Carson City to Minden, was washed out for about a mile and a half north of Minden. In Alpine County, a swollen Monitor Creek washed out power dams recently completed (Fall 1906) by the Hercules Mining Company, and a raging Carson River West Fork washed out the Woodfords bridge on the road to Markleeville, virtually isolating that community.³⁷
- 1907** The first full year of irrigation in the Lahontan Valley using waters from both the Truckee and Carson rivers proved to be unsettling to project planners. An unseasonably warm spring resulted in early floods followed by drought. Further, a temporary mining boom around the area caused many prospective farmers to choose mining over agriculture, thereby neglecting their farms. Water proved inadequate even for the 25,000 acres of pasture and cultivated fields existing at that time, a figure well below the initial estimates of a potential of some 400,000-500,000 acres which could be irrigated using the combined flow of both rivers.³⁸
- 1907** The U.S. Department of the Interior reserved an additional area of 4,640 acres for the reservation on behalf of the Fallon Paiute and Shoshone Indians who had relinquished their

- original allotments and such other Indians as might, on investigation, be found entitled to allotments thereon. (Later, in 1917, the USDI would add an additional 840 acres on the north boundary of the Fallon Paiute-Shoshone Indian Reservation, which then brought the reservation's total area up to 5,480 acres.)³⁹
- 1908** The U.S. Supreme Court entered its precedent-setting Winters Rights Decision (*Winters v. United States*) in which the Court prohibited any water uses by non-Indians that interfered with Indian tribes' use of their "reserved water." The Court held that when reservations were established, the United States implicitly reserved, along with the land, sufficient water to fulfill the purposes of the reservations. The Court also recognized these rights as having a priority date coinciding with the date the reservation was established, thus providing a means to integrate federally "reserved water rights" with "appropriative water rights" recognized under state law.⁴⁰ Under this doctrine, the priority date of the Pyramid Lake Paiute Indian Tribe's claim to water of the Truckee River was established as November 29, 1859, the effective date of withdrawal of lands for the reservation. This later provided the Tribe with the senior most claims to the Truckee River's waters under the 1944 Orr Ditch Decree (Claims 1 and 2).⁴¹
- 1908 (July)** The Truckee-Carson Irrigation Project could no longer meet its irrigation needs from existing river flows. The U.S. Reclamation Service recognized that upstream Carson River water users in Carson Valley, and upstream Truckee River users in the Truckee Meadows, had first access to these rivers, leaving uncertain supplies for the Lahontan Valley farmers downstream.⁴²
- 1908 (December)** Attempting to obtain firm water supplies for the Truckee-Carson Irrigation Project, U.S. Reclamation Service representatives met with the Nevada State Engineer and requested that he adjudicate Truckee River water rights within Nevada.⁴³ Between 1903 and June 1905, this had largely been accomplished for the Carson River.
- 1909 (January)** Based on water rights issues existing in the Lake Tahoe Basin and within the Truckee Meadows, the Nevada State Engineer advised the U.S. Reclamation Service to abandon its plans for stable water supplies from Lake Tahoe and the Truckee River and immediately consider the construction of a reservoir (later to become Lahontan Reservoir) on the lower Carson River as a means to established a dedicated water supply for Lahontan Valley farmers.⁴⁴
- 1909** Another tunnel scheme was developed for the Lake Tahoe Basin (see entries under 1860's and 1899 dates), this one to take water from Lake Tahoe through a power plant to a large reservoir to be constructed at Washoe Lake in Nevada. As this lake flows into Steamboat Creek, which eventually empties into the Truckee River below the City of Reno, it was presumably intended that the water would be available to sell to Truckee-Carson Irrigation Project farmers in the lower Carson River Basin, thereby effectively circumventing the problems concerning the right to the Lake Tahoe Dam at Tahoe City.⁴⁵ The plan eventually was abandoned due to severe opposition by lakeshore property owners and the State of California.
- 1909 (February 24)** The U.S. Reclamation Service began condemnation action to acquire ownership of the Lake Tahoe Dam at Tahoe City through *U.S. v. Floriston Pulp and Paper Company, et al.*⁴⁶ Without control of this facility, reliable flows for diversion at Derby Dam on the lower Truckee River into the Truckee Canal for eventual use on the

- Truckee–Carson Irrigation Project farmlands could not be guaranteed. Under the threat of a condemnation suit, Stone–Webster and Company, which had recently purchased the Truckee River General Electric Company and was therefore the new owner of the Lake Tahoe Dam, entered into negotiations with the U.S. Department of the Interior. A final agreement would not be reached until June 4, 1915.⁴⁷
- 1910 (March)** The Nevada Sugar Company was organized in Churchill County, Nevada, to bring sugar beet cultivation and production to the Lahontan Valley. Studies in California and Utah had shown an average increase of 300 percent in land values after sugar beet cultivation was introduced. A factory, the largest building ever constructed in Churchill County, was completed in August 1911 for processing the beets, and the company offered \$4.50 per ton for sugar beets containing a minimum of 15 percent sugar, with a premium paid for higher yields. In August 1911, after extensive care and weeding by imported Oriental and Mexican field laborers, the Lahontan Valley beet crop looked good. By September, however, the dark green foliage developed a curly, mottled appearance and dropped to the ground. The beets stopped growing and many rotted in the fields. By November it was clear that the beet crop was a failure. Continued attempts to bring success to the valley through this crop persisted through 1928, when the factory was abandoned and its equipment sold to a San Francisco junk dealer. In 1934 the building was dismantled for its bricks and steel while the remaining equipment was sold to Japan as scrap iron. The cause of the disease was found to be a leafhopper, *Eutettix tenella*, which transmitted the “curly top” disease from the region’s native pigweed, which abounded in the valley and was closely related to the sugar beet. Attempts to eliminate the pest and eradicate the pigweed were found to be impossible, and the Lahontan Valley was forced to search elsewhere for a higher-valued cash crop to replace its dominant crop of alfalfa.⁴⁸
- 1910 (June 23)** The first air flight in Nevada took place on the old Raycraft Ranch just north of Carson City. The flight was of national interest not only because an air journey had never before been made at such an altitude (4,675 feet above mean sea level), but also because Ivy Baldwin, a nationally known parachutist and balloonist, would make the flight. Baldwin made the flight in a 48-horsepower Curtis Paulham biplane, reaching a height of 50 feet and covering one-half mile before returning to the starting point.⁴⁹
- 1910 (September)** Due to unreliable and insufficient water supplies, the U.S. Reclamation Service no longer accepted applications for homestead rights within the Truckee–Carson Irrigation Project.⁵⁰
- 1910 (Late September)** A Board of the U.S. Army Corps of Engineers inspected the proposed Lahontan dam site and approved the feasibility of a reservoir on the lower Carson River intended to provide a more stable source of water for Lahontan Valley farmers.⁵¹
- 1911** Dr. James E. Church of the University of Nevada, Reno developed the present-day technique of determining the snowpack water content. His methodology was first applied to the Lake Tahoe Basin and thereby made possible the accurate prediction and eventual control of the seasonal rise in lake, reservoir, and river levels.⁵²
- 1911** O.J. Vannoy, a recognized leader of a small group of truck farmers in the Lahontan Valley, began to develop experimental fields of melons and vegetables on leased land. Vannoy was scientific in his approach as he studied lands throughout the valley in an effort

to determine the perfect conditions of soil and sun for specific crops. It took many years of work to properly condition plant varieties for the Lahontan Valley's capricious climate. By 1914 Vannoy was shipping significant quantities of melons to regional markets. In 1921 valley farmers organized the Churchill County Cantaloupe Growers' Association and adopted the "Hearts-O-Gold" trademark for their produce.⁵³ While quality of the melon crop was never an issue, servicing distant markets proved difficult for the late maturing crop. By 1929, a combination of depression-era prices and severe drought (1928–1935) effectively eliminated all hopes of the industry becoming a major commercial success in the valley. The drought period of 1928–1935 was particularly harmful as the water supply to the Lahontan Valley farmlands failed by late summer just when the farmers needed irrigation to mature the fruit. As a result, most growers returned to the lower-valued alfalfa as their primary cash crop.⁵⁴ Today, distribution of melons from this area is on a far more regional basis, primarily to local markets in northern Nevada and California.

- 1912 (April)** During the driest year of the new century, with snowpack water content measurements at less than 25 percent of average, the Truckee–Carson Irrigation Project Manager alerted homesteaders in the Lahontan Valley of the pending drought crisis and asked that they avoid late-maturing crops, such as melons. Many farmers began to feel that the Truckee River General Electric Company was intentionally withholding Lake Tahoe water and therefore favored a more direct means of opening the Lake Tahoe Dam and gaining access to the waters of Lake Tahoe.⁵⁵
- 1912 (Spring)** Due to severe drought conditions throughout Northern Nevada, the U.S. Reclamation Service was forced to close the downstream gates to Derby Dam, thereby diverting the entire flow of the Truckee River into the Truckee Canal for Lahontan Valley farmers. The Truckee River stream bed below Derby Dam for two miles was reported to be clogged with dead and dying trout, unable to find any means to move upstream.⁵⁶
- 1912 (September)** As a consequence of the severe drought affecting the area, the Truckee River General Electric Company and the U.S. Reclamation Service directed a party of workers to go to Lake Tahoe in order to dredge the river channel at Tahoe City and cut down the lake's rim so more water could be released. This attempted action was blocked by lakeshore property owners through a court injunction.⁵⁷
- 1913 (January 23)** Distrusting the intentions of both the U.S. Reclamation Service and Truckee River General Electric Company, a group of prominent Lake Tahoe property owners filed articles of incorporation forming the Lake Tahoe Protection Association. This organization, which had existed informally for several years, was the first environmental group created specifically to preserve the lake's beauty. Primary objectives included the prevention of any serious lowering of the lake's level, protection of fish and wildlife in the basin, fire prevention, protection against sewage pollution, improved navigation safety, and better roads and trails.⁵⁸
- 1913** Based on a growing threat of litigation and mutual suspicion, the California Conservation Commission issued a statement that the waters of Lake Tahoe were too valuable to permit their unlimited diversion to any other state. It therefore recommended that the State of California bring suit before the U.S. Supreme Court against the State of Nevada to insure a just and equitable apportionment.⁵⁹ This issue was effectively resolved through the 1935 Truckee River Agreement, which established conditions under which waters could be

- taken from Lake Tahoe when it fell below its natural rim,⁶⁰ and later in 1971 with the signing of the *California-Nevada Interstate Compact*, which allocated Lake Tahoe's waters and apportioned the waters of the Truckee River between the two states. While this compact has not been approved by Congress, it has been enacted and enforced through individual state legislative action.⁶¹
- 1913 (March)** Litigation between the U.S. Reclamation Service and virtually all Nevada upstream water users on the Truckee River began (*U.S. v. Orr Ditch Water Company, et al.*).⁶² The suit was brought by the USRS in order to quantify and clarify (adjudicate) the water rights of upstream users in Nevada and thereby secure and protect future water rights of Truckee-Carson Irrigation Project farmers. At first it was expected that as a "friendly suit," litigation and resolution of these rights would be brief;⁶³ however, as it happened, it would take more than 30 years to ultimately resolve and delineate upstream water rights, culminating in the 1944 Orr Ditch Decree.
- 1913 (March 22)** The Nevada Legislature repealed the water law of 1907 and its amendments and approved the so-called "1913 General Water Law," which became the foundation of the state's present water law. For the first time underground water was included under provisions of the state's "doctrine of prior appropriation" for water rights. Section 1 of this act provided that "The water of all sources of water supply within the boundaries of the State, whether above or beneath the surface of the ground, belongs to the public." Section 2 provided that "Subject to existing rights, all such water may be appropriated for beneficial use as provided in this Act and not otherwise."⁶⁴
- 1913** The old rock-filled timber crib dam at Tahoe City, California, originally constructed by the Donner Lumber and Boom Company in 1870, was replaced by the Truckee River General Electric Company and the U.S. Reclamation Service with a new Lake Tahoe Dam consisting of a concrete slab and buttress structure with 17 vertical gates. The dam is actually 400 feet downstream from the lake's natural rim, which is considered to be the point of hydraulic control under low water conditions and has been established at 6,223.0 feet above mean sea level (MSL). Through later agreement (1935 Truckee River Agreement), water would be stored in the top 6.1 feet (later established at between 6,223.0 MSL to 6,229.1 MSL), thereby creating a storage capacity of approximately 744,600 acre-feet.⁶⁵
- 1915** Lahontan Dam and Reservoir on the Carson River was completed creating a maximum storage capacity of approximately 294,000 acre-feet (317,300 acre-feet with flashboards installed) for waters of the Carson River and waters diverted through the 32.5-mile long Truckee Canal from Derby Dam on the lower Truckee River.⁶⁶ This gave the U.S. Reclamation Service a far more reliable supply of water for the farms within the Truckee-Carson Irrigation Project. A power plant, with a generating capacity of 1.92 megawatts, was installed at Lahontan Dam as part of the initial project facilities. The Truckee Carson Irrigation District (TCID), organized in 1918, subsequently constructed its own small power plant on the V-Canal, downstream of the Carson River Diversion Dam, to take advantage of a 26-foot drop in canal elevation. These powerplants provided the first electricity to the rural area around Fallon, Nevada. Over time, the operation of these power plants, particularly with respect to Truckee River waters diverted for non-agriculture use, created considerable controversy and would be terminated with the 1967

- Newlands Project Operating Criteria and Procedures (OCAP).⁶⁷
- 1915 (July 1)** Based on a judgement and consent decree effected on June 4, 1915 in federal court between the U.S. Reclamation Service and the Truckee River General Electric Company (*U.S. v. Truckee River General Electric Company*, formerly *U.S. v. Floriston Pulp and Paper Company, et al.*), the United States assumed control of the outlet dam of Lake Tahoe. For a consideration of \$139,500, the federal government was given the right to control the dam and 14 acres of adjoining property at the outlet of the lake. No change of title occurred. Four of the anticipated six feet of storage (later established at 6.1 feet) in Lake Tahoe (above 6,223.0 feet MSL) were designated as power water, with all water rights not appropriated by the power company coming to the federal government. This Truckee River General Electric Decree effectively granted the U.S. Reclamation Service an easement to operate the Lake Tahoe Dam at Tahoe, which it had sought since the inception of the Truckee–Carson Irrigation Project. For its part, the USRS was forced to pay half of the cost of building the new dam at Tahoe City and it was also required to provide certain year-round flow rates (known as the “Floriston rates”) to support hydropower generation along the Truckee River.⁶⁸
- 1917** The Indian colony at Dresslerville, located on the Carson River’s East Fork in the southern portion of Carson Valley, came into existence when W.F. Dressler, state senator from Douglas County between 1919 and 1945, donated a forty-acre tract of bench land west of the East Fork to the local Washoe Indian Tribe to be used by them as a settlement.⁶⁹
- 1918** The Truckee–Carson Irrigation District (TCID) was formed to take over management of the Truckee–Carson Irrigation Project and to more vigorously pursue persistent irrigation and drainage problems on behalf of the Lahontan Valley farmers.
- 1918** The U.S. Reclamation Service fenced in a tract of about 14,700 acres of vacant land in the vicinity of Carson Lake in the southern portion of the Lahontan Valley for the creation of a pasture in which the Truckee–Carson Irrigation Project water users might graze their surplus stock during the crop growing season. Besides fencing the tract, several miles of laterals were constructed for the purpose of irrigating the area to increase the growth of pasture grass. In 1920 another 5,000 acres were added to this area termed the Carson Lake and Pasture.⁷⁰
- 1919** The Truckee–Carson Irrigation Project was officially renamed the Newlands (Irrigation) Project in honor of U.S. Senator Francis G. Newlands (Nevada) and his sponsorship of the 1902 National Reclamation Act, which ultimately brought this project to Nevada.
- 1919 (August 9)** Based upon a request by the U.S. Reclamation Service that Lake Tahoe shoreline property owners sign quitclaims that would release the federal government from legal penalties for any property damage resulting from the use of the lake as a storage reservoir, alarmed Californians met in a “mass meeting” at Lake Tahoe to discuss the situation and plan a strategy. Representatives appeared from various state and local government agencies, including the office of California’s attorney general, local business groups, automobile associations, chambers of commerce, and environmental groups, including the Lake Tahoe Protection Association and the Sierra Club.⁷¹
- 1919 (August)** Judge Edward Silsby Farrington of the Federal District Court of Nevada, who was hearing testimony on the litigation filed in March 1913 between the United States and upstream Truckee River water users in Nevada (*U.S. v. Orr Ditch Water Company, et al.*),

- appointed George Frederick Talbot as a Special Master to resolve the issue pertaining to the adjudication of Truckee River water rights within Nevada.⁷²
- 1920** Colonel E.E. Winslow of the U.S. Army Corps of Engineers conducted an investigation into the controversy surrounding the use of the waters of Lake Tahoe. His findings placed much of the blame on poor communications by the U.S. Reclamation Service and on its concessions to the interests of Truckee River General Electric Company (Stone-Webster). He specifically opposed any attempt to cut down the natural rim of the lake and even suggested that California revive a 1912 suit against the power company to test its claim to water from Lake Tahoe. Ultimately, Winslow approved of the USRS's regulation of the lake level within its 6-foot storage range, particularly to provide Nevada farmers with water when they needed it most.⁷³
- 1920 (September)** In response to the 1913 suit filed by the U.S. Reclamation Service (*U.S. v. Orr Ditch Water Company, et al.*) to adjudicate Nevada water rights for the Truckee River, the Truckee Meadows Water Users Association was formed. This association consisted of large land owners and water users in the Truckee Meadows and was organized specifically to protect their interests from the downstream Newlands Project water claimants.⁷⁴ It was becoming apparent that the brief and "friendly" suit envisioned in 1913 by the USRS was rapidly developing into something much more contentious and litigious.
- 1921** The Price Decree was entered based on the 1905 settlement (Anderson-Bassman Decree) of the 1899 suit of *Anderson v. Bassman*. This California court decree represented a detailed determination of the rights of California water users on the West Fork of the Carson River. The 1905 Anderson-Bassman Decree specified only the acreage to which water rights applied; it did not set out the amounts of water that could be diverted. The Price Decree represented an adjudication of the California rights that had been recognized in the earlier Anderson-Bassman Decree. Even so, neither decree dealt with water rights claims for irrigated lands within the Newlands Project.⁷⁵
- 1923** The U.S. Reclamation Service (USRS) was officially renamed the U.S. Bureau of Reclamation (USBR).
- 1924** Lake Tahoe fell below its natural rim of 6,223.0 feet MSL. Based on their expectation of not receiving promised water, the Newlands Project farmers threatened Lake Tahoe shoreline property owners with potential crop damage suits. The farmers were successful in persuading Lake Tahoe property owners to allow the lake to be pumped when it fell below its natural rim. Approximately 34,000 acre-feet were pumped from Lake Tahoe during this year.⁷⁶
- 1925** Dat-So-La-Lee, who had seen some 95 winters, mostly in the Carson Valley, died. She was the last of those Washo (Washoe) weavers whose ancient art had been practiced by countless generations. Gathering willow, fern, and birch with the aid of her husband, she wove into her masterpieces the legends of her people and their love of nature. Her baskets are unsurpassed for artistic conception and symbolic importance and provide a constant reminder of the history and unique tribal artistry of her people.⁷⁷
- 1925 (May 11)** On behalf of the Newlands Project farmers, a suit was filed (*U.S. v. Alpine Land and Reservoir Company, et al.*) to adjudicate water rights on the Carson River. In this suit the federal government claimed the right to 5,000 cfs of water of the Carson River to be stored in Lahontan Reservoir to irrigate 300,000 acres of land withdrawn for the Newlands

- Project.⁷⁸ The final decree in this matter—the Alpine Decree—would not be entered until October 28, 1980, over 55 years later, and the appeals court would not affirm the lower court's decision (with one exception) until January 24, 1983.⁷⁹ As such, it would become the longest court battle ever waged by the federal government against private interests in a determination of water rights. While this case was in litigation, it effectively precluded the consideration of plans to establish any other dams or reservoirs on the Carson River or its East and West forks.⁸⁰
- 1926 (February)** The U.S. District Court in Reno entered a temporary ruling (the "Talbot Decree") that divided the Truckee River among its various users, which included Newlands Irrigation Project farmers, and appointed a Federal Water Master (Harry C. Dukes) to oversee the proper use of water along the Truckee River.⁸¹ The Talbot Decree did not, however, set aside any water for Pyramid Lake specifically. This ruling was eventually replaced in 1944 by a final court order, called the Orr Ditch Decree, which provided the Pyramid Lake Paiute Indian Tribe senior appropriative water rights (Claims 1 and 2) of 30,000 acre-feet of Truckee River water for the irrigation of 3,130 acres of reservation bottom lands and 2,745 acres of reservation bench lands.⁸²
- 1926 (December 31)** Through the negotiation of a written contract, the U.S. Bureau of Reclamation turned over the management of the Newlands Project to the Truckee–Carson Irrigation District. TCID would now operate all facets of the project, to include, in addition to distribution systems within the project, the Lake Tahoe Dam at the lake's outlet into the Truckee River, Derby Dam on the lower Truckee River, the Truckee Canal, Lahontan Dam and Lahontan Reservoir on the Carson River, and below that, the Carson River Diversion Dam which diverts waters into the principal "T" and "V" canals. Truckee River diversions at Derby Dam would flow into Lahontan Reservoir via the 32.5 mile long Truckee Canal. Total annual Newlands Project water diversions from both the Carson and Truckee Rivers were set at 406,000 acre-feet⁸³ for the irrigation of, and not to exceed, 74,500 acres of land.⁸⁴
- 1927 (1927–1969)** Beginning in this year, the Truckee–Carson Irrigation District took over the operation of the Newlands Project from the U.S. Bureau of Reclamation by means of a formal contract. From time to time during this period, TCID permitted the project farmers to use project waters for irrigation of lands not described in their contracts in preference to irrigation of lands described in the contracts where it had become impractical to use water beneficially or economically. In permitting these informal transfers of water rights, it was believed that Nevada's water laws did not apply to project [federal] water rights and the federal government had no procedures for formal authorization of these transfers.⁸⁵ While seemingly innocuous at the time, these actions would eventually have important implications on the concept of the water rights "appurtenant to the land," as specified in the 1980 Alpine Decree, the potential for increasing the project's consumptive use when such transfers were permitted between bottom lands (water duty of 3.5 acre-feet per acre per year) and bench lands (water duty of 4.5 acre-feet per acre per year), the applicability of Nevada Water Law and the concepts of perfection, abandonment, and forfeiture,⁸⁶ and efforts by the Pyramid Lake Paiute Indian Tribe to invalidate some of these transfers which they claimed had been abandoned before transfers were made, hence invalidating the Nevada State Engineer's subsequent approval of changes in place of use.

- In 1983, the U.S. District Court in Reno, Nevada, would find that such transfers came under Nevada water law and should have been approved either by the State Engineer or the Federal Water Master. This, in turn, would begin a series of litigations pertaining to the status of these water rights (abandoned or forfeited) before the transfers took place.
- 1928 (March 24–30)** Carson Valley was subjected to flooding, although not nearly as extensive as the last major flood event of 1907. Snow began falling on the afternoon of March 24th, adding 6–12 inches of new snow above the valley floor. By evening, the snow turned to rain and continued throughout the night, frequently falling in torrents. The rain continued through the following day, melting the newly fallen snow as well as the snow underlying it. Both forks of the Carson River reached their peaks on March 26th. Some damage was done when the Carson River East Fork flooded out of its banks in many places. Train service to Minden was temporarily interrupted when the tracks became covered with water, mud, and debris for a distance of about 400 feet.⁸⁷
- 1928** After flood conditions earlier in the year, both the Carson and Truckee River basins experienced the beginning of a severe drought which lasted from 1928 through 1935 (eight years). Due to its severity, this period of time (and particularly the year 1931) established water planning criteria for these river basins. This drought period would not be exceeded in severity until the most recent drought period which began in 1987 and lasted through 1994 (by coincidence, also eight years in duration).⁸⁸
- 1929** Lake Tahoe fell below its natural rim and approximately 33,960 acre-feet were pumped from the lake in this year.⁸⁹
- 1929** The Migratory Bird Conservation Act was passed which provided the federal government authority to purchase land and establish federal refuges for migratory birds and waterfowl.⁹⁰
- 1930** Lake Tahoe fell below its natural rim again and approximately 25,080 acre-feet were pumped from the lake during this year.⁹¹
- 1930** Due to the intensifying drought conditions in the Truckee and Carson River basins, a group of Nevada “water interests” sent a steam shovel, accompanied by a Reno police force guard, to the power company’s property adjacent to the Lake Tahoe Dam at Tahoe City, California, to start digging a diversion trench to the rim. It was suspected that they would also try to dynamite the dam itself. Ultimately, a court injunction was obtained by the Lake Tahoe property owners against the power company, the Truckee–Carson Irrigation District, and others to halt the digging, and the trench was subsequently backfilled.⁹²
- 1930 (August 23)**⁹³ The Truckee–Carson Irrigation District filed application permit number 9322 for 100,000 acre-feet (10,000 cfs) for the appropriation of water from the Carson River and its tributaries to be stored in Lahontan Reservoir and to be used for irrigation and domestic purposes on 150,000 acres in Lahontan Valley. TCID intended to raise the control level of Lahontan Dam by eight feet, thereby increasing the storage capacity by 100,000 acre-feet to 394,000 acre-feet total. One protest was filed against this application and no subsequent hearings were ever held.⁹⁴
- 1930 (September 9)**⁹⁵ The Truckee–Carson Irrigation District filed application permit number 9330 for 100,000 acre-feet (1,500 cfs) for the appropriation of water from the Truckee River and its tributaries to be stored in Lahontan Reservoir and to be used for irrigation

and domestic purposes on 150,000 acres in Lahontan Valley. TCID intended to raise the control level of Lahontan Dam by eight feet, thereby increasing the storage capacity by 100,000 acre-feet to 394,000 acre-feet total. No protest was filed against this application and no subsequent hearings were held until 1994, at which time the USDI refused to allow TCID to use any federal facilities to divert, convey, store, or distribute additional Truckee River waters. It was believed that both this application and that filed previously for the Carson River waters (application 9322, also for 100,000 acre-feet) were prompted by the worsening drought conditions in these basins.⁹⁶

- 1931 (May 8)** A protest was filed against the Truckee–Carson Irrigation District’s application permit number 9322 by Irrigation District Number 1, Carson Valley Unit, Truckee–Carson Project, H.F. Dangberg Land & Livestock Company, W.F. Dressler, George G. Hussman, and others. The protest claimed that TCID’s application was speculative, that the appropriation is uncertain and the lands cannot be ascertained with certainty, that the land described to be irrigated is not irrigable and/or is of such a nature that it cannot be economically reclaimed, that portions of such lands already have sufficient water rights, and that District 1 has prior application and granting of such rights would injure prior rights. No hearings were ever held on this application.⁹⁷
- 1931** The Fallon National Wildlife Refuge (NWR) was established encompassing approximately 17,900 acres (28 square miles) where the Carson River terminates in the Carson Sink. Due to typically limited and uncertain flows of the Carson River at this terminus location, generally not enough water enters this area to maintain the area as a viable wetlands. The area is currently managed by the U.S. Fish and Wildlife Service, along with the Stillwater National Wildlife Refuge (established in 1991), and is included as part of the Stillwater Wildlife Management Area (established in 1948).⁹⁸
- 1932** A soil survey for the Fallon Paiute–Shoshone Indian Reservation’s 5,480 acres near Fallon in Churchill County, Nevada, concluded that only 3,070 acres of reservation land were irrigable. The balance of the reservation (2,410 acres) were found to be non-irrigable because of topography, sandy soil, alkali or lack of drainage.⁹⁹
- 1934 (June)** While giving a speech to Lake Tahoe property owners relating to the severity of the current drought and its devastating effects on Nevada’s farmlands, and in the midst of making a request that the landowners around the lake sanction pumping of the lake, Nevada Acting Governor Moreley Griswold’s plea for relief was interrupted for ten minutes by a sudden hailstorm.¹⁰⁰
- 1934** Lake Tahoe fell below its natural rim again and approximately 24,610 acre-feet were pumped from the lake in this year.¹⁰¹
- 1935** Calpine Corporation of Los Angeles, California, began subsurface sulfur mining at the Leviathan Mine site off the Carson River East Fork approximately nine miles up Bryant and then Leviathan creeks. An extensive system of underground tunnels was developed and up until 1941, when Calpine Corporation gave up its lease, approximately 5,000 long tons of sulfur were produced. The operation was noted as being extremely hazardous due to the highly flammable nature of sulfur.¹⁰²
- 1935** The Truckee River Agreement was formally enacted, recognizing Lake Tahoe’s natural rim at 6,223.0 feet MSL and allowing water storage from 6,223.0 feet MSL to 6,229.1 feet MSL (the upper 6.1 feet, containing a total usable storage capacity equal to

approximately 744,600 acre-feet, i.e., one inch of storage equals approximately 10,172 acre-feet). In conjunction with the Truckee Storage Project, the agreement also paved the way for additional upstream reservoir storage (i.e., the construction of Boca Dam and the creation of Boca Reservoir to be located on the Little Truckee River). In addition to incorporating the Truckee River flow requirements set by the Floriston rates (i.e., the 1915 Truckee River General Electric Decree), the Truckee River Agreement also contained language intended to settle the on-going disputes over pumping Lake Tahoe.¹⁰³

1937 (December 9–13) Carson Valley was subjected to extensive flooding. The rains began falling across the eastern slope of the Carson Range and in Carson and Eagle valleys on the night of December 9th, continuing in a steady downpour until late in the afternoon of December 11th. By this time, the saturated soils and the melting of the snowpack resulted in overland flows and flooding of the Carson River's tributaries. The Carson River East Fork left its main channel on December 10th and poured into adjacent sloughs south and west of Minden and Gardnerville. By the night of December 10th, the Carson River mainstem left its bank and spread over the lowlands at the north end of Carson Valley. On the Carson River West Fork, flood waters destroyed the Woodfords to Markleeville highway bridge, virtually isolating that community. All bridges above Woodfords were either swept away or badly damaged. On the Carson River East Fork, a flooding Markleeville Creek inundated a number of buildings in Markleeville. Also, the old Douglas Power Dam on the East Fork, where the waters enter Carson Valley, was breached with a 75-foot cut down to the riverbed, releasing thousands of tons of silt accumulated behind the dam over the years. Fortunately, the cut was relatively narrow and much of the silt remained above the dam. A number of homes in Gardnerville were saved when the Nevada Highway Department blew up a portion of the present Nevada Highway 56 in order to divert some of the raging floodwaters in the Cottonwood Slough. The flood crested just as waters began flowing down Gardnerville's main street. Virtually all farms along the Carson River East Fork south and east of Gardnerville and Minden sustained some damage or loss. By December 12th, the Cradlebaugh Bridge was under water by 18 inches and the surrounding lands were three feet under water. During this flood event the peak flow of the Carson River East Fork was recorded at 12,000 cfs in Carson Valley (capacity 2,500 cfs) and the peak flow of the Carson River West Fork at Woodfords was recorded at 3,500 cfs (capacity 600 cfs).¹⁰⁴

1938 (March 11–12) A localized wet-mantle (saturated soil) flood visited Carson Valley, only three months after particularly severe flooding in December 1937 caused considerable devastation throughout this area. This flood period began with heavy rains on the afternoon of March 11th and continued until midnight on March 12th, at which time the rains changed to snow and continued through the morning of March 13th. The rapid rise in the Carson River East Fork caused some damage to roads and a highway bridge; however, most of the damage was limited to the eastern portion of Carson Valley, which was subjected to raging torrents from Pine Nut Creek and Buckeye Creek flowing out of the Pine Nut Mountain Range. Most of the flooding during this event was caused by localized runoff, principally from the valley floor itself. Rains falling at higher elevations were insufficient to melt the existing snowpack and were largely absorbed, which limited damage caused by the Carson River East and West forks. Further limiting this flood's

- damaging effects was that after the December 1937 wet-mantle flood event, work had begun on clearing the Carson River East Fork's channel of logs, boulders, and other flood-related debris, significantly enhancing the East Fork's carrying capacity.¹⁰⁵
- 1938 (March 12)** The heavy rains falling on snow in the surrounding mountains caused the tailing pond dams to fail in Gold Canyon above Dayton, sending "thousands of tons of mud" down Gold Canyon Creek and spreading out in a fan-shape along the western edge of the community of Dayton, destroying businesses and filling homes with mud and debris. Since 1926, tailings from Comstock mill sites had been dammed in a series of tailings ponds located two miles above Dayton. The rampaging creek cut a channel through the upstream tailing pond dams 75 feet deep to bedrock and more than 100 feet wide at the top of the dam.¹⁰⁶
- 1939 (March 25)** The Underground Water Act was passed by the Nevada Legislature. Along with many subsequent amendments and additions, this act is now one of the most comprehensive ground-water laws in the western United States.¹⁰⁷ This act provided the mechanism for "designating" ground-water basins that the State Engineer determines are in need of additional administration. Such designation usually occurs when ground-water withdrawals and applications approach the perennial yield of the basin or when pending competitive applications to appropriate water exceed the perennial yield. The State Engineer is empowered to designate preferred uses of limited water resources within any designated ground-water basin.¹⁰⁸ Currently, approximately 116 of Nevada's 232 ground-water basins are so designated.¹⁰⁹
- 1940** A pair of archaeologists, S.M. and Georgia Wheeler, working for the now-defunct Nevada State Parks Commission, discovered the complete, well-preserved mummified remains of a man, surrounded by unusually intricate woven bags and mats, in a small cave near Grimes Point, located a few miles east of Fallon in Churchill County, Nevada. Forty-five years later, using a radiocarbon dating process not developed until 1994, which tested amino acids in the mummy's bones, it was found that the mummy was not 2,000 years old as first thought, but 9,415 years old. This made the find the oldest mummified remains ever unearthed in North America, and the third-oldest directly dated human bones on the continent. The woven bags and mats buried with the body showed that humans were thousands of years more advanced in weaving and textiles than previously believed. This Lahontan marsh-dweller was called the "Spirit Cave Man," and his people are believed to have inhabited this area between 9,500–7,000 years ago as Lake Lahontan was in its descension phase. Between 7,000 and 4,000 years ago, western Nevada became extremely arid, including a 1,000-year period commonly termed "The Big Drought." It is thought that during this later period, the region became more or less uninhabitable for humans, and the native people living in the Lahontan Valley either died off or migrated north to wetter climates, such as the Klamath or Modoc regions.¹¹⁰
- 1941** U.S. Senator Patrick McCarran (Nevada) and local Fallon business leaders pressed the U.S. Army Air Corps to investigate the advantages of establishing a training station in the Lahontan Valley. A crude air strip already existed some eight miles southeast of Fallon where the terrain was well-suited to long runways. In August 1941, a selection board visited the site and agreed to develop a local base. The U.S. Army Corps of Engineers designed the facility and solicited bids for the construction work in July 1942. The

- runways were completed in the same year. In late 1943 the Navy, having found the area well suited for gunnery practice, initially took a six month lease and authorized construction of hangars and other buildings. The government obtained releases from property owners in Dixie Valley and the Carson Sink for the use of these areas as bombing and gunnery ranges. A torpedo range was also established at Pyramid Lake. The station was officially commissioned on June 10, 1944. After the war, on June 1, 1946, the base went into caretaker status, but was reopened on March 1, 1951 due to the Korean War. Over the years the Fallon Naval Air Station (NAS) expanded its operations and today the base constitutes an economic mainstay of Churchill County.¹¹¹
- 1943 (January 20–23)** Carson Valley and lower reaches of the Carson River were subjected to extensive flooding. This flood event was preceded by high winds through Carson Valley on January 19th. Heavy rain began falling on January 20th and continued through the night of January 22nd when the rain turned to snow. Later than night, however, the snow turned back to rain and rapidly washed away the accumulation of snow. By January 21st, both forks of the Carson River had reached flood stage with the destruction of many bridges and roads throughout Carson Valley. Agricultural fields in the northern portion of Carson Valley around the Cradlebaugh Bridge were completely inundated. Interestingly, due to war-time censorship restrictions enforced at this time, the *Gardnerville Record-Courier* had to go to press on January 22nd without news on the developing flood conditions. As a result, many Carson Valley residents did not receive timely advanced notice of the growing risk. By about February 1st, water had to be spilled from Lahontan Reservoir, and Derby Dam and the Truckee Canal were closed to further Truckee River diversions.¹¹²
- 1943** Donner Lake Dam was acquired from the Donner Lake Company by Sierra Pacific Power Company (SPPCo, successor to the Truckee River General Electric Company) of Reno, Nevada, and the Truckee–Carson Irrigation District, with one-half interest to each. Stored water in Donner Lake, located in Nevada County, California, is contained in the top 12 feet of the lake and amounts to approximately 9,500 acre-feet. Stored waters are privately owned by SPPCo for the municipal and industrial needs of the Reno–Sparks metropolitan area, located in Washoe County, Nevada, and by TCID as a supplemental water supply for the Newlands Project in Churchill County, Nevada.¹¹³
- 1944 (September 8)** Based on the “friendly suit” originally filed in March 1913 by the U.S. Reclamation Service (renamed the U.S. Bureau of Reclamation in 1923) on the behalf of the Newlands Project farmers to delineate Truckee River upstream water rights, the Orr Ditch Decree was entered adjudicating Truckee River water rights and incorporating the provisions of the 1935 Truckee River Agreement (along with the Floriston rates), which provided the framework for operating the river to meet those rights. This adjudication (Claim 3 with a 1902 priority date) permitted the Truckee–Carson Irrigation District to divert up to 1,500 cfs at Derby Dam into the Truckee Canal (with a nominal capacity of 900 cfs). The Orr Ditch Decree also granted the Pyramid Lake Paiute Indian Tribe the two most senior rights (Claims 1 and 2 with a December 8, 1859 priority date) on the river for irrigation purposes on 3,130 acres of bottom land and 2,745 acres of bench land on the reservation.¹¹⁴
- 1948** The Stillwater Wildlife Management Area (WMA) was established in Churchill County,

Nevada, under a tri-party agreement among the Truckee–Carson Irrigation District, U.S. Fish and Wildlife Service, and the Nevada Department of Wildlife (NDOW). Initially, approximately 224,000 acres (350 square miles) were included to protect wildlife and preserve wildlife habitat in the Lahontan Valley. In 1960 the management of this area was changed to a two-party agreement between USFWS and NDOW and in 1991 some 77,500 acres (121 square miles) were withdrawn from this area for the establishment of the Stillwater National Wildlife Refuge. Currently, the Stillwater WMA consists of approximately 146,500 acres (229 square miles) of very diverse wildlife habitat.¹¹⁵

1950 This year's series of flood events were particularly damaging to Carson Valley, as they were to Carson City and Eagle Valley, as well as that portion of the basin above Carson Valley. During this year the upper Carson River Basin was subjected to four flood event periods: (1) January 13–21; (2) November 10–20; (3) December 3–4; and (4) December 8–10. The January event was the least damaging of the four, but nonetheless inundated many fields in Carson Valley and subjected Minden to localized flooding due to clogged storm drains. The second set of flood events began in mid-November and ran intermittently through mid-December. These events created extensive property damage in Carson Valley and resulted in severe stream bed damage to the Carson River. The storm was characterized by extremely high winds and alternating snow and warm rains. During the November flood event, 7.41 inches of precipitation was recorded at Woodfords during the six-day period ending November 21. Flood damage from the East and West forks above Carson Valley was greater in this flood period than in 1937. One individual flying over Carson Valley on November 21st described the valley as "...a large lake dotted here and there with islands of soggy land on which cattle, sheep, and horses had huddled to escape the flood." A cloud burst precipitated the third flood event of the year, dropping nearly 6 inches of rain at Woodfords in a 24-hour period on December 3rd and producing another flood crest in Carson Valley. The final flood event of the year followed the previous one only by a couple of days, producing the third flood crest in Carson Valley during the November–December time frame. Damage to roads, bridges, fields and structures was extensive. During these series of floods, the peak flow of the Carson River East Fork in Carson Valley was recorded at 13,500 cfs (capacity 2,500 cfs) and the peak flow of the Carson River West Fork at Woodfords was recorded at 3,300 cfs (capacity 600 cfs).¹¹⁶

1951 The Anaconda Copper Mining Company purchased the Leviathan Mine in Alpine County, California, for sulfur mining by open-pit methods. The sulfur was to be used for processing Anaconda's copper ore at its Weed Heights mine near Yerington, Nevada in Mason Valley (Lyon County). Isabell Construction Company was hired for the excavation of the Leviathan Mine site, and the following year it began stripping away some 22 million tons of overburden. The overburden was dumped in three spoil areas, one of which consisted of a 26-acre site more than 130 feet in depth in the Leviathan Creek canyon. The waste consisted of low grade sulfur ore. Water from Leviathan Creek flowed around and seeped through these deposits, creating extensive acid mine drainage in Leviathan Creek and killing virtually all plant and animal life in this creek and Bryant Creek all the way downstream to the East Fork of the Carson River. Waters in this reach would remain largely toxic until remediation efforts were completed by the State of California in 1985.

- Mining operations began at the site in 1953 and continued through 1962 when Anaconda sold the mine. No mining was done at this site after that date.¹¹⁷
- 1954 (April)** An extensive fish kill occurred in Leviathan Creek below the Leviathan Mine site, along Bryant Creek and in the Carson River East Fork itself when a slug of acidic water was released from Anaconda's Leviathan Mine when overburden removal operations collapsed an old mining tunnel. Downstream ranchers became concerned about the mining operations when they noticed poor crop growth from diverted irrigation water and increased cattle mortality.¹¹⁸
- 1954** The U.S. Bureau of Reclamation formally released its feasibility study for its Washoe Project. This project was intended to build additional upstream reservoir sites on both the Carson and Truckee rivers to serve (primarily) Nevada agricultural interests and provide hydropower. Flood control needs were also incorporated into the USBR's study.¹¹⁹ The Washoe Project contained proposals for both the Carson River Basin and the Truckee River Basin, including:¹²⁰
- [1] *Carson River Basin*—Watasheamu¹²¹ Dam and Reservoir (and Watasheamu Power plant), Dressler Diversion Dam and Afterbay, Carson Canal, Paiute Dam and Reservoir, and the enlargement of Stillwater Point Reservoir;
 - [2] *Truckee River Basin*—Prosser Creek Dam and Reservoir, Stampede Dam and Reservoir, Marble Bluff Dam and Pyramid Lake Fishway.
- The Watasheamu Dam and Reservoir and the Dressler Diversion Dam were to be located on the Carson River East Fork below Bryant Creek. The Carson Canal was to connect the Dressler Afterbay with the Carson River West Fork. The Paiute Dam and Reservoir was to be located approximately 12 miles northeast of Fallon in Churchill County. All the projects proposed for the Truckee River Basin were completed; however, none of those water projects proposed for the Carson River Basin were ever funded.
- 1955** The California–Nevada Interstate Compact Commission, a federal-level agency designed to address the myriad local problems tied to water allocation, was formed. The primary purpose of this commission was to fund the Washoe Project, a proposed U.S. Bureau of Reclamation project that grew out of studies conducted by the U.S. Army Corps of Engineers and the USBR during the 1930's designed to resolve water-related disputes between California and Nevada and guarantee water supplies to the Newlands Project in Churchill County, Nevada.¹²²
- 1955 (August)** Public Law 353 was passed whereby Congress granted its consent to the states of California and Nevada to negotiate and enter into a compact with respect to the distribution and use of the waters of the Truckee, Carson, and Walker rivers, Lake Tahoe, and the tributaries of such rivers and lakes within these states.¹²³ However, 16 years later, after both states has passed legislation addressing these issues by means of the California–Nevada Interstate Compact, Congress refused to ratify it.¹²⁴
- 1955** California and Nevada each appointed their own commission with the same name—the California–Nevada Interstate Compact Commission—in response to the interstate issues being continually raised on matters pertaining to the Truckee River and Lake Tahoe. When the two commissions met as one body, it was referred to as the Joint California–Nevada Interstate Compact Commission.¹²⁵ This body worked together until 1968 when a Draft Interstate Compact was produced for consideration and adopted by each

- state's legislature.
- 1955** The Carson-Truckee Water Conservancy District was formed for the purpose of handling contractual and repayment procedures for the Washoe Project, a program intended, in part, to control the periodic flooding on the Truckee River. The district covered all of Washoe and Churchill Counties and Carson City, plus extensive portions of Lyon, Douglas, and Storey Counties. It was governed by a board of seven members which included a member from the Truckee-Carson Irrigation District, Sierra Pacific Power Company, Washoe County Water Conservation District, and a representative from the Subconservancy District in Carson Valley.
- 1955 (December 18–24)** The Carson River Basin was subjected to its worst recorded flooding up to this date, with the Carson City gage [USGS gaging station 1031100] recording a peak flow of 20,400 cfs.¹²⁶ During a two-day period of December 18th and 19th, 4.01 inches of rain was recorded at Woodfords with 3.19 inches falling on December 19th alone. During this flood event there was 60 hours of continuous heavy rainfall. The Woodfords Weather Station also reported that another 9.91 inches of rain fell between December 20–23. By December 23rd, both East and West forks of the Carson River were flooding wildly. On December 27th, President Eisenhower added Douglas County to the original disaster relief area he had set up on December 24th. The 1955 flood event was the most damaging and costly flood on record to date. On December 28th, the Soil Conservation Service (SCS) estimated the peak flow of the East Fork where it enters Carson Valley at 14,000 cfs (capacity 2,500 cfs) and the peak flow of the West Fork at Woodfords at 3,300 cfs (capacity 600 cfs).¹²⁷
- 1956** Congress authorized the Washoe Project,¹²⁸ a U.S. Bureau of Reclamation program intended to build additional upstream reservoir sites on both the Carson and Truckee rivers to serve (primarily) Nevada agricultural interests and provide hydropower. While all the projects proposed for the Truckee River Basin were completed, none of those water projects proposed for the Carson River Basin were ever funded.
- 1956** The Fish and Wildlife Act was passed giving additional impetus to the federal wildlife refuge program by authorizing the U.S. Fish and Wildlife Service to acquire land for refuge purposes for all kinds of wildlife.¹²⁹
- 1957** In a letter written by California Department of Fish and Game Warden Artie G. Brown, he stated that Leviathan Creek, a tributary to Bryant Creek and the Carson River East Fork, was always polluted downstream of the Leviathan Mine as evidenced by yellow colored water and yellow sediment ("yellowboy")¹³⁰ deposited on the bottom of the stream bed. Therefore, mining activity may have only worsened a pre-existing condition. Even so, fish were reportedly caught in Bryant Creek as late as May 1953, indicating that such a condition was not nearly as severe prior to the commencement of mining operations at this location.¹³¹
- 1958 (January and July)** Two bioassay studies were performed in this year with cutthroat trout to show the toxic impacts of Leviathan Mine discharges on Leviathan and Bryant creeks. The first study was performed at the Verdi Fish Hatchery (Nevada) in aquarium tanks, and the second on site in live boxes constructed of wire mesh. Both studies showed toxicity in the head waters of Bryant Creek (at the confluence of Mountaineer and Leviathan creeks). The in-stream study also indicated that toxicity existed along the entire reach of

- Bryant Creek all the way to the Carson River East Fork. The results of these studies confirmed impairment of cold fresh water habitat, a beneficial use designated for both Leviathan and Bryant creeks.¹³²
- 1959 (November)** Another massive fish kill on the East Fork of the Carson River was caused by acid mine drainage from the Leviathan Mine in Alpine County, California in the upper Carson River Basin. A breach in Anaconda's containment pond dike released approximately five million gallons of acid mine drainage into Leviathan Creek, which then flowed into Bryant Creek, and finally on to the East Fork, where the fish kill was reported as far as ten miles below Bryant Creek's entry into the East Fork. The absence of trout among the fish killed indicated that continuous discharges from the mining site had already eliminated the more sensitive trout species that had existed before the open-pit operations had begun in 1953.¹³³
- 1962** As part of the original Washoe Project, the USBR officially announced its intention to construct the Watasheamu Dam and Reservoir on the Carson River East Fork below Bryant Creek. The project envisioned by the USBR called for a dam 300 feet high resulting in a reservoir containing approximately 160,000 acre-feet and extending upstream for approximately nine miles, actually crossing the state line into California. Plans also included (see 1955 entry) an afterbay below the Watasheamu Dam at the present Ruhstroth site, the construction of a canal (the Carson Canal) connecting the East Fork to the West Fork, an 800 kilowatt power plant and some drainage laterals within Carson Valley. The estimated cost of the project (current dollars) was \$23 million. Carson Valley farmers, having seen the subsequent controversy tied to Lahontan Dam and Reservoir, and still in litigation with the federal government (*U.S. v. Alpine Land and Reservoir Company, et al.*) were reluctant to subscribe to the USBR's project proposal.¹³⁴
- 1963 (February)** Major flooding occurred in Carson Valley and the Carson River Basin. While recorded total flood damages of this flood event exceeded those of the 1955 flood event (estimated at \$1,012,210 in 1963 versus an estimate of \$835,822 in 1955), strict comparison is not possible or realistic due to different levels of development and changing replacement costs.¹³⁵
- 1964** The U.S. Secretary of the Interior formed a task force to study and report on methods to resolve the persistent controversies resulting from intense competition for the limited waters from the Truckee and Carson rivers, and particularly related to the issues of the diversion of Truckee River waters into the lower Carson River Basin for use within the Newlands Project. Subsequently, an Interior Committee was established to formulate Operating Criteria and Procedures (OCAP) for the Newlands Project in Churchill County, Nevada.¹³⁶
- 1964 (October)** The U.S. Secretary of the Interior approved a report ("Action Program for Resource Development, Truckee and Carson River Basins—California and Nevada"). Important findings and recommendations included:¹³⁷
- [1] Article 35 of the original 1926 compact between the USBR and the TCID should be satisfied (committing the USBR to the delivery of 406,000 acre-feet of water for the irrigation of a maximum of 74,500 acres of Newlands Project farmlands);
 - [2] The Secretary of the Interior should promulgate regulations (the OCAP—

- Operating Criteria and Procedures) defining amounts and conditions of water releases for the Newlands Project;
- [3] The Secretary of the Interior, in consultation with TCID, would issue regulations on return flows for the Stillwater [Wildlife Management] Area;
 - [4] The drainage and supply system relating to the Stillwater Area shall be improved;
 - [5] Public lands would be withdrawn in the Stillwater Area; and
 - [6] Policies would be implemented to clearly support the greatest possible flows of water into Pyramid Lake in support of the Pyramid Lake Indians.
- 1966** The Endangered Species Preservation Act was passed. This act constituted the precursor of the Endangered Species Act (ESA) of 1973.¹³⁸
- 1967 (February 6 and March 6)** Pyramid Lake reached its lowest surface level in recent history (3,783.9 feet MSL),¹³⁹ approximately 86.1 feet lower than it was in July 1911 (3,870.0 feet MSL) shortly after diversions began at Derby Dam into the Truckee Canal. This level was also 94.3 feet lower than the maximum surface level of 3,878.2 feet MSL recorded on September 1, 1891.¹⁴⁰ The Pyramid Lake fish species cui-ui (*Chasmistes cujus*) could no longer swim up the Truckee River delta on their own to spawn. It was later estimated by the U.S. Army Corps of Engineers that Pyramid Lake needed an annual inflow of at least 440,000 acre-feet to maintain a stable lake level,¹⁴¹ although other estimates indicate that a lesser amount, approximately 385,000 acre-feet would suffice.¹⁴² According to stream gaging reports, Truckee River flows at the Nixon gaging station [USGS gaging station 10351700] have averaged 356,920 acre-feet per year over the 1958–1994 period of record (resulting in an average annual deficit of between 28,080–83,080 acre-feet) and have been as low as 17,450 acre-feet (1992) and as high as 1,888,840 acre-feet (1983).¹⁴³
- 1967** The Pyramid Lake cui-ui fish species was identified as in danger of extinction (endangered) under the federal Endangered Species Preservation Act of 1966.¹⁴⁴
- 1967 (February 13)** The U.S. Secretary of the Interior issued the first Newlands Project regulations—Operating Criteria and Procedures (OCAP)—that required project farmers to conserve water, use as much water from the Carson River, minimize diversions from the Truckee River, and improve project irrigation efficiency. By this action, total irrigated acreage was set at 74,500 acres with an annual water allocation of 406,000 acre-feet using both the Carson and Truckee rivers. These amounts were originally established in the contract between the U.S. Bureau of Reclamation and the Truckee–Carson Irrigation District in 1926.¹⁴⁵ Project OCAPs would be re-instituted annually through 1972.¹⁴⁶
- 1967 (October 1)** In an effort to reduce diversions from the Truckee River for the Newlands Project, the 1967 OCAP discontinued the practice of using water for single-purpose [electrical] power generation at the Lahontan and Carson Diversion dams except as incidental to other authorized purposes such as irrigation.¹⁴⁷ Since their construction in the early 1900's, power had been generated and sold at these facilities throughout the year, thereby increasing diversions of Truckee River water at Derby Dam for uses other than irrigation. According to TCID files, between 1910 and 1966 (encompassing the 1915–1967 period when hydropower was generated) approximately 240,000 acre-feet were diverted into the Truckee Canal each year.¹⁴⁸ From 1967 through 1994, a period of record after the termination of hydropower-specific diversions, Truckee River diversions at Derby

- Dam have averaged 183,160 acre-feet per year, an average reduction of 23.6 percent per year in diverted Truckee River water.¹⁴⁹
- 1968** The Pyramid Lake Paiute Indian Tribe filed the first in a series of lawsuits based on the 1967 OCAP (*Pyramid Tribe of Paiute Indians v. Walter J. Hickel, Secretary of the Interior*), claiming that water was being wasted within the Newlands Irrigation Project. The suit was primarily aimed at reducing Truckee River water diversions at Derby Dam, thereby allowing more of the river's waters to flow into Pyramid Lake.
- 1968 (July)** After thirteen years of negotiations between the two states, the joint California-Nevada Interstate Compact Commission approved a provisional Interstate Compact for the division of the waters of Lake Tahoe, and the Truckee, Carson, and Walker rivers. This provisional compact, with some modification, was eventually ratified by both states (California in September 1970 and Nevada in March 1971). The compact created the Tahoe Regional Planning Agency (TRPA). However, the compact was never ratified by Congress, which would have made it law. Even so, both states chose to implement its terms through individual state legislation.
- 1969 (July)** In a meeting at Lake Tahoe, the U.S. Secretary of the Interior and the Governors of the states of California and Nevada came to an agreement that action was urgently needed to halt the recession of Pyramid Lake. Just two years prior, in March 1967, Pyramid Lake had reached its lowest level (nadir) in recorded history and was nearly 83 feet below its level recorded in June 1912. As a result of this meeting the Pyramid Lake Task Force was created and subsequently published their findings and recommendations on December 31, 1971.¹⁵⁰
- 1969** The Endangered Species Conservation Act was passed. This was the last such act before the final passage of the Endangered Species Act (ESA) of 1973.¹⁵¹
- 1969** The National Environmental Protection Act (NEPA) was passed establishing the U.S. Environmental Protection Agency (EPA) and requiring Environmental Assessments (EAs) and Environmental Impact Statements (EISs) for all major construction projects.
- 1970** Another soil survey of the Fallon Paiute-Shoshone Indian Reservation's 5,480 acres near Fallon in Churchill County concluded that approximately 1,600 acres were non-irrigable, down from the 2,410 non-irrigable acres found in 1932.¹⁵²
- 1970 (August)** A suit (*Pyramid Lake Paiute Tribe of Indians v. Rogers C.B. Morton, et al.*) was filed against the U.S. Secretary of the Interior and the U.S. Attorney General for failure to protect water rights and other property rights of the Pyramid Lake Indian Tribe, including the full rights to use and receive Truckee River waters for maintaining Pyramid Lake's fishery.¹⁵³
- 1970 (September 19)** California passed legislation adopting the California-Nevada Interstate Compact.¹⁵⁴
- 1970 (August 25)** The Pyramid Lake Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) was listed as a species in danger of extinction (endangered) under the federal Endangered Species Conservation Act of 1969.¹⁵⁵
- 1971 (March 5)** The Nevada Legislature formerly adopted the terms of the California-Nevada Interstate Compact which the California Legislature had approved in September 1970.¹⁵⁶ While this compact was never ratified by Congress, many of its provisions pertaining to the Truckee and Carson rivers and Lake Tahoe were eventually formalized and

- incorporated into Public Law 101-618, the Negotiated Settlement, in November 1990. Compact provisions regarding the Walker River were not incorporated into the Negotiated Settlement.
- 1971** In a fairly typical year, TCID reported in their 1971 annual report to the USBR that the Newlands Project withdrew 391,700 acre-feet of its annual allotment of 406,000 acre-feet from the Truckee and Carson rivers. Of this amount, 56 percent, or 219,352 acre-feet, came from the Carson River and 44 percent, or 172,348 acre-feet, came from the Truckee River. Further, it was reported that the net supply available to project farmers was 362,612 acre-feet, but of this amount only 213,705 acre-feet actually reached farmlands; the remainder was lost to seepage or spilled to wildlife areas, representing an overall project water efficiency of 59 percent [net water available to the farmlands divided by total gross diversions].¹⁵⁷
- 1971 (December)** The Pyramid Lake Task Force, a group formed in 1969 to study the problems associated with Pyramid Lake's recession, published their findings and recommendations. Based on 40 years of record from 1929-1969, it was found that Pyramid Lake was experiencing an annual water deficit of 135,000 acre-feet based on annual Truckee River inflows of 250,000 acre-feet per year, lake surface precipitation of 55,000 acre-feet per year, and annual surface evaporation of 440,000 acre-feet.¹⁵⁸ Some of the Task Force's recommendations called for a combination of water importation (Columbia River), weather modification (cloud seeding), and water salvaged from inbasin sources, which alone could add as much as 95,150 acre-feet per year for downstream uses.¹⁵⁹ It was determined that if this 95,150 acre-feet could be salvaged and diverted into Pyramid Lake, the lake's surface elevation would stabilize by the year 2580 at an elevation some 40 feet below its current (1971) level.¹⁶⁰ It was also noted in this report that greater efficiencies in the Newlands Project could save as much as 85,650 acre-feet.¹⁶¹
- 1972** The Clean Water Act (CWA) was passed and was based on the 1965 Water Quality Act. The new act dramatically increased the goal of zero toxic discharges providing for "fishable" and "swimmable" surface waters.¹⁶²
- 1972** The California Wild and Scenic Rivers Act was passed requiring that certain rivers possessing extraordinary scenic, recreation, fishery, or wildlife values be preserved in their free-flowing states. The act specifically prohibited the construction of dams, reservoirs, and most water diversion facilities on river segments included in the wild and scenic river system.¹⁶³ The California wild and scenic river system would come to include portions of the Klamath, Scott, Salmon, Trinity, Smith, Eel, Van Duzen, and American rivers, the upper portion of the West Walker River, as well as the portion of the Carson River East Fork between Markleeville and the California-Nevada state line. The major difference between the national and state acts is that if a river is designated wild and scenic under the state act, the Federal Energy Regulatory Commission (FERC) can still issue a license to build a dam for hydropower generation on that river. For this reason, designation under the National Wild and Scenic Rivers Act (1968) affords enhanced protection to a river system.¹⁶⁴
- 1972** The Carson River was declared to be a navigable stream by the Nevada Supreme Court in the case *State of Nevada v. Bunkowski, et al.* This case was nationally recognized and often cited as it was the precedent-setting decision which recognized a stream as navigable

- based on its use to float logs rather than boats. Due to this status, the State of Nevada owns the bed and banks to the ordinary and permanent high water mark. Uses of this land are regulated by the Nevada Division of State Lands.¹⁶⁵
- 1972 (July 11)** Based on extensive aerial reconnaissance and mapping, it was determined that the Newlands Project in Churchill County, Nevada, had 64,388.4 acres of improved irrigated lands. These lands consisted of 5,300.3 acres in the Truckee Division, which included the Fernley, Hazen, and Swingle Bench areas of the Newlands Project serviced from the Truckee Canal alone, and 60,209.1 acres in the Carson Division, which included the Stillwater, Stillwater Indian Reservation, Fallon, Island and Sheckler areas serviced below Lahontan Dam from both the Carson and Truckee rivers, for a total of 65,509.4 acres, less 1,121.0 acres of fallowed lands.¹⁶⁶
- 1972 (August)** A non-governmental Pyramid Lake task force, initiated by the Sierra Club, published its report which sought a physical solution for the maintenance of Pyramid Lake at its present level without destroying competing beneficial uses associated with the Newlands Project.¹⁶⁷ The major competitive uses (aside from the Newlands Project) were determined to be the Stillwater Wildlife Management Area, the Carson Lake and Pasture (for its agricultural productive value), and the recreational role of Lahontan Reservoir. Principal recommendations included:¹⁶⁸
- [1] Reduce Lahontan Reservoir's storage capacity from a maximum of 319,000 acre-feet to 150,000 acre-feet;
 - [2] Reduce the Newlands Project acreage from 64,600 acres to approximately 48,000 acres;
 - [3] Reduce the Newlands Project annual water diversions from 400,000 [actually 406,000] acre-feet to 273,000 acre-feet per year; and
 - [4] Reduce the present size of the Stillwater Wildlife Management Area and Carson Lake and Pasture and upgrade the remaining areas with physical improvements (e.g., dikes, regulating devices, etc.).
- 1973 (February)** Litigation that began in 1968 by the Pyramid Lake Paiute Tribe (*Pyramid Tribe of Paiute Indians v. Walter J. Hickel, Secretary of the Interior*) and in 1970 (*Pyramid Lake Paiute Tribe of Indians v. Rogers C.B. Morton, et al.*) resulted in a decision by the U.S. District Court in Washington, D.C., that the U.S. Bureau of Reclamation, and specifically, the U.S. Secretary of the Interior, was required to deliver to Pyramid Lake all Truckee River water in excess of valid Newlands Project water rights. This February 20, 1973 judgement, popularly known as the Gesell Opinion (named after U.S. District Court Judge Gerhard Gesell), contained new operating criteria for the Newlands Project calling for a stepwise reduction in allowed diversions of water from the current diversion amount of 406,000 acre-feet per year (based on the 1926 USBR and TCID agreement) to 350,000 acre-feet in 1973 and then to 288,129 acre-feet each year for the years 1974 through 1984. Annual OCAPs would be put into effect during 1985, 1986, and 1987, and the current ("final") OCAP would be put into effect in 1988.¹⁶⁹ It was estimated that annual Truckee River diversions at Derby Dam would be reduced from approximately 187,000 acre-feet per year to approximately 108,000 acre-feet. The court's claim of excessive project diversions of Truckee River waters was based on: (1) the definition and delineation of bench lands (water duty of 4.5 acre-feet per year) and bottom

- lands (water duty of 3.5 acre-feet per year); (2) project irrigation inefficiencies;¹⁷⁰ and (3) the alleged lack of compliance by TCID with various interim OCAPs.¹⁷¹
- 1973** The Endangered Species Act (ESA) was passed superseding and strengthening the Endangered Species Preservation Act of 1966 and the Endangered Species Conservation Act of 1969. The U.S. Fish and Wildlife Service and the National Marine Fisheries Service (NMFS) shared the authority and responsibility to list endangered species, determine critical habitat, and develop recovery plans for listed species. Provisions also required the act's re-authorization by Congress every five years.¹⁷²
- 1973** U.S. Secretary of the Interior Rogers Morton officially notified TCID that every acre-foot of excessive diversions of water, based on the 1973 OCAP and the Gesell Opinion, would have to be returned to Pyramid Lake.¹⁷³
- 1973 (August)** The Truckee–Carson Irrigation District's delay in complying with the U.S. Department of the Interior's operating criteria prompted the federal government to threaten TCID with federal resumption of control of the Newlands Project and cancellation of its 1926 operating agreement. Despite USBR directives and the federal court order (Gesell Opinion), TCID continued to distribute irrigation water according to earlier standards. USBR Commissioner, Gilbert Stamm, visited Fallon and met with local representatives to explain the danger of continuing to refuse to meet the new criteria. The meetings failed to reach an agreement.¹⁷⁴
- 1973 (September 17)** Amid growing frustrations and increasing acrimony, the U.S. Department of the Interior gave the Truckee–Carson Irrigation District a one-year required notice of its intention to cancel TCID's contract to operate the Newlands Project, effective October 31, 1974.¹⁷⁵
- 1973** Based on growing controversies surrounding the Newlands Irrigation Project and associated water rights issues, the Federal District Court in Washington, D.C. (which had entered the Gesell Opinion), ordered the implementation of a new Operating Criteria and Procedures.¹⁷⁶
- 1973 (December 21)** In order to halt the decline in Pyramid Lake's water level, the Pyramid Lake Paiute Indian Tribe attempted to show that since its cultural heritage was clearly one of fishing and not farming, its reserved water rights (1908 Winters Doctrine and the federal reservation doctrine) should be based on the water necessary to sustain the lake's fishery, rather than a lesser amount of water based on the irrigation of farmlands and the concept of "practicably irrigable acreage." The United States, on behalf of the Pyramid Lake Paiute Tribe, therefore filed a lawsuit (originally *U.S. v. TCID*, but later renamed *Nevada v. United States*) against the Nevada parties¹⁷⁷ involved in the 1944 Orr Ditch Decree seeking to reopen that decree to obtain a reserved water right with an 1859 priority date for the Tribe to maintain lake levels for fishery purposes.¹⁷⁸ As part of this process, the United States government also sought water for other federal "reservations," namely the Stillwater Refuge (designated in 1948), the Toiyobe National Forest (set aside in 1905, 1909, 1926), and for other purposes.¹⁷⁹ On June 24, 1983 the U.S. Supreme Court ruled against the federal government and the Indian Tribe and refused to open the Orr Ditch Decree to litigate additional water claims under the federal reservation doctrine.¹⁸⁰
- 1974 (March)** The Truckee–Carson Irrigation District sued the federal government (*TCID v. Secretary of the Interior*) in U.S. District Court in Reno, Nevada, over the contract

- cancellation in 1973. Later, in 1983, a judgement would rule against the Lahontan Valley farmers and TCID, and would uphold the contract cancellation, after which time TCID would operate the project under an interim contract. On August 18, 1983, the U.S. District Court would decide that: (1) the Secretary of the Interior had authority to issue OCAPs pursuant to the 1926 contract; (2) the Secretary had properly terminated the 1926 contract; and (3) the U.S. had a right to possession and control of the Newlands Project.
- 1974 (July)** The City of Fallon filed a lawsuit (*City of Fallon, et al. v. Secretary of the Interior*) under the National Environmental Policy Act (NEPA) enjoining the United States from taking over the Newlands Project or from enforcing the U.S. Department of the Interior's operating criteria (1973 Gesell Opinion and new OCAP) in the absence of compliance with the provisions of NEPA and the submission of a formal Environmental Impact Statement (EIS). By mutual agreement of the federal government, the Pyramid Lake Paiute Indian Tribe, the Nevada Wildlife Federation, the City of Fallon, and others, the 1973 OCAP was not to be implemented until the completion of the OCAP EIS. On November 4, 1983, as a motion had not been filed, this case was dismissed, without prejudice, even though the EIS was still not final.¹⁸¹
- 1975 (July 16)** Pyramid Lake's endangered Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) was reclassified to threatened under the ESA of 1973 because of the successful establishment of additional populations and hatchery rearing programs.¹⁸²
- 1975** Monitoring data recorded from 1954 (one year after Anaconda began open-pit mining at the Leviathan Mine site in Alpine County, Nevada) to 1975 demonstrated significant mining impacts to water quality in the Leviathan Creek and Bryant Creek drainage areas in the form of high metal and sulfate concentrations, and low pH and dissolved oxygen concentrations in Leviathan and Bryant creeks. Iron and arsenic concentrations exceeded the U.S. Public Health Services's 1962 Drinking Water Standards as far as seven miles downstream from the mine. No fish were found in Leviathan or Bryant creeks between the mine and the East Fork of the Carson River, a distance of approximately nine miles. A bioassay study showed toxicity throughout this entire reach from the mine to the East Fork. Further, stream bottom studies revealed that no invertebrates existed along this reach and that the benthic environment of the East Fork did not fully recover until two miles below the entry of Bryant Creek. Soil samples irrigated by Bryant Creek waters also showed low soil pH that could result in metal toxicity with continued use.¹⁸³
- 1976** The federal Safe Drinking Water Act (SDWA) was passed establishing uniform drinking water standards for the nation.¹⁸⁴
- 1976 (June)** In response to a letter from the Department of Justice insisting that the Federal Water Master in Reno, Nevada, enforce the terms of the 1944 Orr Ditch Decree with respect to the diversion of water from the Truckee River, the Federal Water Master responded by filing a petition (*Petition of the Watermaster in U.S. v. Orr Ditch Decree*). The Federal Water Master wanted to adhere to past practices permitting excess diversions, despite the terms of the decree, if in his opinion, no decreed rights were being adversely affected. Continuance of such practices would, in effect, allow unappropriated Truckee River waters, i.e., flood waters, to be diverted at Derby Dam for use in the lower Carson River Basin (Newlands Project and Lahontan Valley wetlands), as opposed to allowing them to flow into Pyramid Lake.

- 1977** (October 1, 1996–September 30, 1977) The Carson River’s lowest annual average rate of flow, measured near Carson City, Nevada, [USGS gaging station number 10311000] was recorded at 42,352 acre-feet, equivalent to an average annual rate of flow of 58.5 cfs, well below the annual average rate of flow of 284,100 acre-feet (water years 1940–1994) or 392 cfs. This would constitute, generally, the “Low Water Year” for most USGS gaging stations within the Carson River Basin. [By contrast, the Carson River’s highest recorded annual average rate of flow—“High Water Year”—was attained in 1983 at 826,774 acre-feet, equivalent to an average rate of flow of 1,142 cfs.]¹⁸⁵
- 1978** An important U.S. Supreme Court case (*California v. United States*) held that the federal government must obtain water rights under state law for reclamation projects, unless state law conflicted with clear Congressional directives. As a practical matter, the U.S. Bureau of Reclamation had normally participated in the state permitting process since its inception with the Reclamation Act of 1902.¹⁸⁶
- 1978** Amendments were made to the Endangered Species Act (of 1973).¹⁸⁷
- 1978** Public Law 95–337 was passed to compensate the Indians of the Fallon Paiute–Shoshone Indian Reservation in Churchill County, Nevada, for continuing irrigation problems on reservation lands. The act added 2,640 acres to the reservation (bringing the total acreage up to 8,120 acres) to compensate for the 1,600 non-irrigable acres found in the 1970 resurvey. This brought total irrigable and water-righted acreage up to 5,440 acres, although actually only between 1,800 and 2,700 acres are typically irrigated.¹⁸⁸
- 1978** (November 24) The Truckee–Carson Irrigation District filed a suit in the U.S. Court of Claims (*TCID v. United States*) claiming monetary damage for breach of an alleged implied contract between TCID and the federal government. TCID claimed the right to recover revenues lost as a result of it having to forego the sale of winter hydroelectric power from the Lahontan Dam structure since 1967. At issue was the government’s 1967 stipulation (OCAP) which prevented such power sales and, by so doing, reduced TCID’s diversion of Truckee River water for uses other than agriculture production on Newlands Project farmlands.
- 1980** (October 28) Based on litigation begun on May 1925 (*U.S. v. Alpine Land and Reservoir Company, et al.*), the Alpine Decree was entered (Judge Bruce R. Thompson, U.S. Ninth District Court, Nevada) to resolve water rights disputes of the Carson River and obtain a guaranteed supply of Carson River water for the USBR’s Newlands Project. After 55 years of litigation, this represented the longest court battle ever between the federal government and private interests over water rights.¹⁸⁹ The lengthy litigation effectively precluded any serious consideration of establishing dams on the Carson River or its East and West forks over this entire time period (1925–1980). As applied to lands within the Newlands Project, the decree established a maximum irrigation water duty of 4.5 acre-feet per acre per year for water-righted bench land and 3.5 acre-feet per acre per year for bottom lands, *delivered to the land*.¹⁹⁰ For lands above Lahontan Reservoir, the water duties were established 4.5 acre-feet per acre per year for the bottom lands, 6.0 acre-feet per acre per year for alluvial fan lands, and 9.0 acre-feet per acre per year for bench lands *diverted to the canal*.¹⁹¹ While the Alpine Decree established water duties for bench and bottom lands, it made no identification of those lands. The water duties apply to all irrigated lands within the Newlands Project and therefore affect allowable diversions from

the Truckee River as well. Judge Thompson also affirmed the right of property owners in the project to own their water rights individually (“...Each such landowner is the owner of an appurtenant water right for the patented land...”), as opposed to ownership by the federal government.¹⁹² This individual ownership of water rights within the Newlands Project has important implications in the federal government’s ability to cancel or reacquire these water rights, except by means of outright purchase from willing sellers. It also has implications on when the rights were appropriated (perfected) and the abandonment of such water rights through non-use.¹⁹³ For purposes of administering the decree, the Carson River and its tributaries were divided into eight segments:¹⁹⁴

- [1] *Segment 1*—The East Fork of the Carson River from the California– Nevada state line up to the headwaters of the East Fork in the mountains;
- [2] *Segment 2*—The East Fork of the Carson River from the California– Nevada state line to the confluence of the East and West forks of the Carson River;
- [3] *Segment 3*—The West Fork of the Carson River from the gauge at Woodfords, California upstream to the headwaters in the mountains;
- [4] *Segment 4*—The West Fork of the Carson River from the gauge at Woodfords to the California–Nevada state line;
- [5] *Segment 5*—The West Fork of the Carson River (and Brockliss Slough) between the California–Nevada state line and the confluence of the East and West forks of the Carson River;
- [6] *Segment 6*—The main stream of the Carson River from the confluence of the East Fork, West Fork and Brockliss Slough to the gauge at Carson City;
- [7] *Segment 7*—The main stream of the Carson River from the Carson City gauge to Lahontan Reservoir. This segment is further subdivided for administration into autonomous subsegments:
 - (a) Mexican Ditch, Dayton and the reach between Rose Ditch and Cardelli Ditch, inclusive;
 - (b) Gee Ditch;
 - (c) Koch Ditch;
 - (d) Houghman and Howard Ditches;
 - (e) Buckland Ditch.
- [8] *Segment 8*—The area below the Lahontan Dam.

1981 The U.S. Geological Survey began a two-year monitoring project at the Leviathan Mine site on Leviathan Creek in Alpine County, California. Forty-five monitoring sites, both above and below the mine site, were sampled at least once during the 1981–1982 monitoring period, and samples from 26 sites were analyzed for major cations, anions, and a wide range of minor constituents. The following water quality samples were recorded for above the mine site, below all mine impacts, and at Bryant Creek, approximately two miles downstream from the mine, respectively (constituents are for dissolved concentrations only and presented in milligrams per liter—mg/l): (1) *pH*—[7.4 / 3.3 / 4.6]; (2) *Sulfate*—[13.4 / 769.4 / 362]; (3) *Iron*—[0.5 / 81.9 / 19.5]; (4) *Arsenic*—[0.004 / 0.3 / 0.1]; (5) *Aluminum*—[0.3 / 29.8 / 9.9]; and (6) *Nickel*—[0.01 / 0.7 / 0.3].¹⁹⁵

1981 (October 1) A period of wet years began in the water basins of northwestern Nevada. This period, which included the record “High Water Year” of 1983 for the Carson River

- Basin, would last through 1986. During this 1982–1986 (water year) period,¹⁹⁶ the Carson River Basin recorded an average annual snowpack water content 138 percent of normal, ranging from a low of 85 percent of normal (1985) to 206 percent of normal (1983).¹⁹⁷
- 1982** Further amendments were made to the Endangered Species Act.¹⁹⁸
- 1982** The Pyramid Lake Paiute Indian Tribe won an important suit (*Carson-Truckee Water Conservation District v. [U.S. Attorney General] Clark*) that obtained dedicated water rights for the endangered Pyramid Lake cui-ui fish species and the threatened Lahontan cutthroat trout.¹⁹⁹ The original ruling in the 1944 Orr Ditch Decree held that the 1908 Winter’s Decision applied to reserved water rights for irrigation only on the Indian reservation; water rights for lake restoration and the fishery operations would have to be adjudicated (determined by court action). This new suit (an adjudication) provided the dedicated upstream source of water for the Tribe’s fishery by ruling that the waters of Stampede Reservoir,²⁰⁰ which was constructed in 1970 as part of the Washoe Project, were to be used solely for the benefit of the Pyramid Lake fishery.
- 1982** The U.S. Bureau of Reclamation offered a re-evaluation of the Watasheamu Dam and Reservoir project proposal they had originally made in 1962 as part of the Washoe Project. The new cost, for a somewhat scaled-down version of the earlier project, was now deemed to be prohibitive, having grown from \$23 million in 1962 to \$130 million in 1982. Recognizing the growing urban populations in the Carson, Eagle (Carson City), and Dayton valleys in this re-evaluation, the USBR included both irrigation and municipal and industrial uses in developing its cost-benefit analysis.²⁰¹
- 1982** (**October 1, 1992–September 30, 1983**) Beginning of the wettest year ever recorded in the Carson River Basin. This year became the standard “High Water Year” for virtually all creeks, streams, and rivers within the basin. The Carson River’s annual average rate of flow near USGS Fort Churchill in the Carson River Canyon [USGS gaging station 10312000] for this year was recorded at 804,331 acre-feet, equivalent to an average flow rate of 1,111 cfs. [By contrast, the Carson River’s lowest recorded annual average rate of flow at this station was attained in 1977 at 26,280 acre-feet, equivalent to an average rate of flow of 36.3 cfs.]²⁰² The Carson River East Fork near Markleeville [USGS gaging station 10308200] recorded an annual average flow of 585,692 acre-feet (809 cfs),²⁰³ while the Carson River West Fork at Woodfords [USGS gaging station 10310000] recorded an annual average flow of 176,650 acre-feet (244 cfs).²⁰⁴
- 1983** (**January 24**) With respect to the issuance of the Alpine Decree (*U.S. v. Alpine Land and Reservoir Company, et al.* on October 28, 1980), the Ninth Circuit Court of Appeals affirmed the decision of the lower court on all but one issue: the appellate court, on appeal, remanded for additional evidence the decision of Judge Bruce R. Thompson (U.S. Ninth District Court) to establish a 30,000 acre-foot minimum pool for public fishing and recreation at Lahontan Reservoir. No subsequent effort was taken to establish a minimum pool in this reservoir until 1995 negotiations related to Public Law 101–618.
- 1983** It was definitively determined by the U.S. District Court in Reno, Nevada,²⁰⁵ that the informal transfers of water rights within the Newlands Project that had been allowed by The Truckee–Carson Irrigation District from 1927 until 1969 were, in fact, governed by Nevada Water Law. Specifically, it was found that the requirements of the Nevada Water Law of 1913 should have been applied to every case in which there had been a change in place of

- use in the Newlands Project from 1913 until 1983.²⁰⁶ As a result of this determination, water rights applications for past water transfers on project farmlands were filed with the Nevada State Engineer.
- 1983 (April 1)** High water year for the Carson River Basin. Winter snowpack water content of the basin's snowpack measured on this date was 206 percent of normal.²⁰⁷
- 1983 (June 24)** Based on the lawsuit (*Nevada v. United States*, originally *U.S. v. TCID*)²⁰⁸ filed by the federal government on behalf of the Pyramid Lake Indian Tribe in 1973 to open the Orr Ditch Decree based on the "reservation doctrine" and obtain additional waters for the Pyramid Lake fisheries, the U.S. Supreme Court ruled in favor of the existing water right holders that the Orr Ditch Decree was final and binding on all parties and that it should not be reopened on the reserved rights issue (1908 Winters Doctrine).²⁰⁹
- 1983 (June)** After assuming control for remediation efforts with respect to the Leviathan Mine site, located on Leviathan Creek in Alpine County, California, the California Regional Water Quality Control Board (Lahontan Region) opened bids for the construction of the Leviathan Mine Pollution Abatement Project. As all the bids exceeded available state funds, the state attorney general initiated legal action under the 1980 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) against Anaconda Minerals, a wholly-owned subsidiary of ARCO, to recover funds for the cleanup and abatement of water pollution generated by the Leviathan Mine. Agreement was reached and a construction contract was awarded on August 15, 1983.²¹⁰
- 1983 (August 8)** Based on the lawsuit (*TCID v. Secretary of the Interior*) filed by the Truckee-Carson Irrigation District against the U.S. Secretary of the Interior in March 1974 for the cancellation of its contract, the U.S. District Court in Reno, Nevada, decided in favor of the federal government stating that: (1) the Secretary of the Interior had the authority to issue Operating Criteria and Procedures pursuant to the 1926 contract; (2) the Secretary had properly terminated the 1926 contract; and (3) the United States had a right to possession and control of the Newlands Project. TCID appealed this decision to the Ninth Circuit Court of Appeals.
- 1983 (August 22)** Construction of the Leviathan Mine Pollution Abatement Project was begun to reduce the acid mine drainage into Leviathan Creek, a tributary of Bryant Creek and the Carson River's East Fork. With two winter shutdowns, the project would not be completed until 1985. Though some of the problems encountered during construction went unsolved, the completed project achieved several important objectives that would significantly enhance downstream water quality. For example, infiltration in the pit was reduced, Leviathan Creek was channelized to prevent contact with mining wastes, and acid mine drainage was being stored in evaporation ponds to reduce volumes of such drainage discharged and to coincide discharges with periods of high creek flows. These site improvements were expected to reduce the length of stream impacted and reduce contaminant loads.²¹¹
- 1983 (December 19)** Alpine Mining Enterprises, the owner of the Leviathan Mine site located in Alpine County, California, deeded the last of 23 patented lode claims and the Leviathan Mill site claim to the State of California. The State Public Works Board had authorized the acquisition of the Leviathan Mine with a resolution dated January 31, 1984, and subsequently transferred jurisdiction of Leviathan Mine to the State Water Resources

- Control Board in a letter dated August 20, 1984. California would now undertake the task of developing a work program to continue monitoring this contamination site and attempt to improve on-going remediation efforts.²¹²
- 1983 (December 31)** U.S. Fish and Wildlife Service reported that more water was received (496,000 acre-feet) in the Stillwater Wildlife Management Area, located near the mouth of the Carson River, in calendar year 1983 than in any of the previous 38 years.²¹³ By September 1984, the surface-water altitude in the Carson Sink was 3,876.2 feet MSL, a level probably the highest in more than 100 years (see 1868 entry on the reported “joining” of the Carson and Humboldt sinks). Between July 1984 and February 1985 the lake formed in the Carson Sink inundated about 330 square miles (212,000 acres) to a maximum depth of 12 feet, making it the largest areal extent of any water body in the State of Nevada.²¹⁴ By late 1986, the subsequent effects of these inflows, which were more than eight times normal, along with high constituent levels and dissolved solids (salts), freezing weather, and rapid evaporation, combined to wreck havoc on fish and wildlife in this area.
- 1984 (February 14)** Based upon the August 1983 resolution of the suit filed by the Truckee-Carson Irrigation District in March 1974 against the Secretary of the Interior over contract cancellation (*TCID v. Secretary of the Interior*) in favor of the federal government, an interim contract was signed with TCID. It was stipulated that the contract, *Temporary Operation and Maintenance Agreement*,²¹⁵ can be terminated by either party with 45 days written notice. The issue of recoupmnt of excess waters diverted between 1973 and 1983 remained unresolved, however.
- 1984 (November 26)** The Nevada State Engineer held the first hearings on the transfer of water rights within the Newlands Project that had been allowed by TCID on an informal basis between 1927 and 1969. Seven days of hearings were held over a period of three months in 1984 and 1985.²¹⁶ The Pyramid Lake Paiute Indian Tribe argued that 25 of the 129 transfer applications were not perfected, or had been abandoned or forfeited.²¹⁷ Nonetheless, the State Engineer approved all 129 transfer applications²¹⁸ “subject to existing rights on the sources and subject to water duties affirmed or modified by the Federal Watermaster.” The Tribe appealed all the rulings and the United States petitioned for a review of all rulings.²¹⁹
- 1985** The U.S. Bureau of Reclamation published an Environmental Assessment (EA) which examined alternative OCAPs for the Newlands Project. This resulted in a Finding of No Significant Impact (FONSI) for the 1985 OCAP within the range of alternatives outlined in the EA. Public comment, however, resulted in the decision to develop a full EIS.²²⁰
- 1985** The USBR’s Environmental Assessment (EA) found that within the Newlands Project 63,100 acres were being irrigated, of which 57,518 acres had legal project water rights. It was estimated that of this difference of 5,582 acres, 900 acres were irrigated by groundwater, 475 acres were irrigated with return flow rights, and 4,207 acres were being irrigated which lacked documented water rights or for which water right transfer applications were incomplete.²²¹
- 1985** In part due to the lack of success in the funding and construction of the Watasheamu Dam and Reservoir Project (as part of the U.S. Bureau of Reclamation’s Washoe Project), the Nevada Legislature called for a study of potential reservoir sites in the upper watershed of the Carson River. One potential reservoir site recommended for further study was the

- Bodie Dam and reservoir, which would be located on the East Fork of the Carson River entirely within Nevada.²²²
- 1985 (August 30)** Based on a U.S. Bureau of Reclamation contract commissioned on August 22, 1984, Chilton Engineering, Chartered, of Reno, Nevada, determined that there existed a total of 73,858.88 water-righted acres as part of the Newlands Project in Churchill County, Nevada. This total amount consisted of 68,396.48 acres of Truckee–Carson Irrigation District acres, 22.10 acres of additional acreage concluded to be part of the TCID acres, and 5,440.30 acres of Fallon Indian Reservation water-righted acreage.²²³
- 1985** It was reported that in the Fallon area (Newlands Project) during this year about 70 percent of the total irrigated acreage (62,000 acres) and 85 percent of the total crop revenue (\$17,650,000) involved the production of alfalfa. The remaining 30 percent of irrigated acreage consisted mostly of pasture, on which beef, dairy cattle, and sheep fed. Other cash crops included barley, wheat, corn, and vegetables.²²⁴
- 1986 (February)** Nine days of rain on the Sierra Nevada Mountain snowpack dramatically increased river flows in the Truckee, Carson, and Walker River basins.²²⁵ This marked the end of one of the wettest periods of record (1982–1986 [water years], including the wettest year on record—October 1, 1982–September 30, 1983). It also marked the beginning of the worst recorded drought period in the history of these water basins (1987–1994).
- 1986 (April)** The Nevada Division of Environmental Protection and Nevada Consumer Health Services²²⁶ issued a public health advisory which recommended that the consumption of fish taken from Lahontan Reservoir on the lower Carson River be limited due to high levels of methyl mercury in lakebed sediments. It was noted that much of the mercury in the reservoir was used in the recovery of silver and gold during the Comstock mining era and subsequently dumped into the Carson River.²²⁷
- 1986** A graduate thesis written by Wendy Milne, a student in the Department of Geology and Geologic Engineering, Colorado School of Mines, in Golden, Colorado, reconstructed Truckee River flows without upstream agriculture diversions and other human intervention and hypothesized that the Pyramid Lake/Winnemucca Dry Lake system would have been at a level above the sill and existed as one large lake until 1930 if pristine conditions had prevailed.²²⁸ The “joining” of these lakes would have required a joint surface elevation of approximately 3,861 feet MSL (1,177 meters), a level approximately 64 feet above Pyramid Lake’s July 31, 1995 highstand surface elevation of 3,796.94 feet MSL.²²⁹
- 1986 (June)** The U.S. Bureau of Reclamation issued its Draft Environmental Impact Statement (DEIS) for a new long-term OCAP for the Newlands Project. The DEIS allowed for a probable range of annual diversions, using the waters of both the Carson and Truckee rivers, ranging from the 288,129 acre-feet established in the 1973 Gesell Opinion (OCAP) to 406,000 acre-feet, which was the limit established in the 1967 OCAP.²³⁰
- 1986** U.S. Senator Paul Laxalt (Nevada), after attempting to negotiate outstanding issues of the California–Nevada Interstate Compact pertaining to the apportionment of the waters of Lake Tahoe and the Truckee, Carson, and Walker rivers between the two states, failed in his effort to have Congress ratify the compact. A major issue of contention was a phrase in the compact which stated that the use of waters by the federal government, its agencies, instrumentalities, or wards was to be credited against the use by the state in which it is

- made. This limitation, combined with new court interpretations of the federal reserved water rights (Winters Doctrine), waters required for Pyramid Lake fish species under the Endangered Species Act, and public trust doctrine issues, all combined to derail Congressional approval.²³¹
- 1986** Based on the failure of the California–Nevada Interstate Compact to be ratified and continuing conflicts and litigation over Truckee and Carson River water rights, in particular, U.S. Senator Harry Reid (Nevada) began negotiations among state, federal, and other interests. These negotiations eventually resulted in the passage of Public Law 101–618 (the Negotiated Settlement) in November 1990.²³²
- 1986 (October 1)** A period of drought began in the water basins of northwestern Nevada. This period would last for essentially eight years through 1994. During this 1987–1994 (water year) period, the Carson River Basin recorded an average annual snowpack water content 61 percent of normal, ranging from a low of 36 percent (1988) to 123 percent (1993).²³³
- 1986 (October 8)** Based on an appeal filed by the Pyramid Lake Indian Tribe over the State Engineer’s approval of a total of 129 Newlands Project applications for water rights transfers in March, May, and September of 1985, the U.S. District Court affirmed the State Engineer’s ruling with the exception of ordering the State Engineer to adjust certain transfers to reduce the transferee acreage when transfers were made from bottom lands (water duty of 3.5 acre-feet per acre per year) to bench lands (water duty of 4.5 acre-feet per acre per year). In this manner, the 4.5 acre-feet per acre water duty would still be applied, but to a smaller parcel of land, resulting in an effective water duty of 3.5 acre-feet per acre per year. In an important issue, the court disallowed the Tribe’s claim of abandonment and forfeiture,²³⁴ and instead ruled that “...disputes as to the existence...of beneficial use, abandonment or forfeiture should be raised before the [Federal] Watermaster prior to complaining to this Court for relief.”²³⁵ After amended orders were entered on January 20, 1987, on February 19, 1987, the Pyramid Lake Indian Tribe filed an appeal to the United States Court of Appeals for the Ninth Circuit on this ruling.²³⁶ TCID also filed an appeal on this decision, requesting that transfer acreage adjustments ordered by the Court be made on an equal acreage basis and that one acre-foot per acre would not be used on transferee bottom lands to effect the same end.²³⁷
- 1986 (December)** Following considerable inflows of water (estimated at 496,000 acre-feet) into the Carson Sink in 1983 from both the Carson and Humboldt rivers, state and federal biologists reported a massive fish kill near the mouth of the Carson River, in the Carson Sink, which is part of the Fallon National Wildlife Refuge. By early February 1987, the estimated number of dead fish totaled about 7 million. Fish carcasses were found along 40 miles of shoreline and about 1,500 aquatic birds of many species were also found dead, mainly near the Humboldt Slough on the western side of the sink. After further investigation, the situation was attributed to excessively high TDS levels, due to both evaporation and water freezing, and the congregation of feeding birds, which allowed an outbreak of avian cholera to spread easily.²³⁸
- 1987 (April 1)** The snowpack water content of the Carson River Basin was recorded at only 48 percent of normal for this time of year²³⁹ and a record drought period began, lasting through 1994 (eight years). Its effects would adversely impact stream flows, reservoir levels, habitat and wildlife, as well as dramatically alter conservation and water use

- practices throughout the water basins of Northern Nevada. Interestingly, this drought period had essentially the same duration as the 1928–1935 drought period.
- 1987** U.S. Senator Harry Reid (Nevada) began formal discussions with primary Truckee River water users—Pyramid Lake Paiute Indian Tribe, Sierra Pacific Power Company, and the Truckee–Carson Irrigation District—about settling various litigation over the waters of the Truckee River. The Pyramid Lake Indian Tribe demanded that the Newlands Project water allocation from both the Truckee and Carson rivers be cut back to a maximum of 300,000 acre-feet per year. However, the Lahontan Valley farmers were only willing to reduce the project’s annual water requirement to 350,000 acre-feet.²⁴⁰
- 1987 (November)** The U.S. Fish and Wildlife Service issued its *Biological Opinion* pursuant to the U.S. Bureau of Reclamation’s request for formal consultation on the long-term OCAP Draft Environmental Impact Statement originally submitted in June 1986. Accordingly, the USFWS concluded that the implementation of “Alternative E” at 320,000 acre-feet or less of total allowable Newlands Project water diversions (including both Truckee and Carson River waters) would not likely jeopardize the continued existence of the endangered cui-ui fish species or bald eagle populations. Further, the USFWS also determined that this scenario would not affect the endangered peregrine falcon or the threatened Lahontan cutthroat trout.²⁴¹
- 1987 (December)** *Final Environmental Impact Statement for the Newlands Project Proposed Operating Criteria and Procedures* was issued by the U.S. Bureau of Reclamation. The report was intended to describe the environmental consequences of adopting the most recent OCAP for 1988 and future years. The OCAP intended to reduce Newlands Project diversion stepwise from 332,000 acre-feet in 1989 to 326,000 acre-feet in 1990, to 322,000 acre-feet in 1991, and to the ultimate goal of 320,000 acre-feet or less by 1992.²⁴²
- 1988** Further amendments were made to the Endangered Species Act.²⁴³
- 1988** Recognizing its importance as a key migration and wintering area for up to one million waterfowl on the eastern edge of the Pacific Flyway, the Lahontan Valley Wetland System was named to the Western Hemisphere Shorebird Reserve Network. It was also nominated for inclusion under the Convention of Wetlands of International Importance, thereby attesting to the continental significance of this area.²⁴⁴
- 1988** In the *State of Nevada v. Morros*, the Nevada Supreme Court upheld the State Engineer’s issuance of a water permit for using Blue Lake for public recreation and as a fishery. It was stated that the permit was in the public interest and therefore constituted a beneficial use of water. This authorized an *in situ* use of water rather than a traditional diversionary consumptive use. An important distinction between this case and the 1983 California Public Trust Doctrine case (*National Audubon Society v. Superior Court*), in which the California State Supreme Court ruled that the State Water Resources Control Board may reconsider the effects of past water allocations and, possibly, even transfer existing water rights to other [more] beneficial uses,²⁴⁵ was that the Nevada permit was an original allocation, not a transfer. Furthermore, the Nevada case was based on existing Nevada water law rather than on the public trust doctrine. The following year, the Nevada Legislature would take action to legislate these uses as beneficial.
- 1988 (April 15)** The U.S. Secretary of the Interior adopted a new Operating Criteria and Procedures (“Final OCAP”) for the Newlands Project with respect to allowable water

- diversions. From this date through at least December 31, 1997,²⁴⁶ the project's annual water allotment would be determined by a "maximum allowable diversion" (MAD) concept, which is based on actual project water-*righted and* irrigated acreage, bench and bottom lands designations, and the water duty assigned to those lands as specified in the 1944 Orr Ditch Decree and the 1980 Alpine Decree. TCID records showed that this acreage totaled approximately 59,800 acres, of which 4,085 acres were located in the Truckee Division, fed directly from the Truckee Canal (Truckee River waters only), and 55,715 acres were in the Carson Division, fed from Lahontan Reservoir (Carson and Truckee River waters).²⁴⁷
- 1988** (May) Due to severe drought conditions which resulted in (April 1) 1987's snow water content in the Carson River Basin to be 48 percent of normal and 1988's only 36 percent of normal,²⁴⁸ western Nevada farmers appealed for emergency disaster relief. The Nevada Farm Bureau estimated the drought would cost the state's farm economy \$30 million.²⁴⁹
- 1989** The Nevada Legislature passed Assembly Bill (AB) 322 which stated that "the watering of wildlife, and the establishment and maintenance of wetlands, fisheries, and other wildlife habitats" constitutes a beneficial use of water.²⁵⁰
- 1989** (April 14) By this date, the Nevada State Engineer had approved another 138 water rights transfers for the Newlands Project based on the October 8, 1986 ruling by the U.S. District Court.²⁵¹ (In 1985, the State Engineer had approved an initial 129 transfers, making for a total of 267 transfers approved as of this date.) In each case, the State Engineer justified the transfers based on: (1) the assumption that Newlands Project water rights were vested with the federal government with a priority date of 1902 per both 1980 Alpine Decree and 1944 Orr Ditch Decree (thereby occurring before the 1913 Nevada Water Law which specifically prohibited the concepts of forfeiture and abandonment to water rights vested before 1913);²⁵² (2) the fact that the Alpine Decree addressed the issue that the farmers were not using water on the exact acreage for which they contracted on an acre-for-acre accounting; and (3) that the issue of forfeiture and abandonment was moot based on the U.S. District Court's October 8, 1986 ruling.²⁵³
- 1989** United States Court of Appeals for the Ninth Circuit reversed for further proceedings the U.S. District Court's October 8, 1986 decision relative to the Nevada State Engineer's 1985 approval of the transfer of 129 water rights on Newlands Project farmlands. This decision, sometimes referred to as "Alpine II," also affected an additional 138 transfers approved by the State Engineer in 1987, 1988, and 1989.²⁵⁴ The appeals court decided that "The district court's error was to conclude that Nevada law is wholly irrelevant [on Newlands Project farmlands], and that it is inappropriate for the [State] Engineer to adjudicate the issues of perfection, forfeiture, or abandonment." On July 25, 1990, the U.S. District Court would remand the issue back to the State Engineer "...for whatever proceedings he shall deem reasonable and proper..."²⁵⁵ Based on this decision, the State Engineer was required to hold hearings on all water rights transfers previously approved for the Newlands Project.
- 1990** (August) The U.S. Environmental Protection Agency designated the Carson River Mercury Site (CRMS) a Superfund site in accordance with the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). In making this designation, it was found that mercury laden tailings were distributed in Washoe Valley

(Truckee River Basin) and throughout the Carson River Basin below New Empire (near the former Empire City).²⁵⁶ The mercury was the result of milling operations in these areas during the Comstock era (1859–1900) when mercury was used to recover gold and silver from ore. It has been estimated that approximately 7,500 tons (200,000 flasks) of mercury were released into the region during this period.²⁵⁷ Upon this designation, the EPA began an extensive investigation (termed Remedial Investigation and Feasibility Study, or RI/FS) to evaluate human health risks and assess measures to reduce these risks. After an assessment of the potential threat to humans, the feasibility study would develop and evaluate alternatives to achieve the cleanup objectives established in the remedial investigation. This remedial investigation portion of the EPA's study would be completed by year-end 1994.²⁵⁸

1990 (November 7) In hearings for the 138 water rights transfers approved by the State Engineer in 1987, 1988, and 1989,²⁵⁹ all transfers were approved based on the threshold issue of the vested date of transfer being the 1902 date when the Newlands Project was granted its water right per the Orr Ditch Decree (Claim 3). This finding would be appealed by the Pyramid Lake Paiute Indian Tribe on the basis that the vested right should not be based on the date when the federal government obtained "project" water rights, but when the rights became fixed by actual diversion and application through beneficial use to a specific parcel of property or by actual appropriation.²⁶⁰

1990 (November 16) Public Law 101-618 was enacted into law in two titles:²⁶¹

- [1] *Title I*—The Fallon Paiute-Shoshone Indian Tribal Settlement Act; and
- [2] *Title II*—The Truckee-Carson-Pyramid Lake Water Rights Settlement Act.

Seven main elements were covered by the legislation including:

- [1] Promote the enhancement and recovery of [Pyramid Lake's] endangered and threatened fish species;
- [2] Protect [Lahontan Valley] wetlands from further degradation;
- [3] Encourage the development of solutions for demands on Truckee River waters;
- [4] Improve the management and efficiency of the Newlands Project;
- [5] Settle Fallon Paiute-Shoshone water issues;
- [6] Settle Pyramid Lake Paiute Tribe water issues; and
- [7] Settle California-Nevada interstate water apportionment.

The act gave Sierra Pacific Power Company 39,500 acre-feet of drought storage space in federal reservoirs for the Reno-Sparks metropolitan area, located in Washoe County, Nevada, provided that a water meter retrofit program was implemented. It also called for the federal government to acquire by purchase or by other means water rights for Pyramid Lake and for the Lahontan Valley wetlands (Stillwater Wildlife Refuge and Carson Lake and Pasture). More importantly, the act attempted to settle much of the on-going litigation surrounding Truckee and Carson River water rights. Most important for TCID and the Lahontan Valley farmers was Section 209(h)(1) which stated that "...Subsections 209(d), (e), (f), and (g) of the act would not become effective unless and until the Truckee-Carson Irrigation District has entered into a settlement agreement with the Secretary [of the Interior] concerning claims for recoupment of water diverted in excess of the amounts permitted by applicable operating criteria and procedures."²⁶² Another important section

of this settlement document was Section 204.(a)[Carson River](6) which stated that "Nothing in this title shall preclude the State of Nevada...from constructing storage facilities within the Carson River Basin...except that such storage facilities...shall not result in the inundation of any portion of the East Fork of the Carson River within California."²⁶³ This section recognized California's inclusion of a portion of the East Fork from Markleeville to the state line in that state's Wild and Scenic Rivers System and effectively eliminated the possibility of constructing the Watasheamu Dam and Reservoir, which would have covered nearly five miles of the East Fork in California above the state line.²⁶⁴

- 1991** The Stillwater National Wildlife Refuge was established consisting of 77,500 acres (121 square miles) which were withdrawn from the 224,000-acre (350 square-mile) Stillwater Wildlife Management Area, which was established in 1948. The refuge is located approximately 15 miles east of Fallon within Churchill County, Nevada, on the edge of the Carson Sink. Today, the Stillwater NWR includes a variety of habitats, from freshwater sloughs and marshes to brackish-water marshes and alkali flats. Each habitat hosts a unique assemblage of plants and invertebrates, which in turn attracts more than 160 bird species and many other animals.²⁶⁵ Due to the frequently poor quality of waters entering this area, consisting primarily return flows from upstream Newlands Project irrigation, the area has experienced periodic fish and wildlife kills.²⁶⁶
- 1991 (April 1)** Carson River Basin snowpack water content recorded at 63 percent of normal. Truckee River Basin snow water content was 60 percent of normal while Lake Tahoe's was 64 percent of normal.²⁶⁷
- 1991 (May)** Due to persistent drought conditions and below normal snow water content in the Carson and Truckee River basins, Churchill County commissioners requested Nevada Governor Bob Miller to declare the county a disaster area. Fallon area farmers would get only 30 percent of their normal water deliveries for this year.²⁶⁸
- 1991 (June)** Nevada Governor Bob Miller declared eleven Nevada counties agricultural disaster drought areas. Crop and livestock losses were expected to total approximately \$70 million.²⁶⁹
- 1991 (September 4)** Following the completion of the Leviathan Mine Pollution Abatement Project in 1985, the U.S. Environmental Protection Agency, in conjunction with the California Regional Water Quality Control Board, Lahontan Region, conducted a toxicity study in Leviathan and Bryant creeks. Retention Pond 4 was not spilling into Leviathan Creek at the time of the sampling. Bryant Creek showed neither acute or chronic toxicity below the confluence of Leviathan and Mountaineer creeks, a point approximately two miles below the Leviathan Mine. The study demonstrated that the pollution abatement project substantially reduced the length of downstream waters made toxic by Leviathan Mine discharges during periods when pond overflows do not occur.²⁷⁰
- 1992 (January)** The U.S. Bureau of Reclamation issued its revised *Initial Bench & Bottom Land Map & Criteria* report for the Newlands Project. The report opened with a quote by Professor James N. Luthin of the University of California at Davis, which noted the fallacy in assuming that soils such as those of the Newlands Project, underlain with sandy layers and having been idle for centuries, would be safe from waterlogging (establishment of an artificially high water table).²⁷¹ It was noted that the Newlands Project had been

hampered by water logging soon after the start of irrigation. The criteria used to classify lands as to either bench or bottom included two aspects: (1) the available water-holding capacity in the top five feet of the soil profile (AWHC5), and (2) the seasonal high water table (SHWT). By this classification system, of the total 73,789 acres recorded as being within the Newlands Project, there existed 64,233 acres of bottom lands (water duty of 3.5 acre-feet per acre per year) and 9,556 acres of bench lands (water duty of 4.5 acre-feet per acre per year).²⁷²

1992 (April) The De Bruyn Report was issued relative to an efficiency study of the Newlands Project and related matters. It was proposed that with upgraded facilities, extensive (and very costly) canal lining, and more precise diversion measuring capabilities, total potential water conservation within the project could total as much as 212,000 acre-feet per year out of a total annual water diversion of 375,000 acre-feet. It was also estimated that total farm consumptive water use was 155,000 acre-feet per year on 58,000 irrigated acres, and that the agriculture leaching requirement was approximately 8,000 acre-feet per year. Admittedly, this optimum level of project efficiency would come at an extremely high price. For example, lining the central 20 miles of the Truckee Canal's 32.5 mile length, where losses were estimated at 30,000 acre-feet per year, was estimated to cost \$40 million with an additional \$3.55 million annual operations and maintenance expense. This study also estimated that 1,066,016 acre-feet constituted the total payback (recoupment) for Truckee River waters diverted by TCID in excess of allowed OCAP amounts based on three component parts:²⁷³

- [1] 21,434 acre-feet of water the U.S. District Court allowed diverted in 1988 from storage in Stampede Reservoir;
- [2] 321,117 acre-feet of Truckee River water diverted to Lahontan Reservoir during such times when it was in spill or drawdown conditions; and
- [3] 723,485 acre-feet of Truckee River water diverted in excess of OCAPs established by the 1973 (U.S. District Court) Gesell Opinion covering the years 1973–1984 and subsequent OCAPs covering the years 1985, 1986, and 1987.

1992 (May 26) In response to an appeal to the United States Court of Appeals for the Ninth Circuit by the Pyramid Lake Paiute Indian Tribe (see November 7, 1990 entry), the appellate court found that the individual water rights of Newlands Project farmers did not vest in 1902 when the United States obtained project-wide water rights as had been determined by the Nevada State Engineer, but became vested on an individual basis when the rights became fixed by actual diversion and application through beneficial use to a specific parcel of property or by appropriation. This second appeal to the Ninth Circuit Court on the issue of the transfer of these project water rights became known as "Alpine III."²⁷⁴

1992 (September 5) The continuation of a severe drought in the Carson River Basin, which began in 1987, caused the Carson River to virtually stop flowing at the Carson City gage [USGS gaging station 10311000].²⁷⁵

1992 (October 30) Congress passed the Western Water Policy Act of 1992 (Public Law 102–575, Title XXX) which directed the President to undertake a comprehensive review of federal activities in the nineteen Western states which directly or indirectly affect the

- allocation and use of water resources, whether surface or subsurface, and to submit a report of findings to the Congressional committees having jurisdiction over federal water programs.²⁷⁶ The report was to be submitted to these committees within three years from the date of enactment (October 30, 1995; extended in 1995 to October 1997). The legislation required the President to appoint an Advisory Commission, known as the Western Water Policy Review Advisory Commission, consisting of twenty-two members, to undertake two primary areas of research: (1) a description of the status of water and related resources in the West today; and (2) an investigation of how water is managed in western river basins and watersheds, with an emphasis on the federal role. Six river basin studies were anticipated to cover: (1) the Columbia River; (2) the Colorado River; (3) the Platte River; (4) the Sacramento and San Joaquin Rivers; (5) the Upper Rio Grande; and (6) the Truckee and Carson Rivers. The legislation authorizing the Commission noted that at least fourteen federal agencies have water-related responsibilities, resulting in “unclear goals and an inefficient handling of the nation’s water policy.” It was noted that conflicts between competing goals and objectives among federal, state, and local agencies and private water users is particularly apparent in the Western states.²⁷⁷
- 1993 (March 5)** The Truckee–Carson Leasing Authority (TCLA) became incorporated in Nevada as a non-profit organization. TCLA’s organizers created the agency to encourage TCID farmers to lease their water rather than sell it to satisfy upstream urban demands, wetland and wildlife needs, and other uses. It was feared that if water right holders in the Newlands Project sold their water rights outright, it would soon become too expensive and inefficient to operate the irrigation system for those who wished to remain in agriculture. Under TCLA’s organizational plan, members were to pay a \$125 membership fee and then give ten percent of any profits derived from leasing to TCLA for operating costs. After an investigation by the U.S. Department of Justice, TCLA agreed that no more than 25 percent of the water-righted acreage in the Newlands Project would be involved at any one time in leasing.²⁷⁸
- 1993 (May and June)** The U.S. Bureau of Reclamation office in Carson City, Nevada, advised the Truckee–Carson Irrigation District to prevent water deliveries to lands involving 190 water rights transfers.²⁷⁹ These instructions pertained to lands for which water rights transfers had been previously approved by the Nevada State Engineer. As a result of this action, the transferees filed a motion with the U.S. District Court for a preliminary injunction. On June 9, 1994, this motion for preliminary injunction against the federal government was denied.²⁸⁰ The State Engineer was now forced to hold hearings to determine precisely when appropriations began on the original water-righted project lands and, if coming after the 1913 Nevada Water Law, if the concept of forfeiture and abandonment applied before the water rights were transferred to other project farmlands.²⁸¹
- 1993 (October)** Fallon and Fernley residents formed the Lahontan Valley Environmental Alliance (LVEA). The LVEA represented an inter-local agreement between the City of Fallon, Town of Fernley, Churchill County, Truckee–Carson Irrigation District, Lahontan Conservation District, and the Stillwater Conservation District. LVEA representatives represented all residents of TCID including the Newlands Water Protective Association (NWPA), which represents many water right owners.²⁸² Until this time, that representation had been left up to individual farmers themselves.²⁸³ This signified a more

- community-wide effort to negotiate a settlement to outstanding water issues and to maintain a viable agricultural industry in the region.
- 1993 (December)** U.S. Senator Harry Reid (Nevada) and U.S. Senator Bill Bradley (New Jersey), both Democrats, held hearings in Reno, Nevada, to take testimony on whether Congress should re-authorize the Newlands Irrigation Project.²⁸⁴
- 1994 (April)** Betsy Rieke, Assistant Secretary of Water and Science of the U.S. Department of the Interior, reported to Congress that the U.S. Bureau of Reclamation was ready to take over the Newlands Project if the farmers could not negotiate a new contract to operate it. It was also noted in her testimony that the USBR had calculated the amount of Truckee River excess water diversions by TCID from 1973 through 1987 to be 1,058,000 acre-feet (see December 8, 1995 entry) and that in accordance with the Negotiated Settlement (Public Law 101-618, Section 209(h)(1)), the Secretary of the Interior was required to pursue through a negotiated settlement or litigation the recoupment of such waters.²⁸⁵
- 1994 (May 18)** Betsy Rieke, Assistant Secretary of Water and Science of the U.S. Department of the Interior, wrote a letter²⁸⁶ to the Nevada State Engineer, R. Michael Turnipseed, stating that even if Truckee-Carson Irrigation District's request for 100,000 acre-feet of additional Truckee River water was approved (see September 9, 1930 entry for application 9330), the USDI would not allow federal facilities to be used for the conveyance, storage, or delivery of Truckee River water appropriated pursuant to that application. Ms. Rieke stated that such approval was contrary to section 210(a)(2)(B) of the Truckee-Carson-Pyramid Lake Water Rights Settlement Act.²⁸⁷
- 1994 (May 31)** Based on the "threshold issue" of U.S. Department of the Interior's refusal to allow federal facilities to be used for the conveyance, storage, or delivery of any Truckee River water appropriated pursuant to Truckee-Carson Irrigation District's application 9330 (see entries under September 9, 1930 and May 18, 1994), the Nevada State Engineer granted the motion to deny TCID's application number 9330 summarily without ruling on whether there exists unappropriated water, whether this application would interfere with existing rights, or whether the application would threaten to prove detrimental to the public interest.²⁸⁸
- 1994 (June 30)** The Truckee-Carson Irrigation District filed an appeal in the Third Judicial Court of the State of Nevada, in and for the County of Churchill, to the State Engineer's May 31, 1994 ruling which denied additional Truckee River water rights. The court subsequently ruled to remand the case back to the State Engineer for a re-hearing so additional evidence and testimony could be presented. The hearing was scheduled for November 1995, but due to federal budget problems which affected USDI's ability to attend the November meeting, the hearing was not held until January 31, 1996.²⁸⁹
- 1994 (July)** U.S. Senator Harry Reid (Nevada) arranged for the services of a professional mediator from Resolve, Center for Environmental Dispute Resolution, an arbitration and mediation firm located in Washington, D.C.,²⁹⁰ to conduct negotiations to arbitrate outstanding issues on the Truckee and Carson rivers. Costs were to be split equally among the eight parties at the negotiating table (see September 1994 entry below).
- 1994 (August)** An assessment by the U.S. Census Bureau of trends in agriculture in Douglas County and Carson Valley showed the effects of urban encroachment on farming operations. Between the 1987 and 1992 census of agriculture years, total acreage in

farmlands in Douglas County (primarily Carson Valley) fell from 114,574 acres in 1987 to 79,635 acres in 1992, a decline of over 30 percent. The total number of farms in the county fell from 202 in 1987 to 172 in 1992 and the average farm size declined from 567 acres in 1987 to 463 in 1992. Irrigated acreage in Douglas County declined from 41,285 acres and 151 farms in 1987 to 33,082 acres and 136 farms in 1992. In 1987 irrigated acreage accounted for 36 percent of total farm acreage as compared to 41.5 percent in 1992, indicating that land being taken out of agriculture was primarily non-productive, unirrigated farmland. This was further supported by the value of farm marketings, which rose from \$9.031 million in 1987 to \$11.519 million in 1992.²⁹¹

1994 (August 8) The U.S. District Court of Nevada rejected a motion by Truckee–Carson Irrigation District to overturn the U.S. Bureau of Reclamation’s January 1992 (revised) classifications for bench and bottom lands within the Newlands Project and substitute its own bench/bottom designations as a starting point for the federal water master’s determinations. In its decision, the court specifically limited its jurisdiction to “deciding whether there has been a clear error of judgement and whether the USBR’s action was based upon consideration of the relevant factors.” It was noted in this decision that the most significant physical characteristic within the Newlands Project that distinguished the two types of land—bench and bottom—was the subsurface drainage conditions prevalent for each soil type. It was concluded that: (1) the Secretary of the Interior had not abused his discretion in such determination; (2) USDI field investigation substantially supported the accuracy of a previous survey conducted by the Soil Conservation Service (SCS); (3) the bench and bottom land criteria were established from scientific principles of irrigation and drainage; and (4) the judicial decision was in compliance with the Nevada law of beneficial use. The Court therefore confirmed the application of the USBR’s 1992 bench/bottom land report, but reserved the right to change such land classifications upon the submission of additional factual data by individual water users.²⁹²

1994 (September) Negotiator Gail Bingham from Resolve, Center for Environmental Dispute Resolution, convened the first meeting of the Truckee–Carson Settlement Negotiations in Reno, Nevada. Participants included:

- [1] U.S. Department of the Interior (Office of the Secretary);
- [2] State of Nevada (Department of Conservation and Natural Resources);
- [3] Pyramid Lake Paiute Indian Tribe;
- [4] Fallon Paiute–Shoshone Indian Tribe;
- [5] Truckee Meadows Regional Planning Governing Board (Washoe County);
- [6] Sierra Pacific Power Company (Westpac Utilities);
- [7] Lahontan Valley Environmental Alliance (LVEA);²⁹³ and
- [8] the Conservation Caucus (The Nature Conservancy, Environmental Defense Fund, Lahontan Wetlands Coalition).

Various working groups consisted of the Modeling Working Group, Water Quality, Land Use Planning, Hydro Power, and M&I (municipal and industrial). The initial deadline for the completion of negotiations was established to be January 31, 1995.²⁹⁴

1994 (December) After designating the Carson River Mercury Site (CRMS) a Superfund site in August 1990, the U.S. Environmental Protection Agency completed its investigation portion of its overall Remedial Investigation and Feasibility Study (RI/FS) to evaluate

human health risks and assess remediation measures. The EPA found that the health risks were limited to consumption of fish and waterfowl from the Carson River system and exposure to high concentrations of mercury in soil via incidental ingestion.²⁹⁵ As part of their effort to assess mercury levels in the environment, the EPA located and mapped 113 Comstock mill sites. Soil samples around these areas revealed that the highest mercury levels in soil existed in Sixmile Canyon, where mill tailings still exist, and adjacent to the Carson River between New Empire and Dayton, where some of the larger Comstock mills operated. In addition to these sites, elevated mercury concentrations were also found where discharged tailings from historic mill sites have been deposited. These areas included: (1) the alluvial fan below Sixmile Canyon; (2) the floodplain of the Carson River below New Empire; (3) the active channel of the Carson River below New Empire; and (4) the sediments of Lahontan Reservoir, Carson Lake, Stillwater Wildlife Refuge, Indian Lakes, and the Washoe Lakes (in Washoe Valley in the Truckee River Basin). Elevated concentrations of mercury in Sixmile Canyon and Brunswick Canyon (the latter flowing into the Carson River just below New Empire) were not considered a health risk because there was not frequent human exposure within these areas at the present time.²⁹⁶ For the CRMS, the EPA proposed several remediation alternatives as the feasibility study (FS) portion of their RI/FS:

- [1] *Alternative 1: No Action*—Under this program, no remedial activities would be conducted; consideration of a no action alternative is required by Superfund for a baseline comparison;
- [2] *Alternative 2: Institutional Controls*—Included measures to protect public health without addressing contamination in the environment, including deed restrictions, posting signs, installing fences, and imposing restrictions for developing the land for residential use;
- [3] *Alternative 3: Capping*—Consisted of paving over the surface soil to prevent exposure;
- [4] *Alternative 4: Excavation*—Consisted of excavating the contaminated soil to a maximum depth of two feet, backfilling with clean soil and disposing of the contaminated soils at a landfill.

Based on its study of the CRMS, the EPA proposed to address six areas where mercury levels in soils were found to be of potential concern. These included five areas in Dayton on the Carson River and one area in Silver City up Sixmile Canyon. It was also proposed that the Silver City site and four of the sites in Dayton be addressed by the excavation alternative, i.e., removing the contaminated soil and backfilling. The sixth site was the ditch which conveys water from Gold Canyon to the Carson River. It was proposed that this area be fenced off to limit public access. Public comments were requested to be submitted by January 30, 1995.²⁹⁷

1994 (December) Although the promising oil deposits first discovered in 1904 around Soda Lakes in the Lahontan Valley never provided a boon to Churchill County's mineral wealth, the geothermal waters that made drilling for the elusive oil so difficult did eventually prove important. In this year, the largest geothermal power producer (Oxbow Geothermal) in the State of Nevada was located in Churchill County. Its total revenues from geothermal power generation and sales during this year (\$60,771,155) comprised 91.0 percent of the

- gross mineral proceeds of Churchill County and also accounted for 70.6 percent of total geothermal power sales in the State of Nevada for this year.²⁹⁸
- 1995 (March)** Per prior arranged schedule, the Truckee River Settlement Negotiations (Truckee–Carson Settlement Negotiations), which had begun in September 1994, terminated with a commitment for a continuing dialogue by all interested parties at the negotiating table. There was some success in negotiating issues related to Lahontan Reservoir storage (relating to a minimum pool)²⁹⁹ and water quality flows on the Truckee River (greater dilution of discharges from the Truckee Meadows Water Reclamation Facility, formerly the Reno–Sparks sewage treatment plant). Also, Reno, Sparks and Washoe County and the Pyramid Lake Paiute Indian Tribe agreed to settle lawsuits the tribe had filed over 12 years ago against the Reno–Sparks sewage treatment plant.³⁰⁰ Even so, major issues pertaining to the restoration of Pyramid Lake and the Lahontan Valley wetlands remained unresolved.³⁰¹
- 1995 (March 30)** After allowing for the filing of comments (January 30, 1995), the U.S. Environmental Protection Agency issued a Record of Decision (ROD) with respect to the Carson River Mercury Superfund Site. The EPA decided it would remediate five areas through excavation (removal of contaminated soil and backfilling), four of these being in Dayton and one in Silver City. The sixth area, the ditch conveying water from Gold Canyon to the Carson River, was marked for fencing; however, based on concerns raised by the community and the State of Nevada, and given the relatively low levels of mercury concentrations measured in these areas, the EPA decided not to fence the area. However, this area was marked for future sampling and, if necessary, development of a better alternative.³⁰²
- 1995 (April 1)** A very good year, hydrologically, for the Carson River. The Carson River Basin’s snowpack water content was recorded at 157 percent of average for this time of year, after only 43 percent of average in 1994. The Lake Tahoe and Truckee River basins, where flows and storage reservoirs are critical to the hydrology of the lower Carson River Basin, also enjoyed an exceptional water year. The snowpack water content in the Truckee River Basin (excluding the Lake Tahoe Basin) was measured at 184 percent of average and the Lake Tahoe Basin’s snowpack water content was recorded at 168 percent of average.³⁰³
- 1995 (May 12)** The U.S. District Court in Reno, Nevada, heard arguments on the question of whether that court had subject matter jurisdiction and personal jurisdiction to hear the Pyramid Lake Paiute Indian Tribe’s petition to declare that certain water rights in both *U.S. v. Alpine Land and Reservoir Company, et al.*, and *U.S. v. Orr Ditch Water Company, et al.*, had been lost through non-perfection, forfeiture, or abandonment. The petition concerned approximately 1,700 respondents with water rights in the Newlands Project: 1,200 respondents as part of the Alpine Land Petition (Carson River); and 500 respondents as part of the Orr Ditch Petition (Truckee River).
- 1995 (June 28)** In biological sampling done at several stream sites in the Bryant Creek and Leviathan Creek (Leviathan Mine) drainage system, it was noted that these streams, which had been exposed to acid mine drainage for over 40 years (1953), showed little if any indication of recovery. Acid pH (ranging from 2 to 3 below the mine), elevated heavy metals, and deposits of ferric hydroxide (“yellowboy”—Fe(OH)₃) continued to contaminate

this watershed. It was found that on Leviathan Creek and the upper portions of Bryant Creek, contamination by “yellowboy” precipitate was extensive and sediments contained far higher contents of heavy metals including aluminum, arsenic, cadmium, and copper than on the reference stream sites (primarily Mountaineer Creek). Habitat and biological conditions were found to be most degraded below the mine site to between 3.5 and 7.5 miles downstream, where biota began to show signs of recovery (the total distance between the mine and the East Fork of the Carson River is approximately nine miles). It was also found that at times, especially during spring snow-melt runoff, the waters of these streams ran orange with the “yellowboy” ferric hydroxide precipitate, including plumes along the side of the East Carson River receiving inflow from Bryant Creek. Previous studies, e.g., Wilson (1957),³⁰⁴ Davis (1969),³⁰⁵ and Hammermeister and Walmsley (1985),³⁰⁶ showed similar results, indicating that acid mine drainage impacts from Leviathan Mine are chronic and have continued to cause impaired biological conditions in this watershed with little or no sign of recovery.³⁰⁷

1995 (July) A near-record water year of precipitation in the Carson and Truckee River basins did much to recharge groundwater and replenish near-empty reservoirs. Lake Tahoe rose 5.97 feet from its most recent low point on October 31, 1994 of 6,221.01 feet MSL (1.99 feet below its natural rim) to a peak surface elevation of 6,226.99 feet MSL on July 29, 1995 (3.99 feet above its natural rim and 2.11 feet below its maximum allowable elevation of 6,229.1 feet MSL). The total increase in Lake Tahoe’s storage was estimated to be 726,410 acre-feet (236.703 billion gallons), which included 240,810 acre-feet to recharge the lake’s deficit and bring its surface water elevation up to its natural rim of 6,223.0 feet MSL, and an additional 485,600 acre-feet of increased storage above its natural rim.³⁰⁸ Stampede Reservoir also filled, peaking at 236,199 acre-feet on July 19, 1995, the first time this reservoir had been filled in over ten years. Pyramid Lake’s level rose by at least 3.77 feet from its recent low point recorded on January 3, 1995 to 3,796.94 feet MSL recorded on July 31, 1995.³⁰⁹ Lahontan Reservoir on the lower Carson River also filled, peaking at 316,300 acre-feet on July 25, 1995.³¹⁰ This allowed the diversions at Derby Dam on the lower Truckee River to be virtually cut off by the end of March 1995.³¹¹ As a precautionary measure, and because Floriston rates (i.e., Orr Ditch Decree rights) were being satisfied from natural and other reservoir flows, the federal watermaster decided not to allow any discharges from Lake Tahoe.

1995 (July) The U.S. Fish and Wildlife Service released its Draft Environmental Impact Statement (DEIS) *Water Rights Acquisition for the Lahontan Valley Wetlands*. The USFWS began public scoping and planning for this document in early 1992 and conducted formal public scoping workshops, bi-monthly public meetings, and informal agency meetings since that time. The Truckee–Carson–Pyramid Lake Water Rights Settlement Act, Title II, Section 206, of Public Law 101–618 (November 1990) directed the Secretary of the Interior to acquire by purchase or other means, enough water and water rights to sustain, on a long-term average, approximately 25,000 acres of primary wetlands habitat in Stillwater National Wildlife Refuge, Stillwater Wildlife Management Area, Carson Lake and Pasture, and Fallon Paiute–Shoshone Indian Reservation wetlands. In order to meet the 25,000-acre wetland objective, the USFWS determined that an annual average total of up to 125,000 acre-feet of water would be needed. After an extensive comments period,

- the Final Environmental Impact Statement (FEIS) would be issued in September 1996.³¹²
- 1995 (August 8)** Churchill County filed a formal request with the U.S. Bureau of Reclamation in Carson City to receive approximately 20,000 acre-feet of Truckee River water for supplemental municipal and industrial use to be delivered through the Truckee Canal and the existing distribution network in Churchill County, Nevada. The water, representing a supplemental supply for Churchill County, would come from Claim 3 of the Orr Ditch Decree which allows up to 1,500 cfs (nominal capacity of the Truckee Canal is only 900 cfs) of water to be diverted at Derby Dam on the lower Truckee River.³¹³ Since Truckee River diversions began at Derby Dam in 1906 for Newlands Project farmlands, this represented the first formal request for an additional interbasin transfer of Truckee River water for a purpose (municipal and industrial) other than agriculture. Many individual water users in this area rely on shallow alluvial aquifers, portions of which are recharged by Newlands Project water. This has heightened concerns that water rights purchases on lands irrigated by the project could dramatically affect the reliability of future water supplies.³¹⁴ The Negotiated Settlement specifies that the Secretary of the Interior is authorized to "...operate and maintain the [Newlands] project for the purpose of...municipal and industrial water supply in Lyon and Churchill counties, Nevada."³¹⁵
- 1995 (August)** Lyon County Commissioners voted to demand that the U.S. Environmental Protection Agency stop its mercury clean-up project for the Carson River Mercury Site (CRMS) which had been declared a Superfund site in August 1990. The commissioners argued that there was no evidence that anyone has been harmed by the elevated mercury concentrations in the soil and that the negative publicity had harmed tourism, cut into property values, and wasted taxpayer's money. Mercury pollution downstream from Dayton (which is located in Lyon County) had prompted health officials to issue public warnings about consumption of fish caught in the river. In addition to their effort to block the clean-up, Lyon County officials also wanted the EPA to state its inability to prove adverse effects through publication of an open letter in all Nevada newspapers.³¹⁶
- 1995 (September)** Carson City submitted four applications for water rights of 800 acre-feet each to the State Engineer for additional appropriations of groundwater in Eagle Valley. The filings were based on a study by the U.S. Geological Survey that discovered that the bedrock beneath Vicee, Kings, and Ash canyons, located on the eastern slope of the Carson Range, was more porous than originally thought, thereby allowing more surface water to seep through these streambeds and recharge groundwater supplies. This USGS study, which was not publicized until October 31, 1996, and was jointly funded by the USGS and Carson City, found an additional 3,400 acre-feet of groundwater in Eagle Valley beneath Carson City. In response to this filing, in December 1995, the Truckee-Carson Irrigation District filed a protest with the State Engineer claiming that the appropriation, if allowed, would be above the amount of water available in the Eagle Valley basin, thereby increasing valley recharge from the Carson River.³¹⁷
- 1995 (September)** Douglas County began developing financing plans to purchase the 9,868-acre Slash Bar H Ranch in Carson Valley. Of particular concern was retention of the ranch's 55,000 acre-feet of water rights for future use within the valley. The county prepared a 45-page report on how it would pay for the \$24 million acquisition from the recent new owners: Don Bently and the Park Land and Cattle Company. However, strong public

- opposition to the extensive spending cuts required in other county programs prevented the deal from become finalized.³¹⁸
- 1995 (September)** Truckee–Carson Irrigation District requested that the U.S. Bureau of Reclamation approve its request to allow an estimated 3,500 acre-feet of its water stored in Donner Lake to be used for the Fernley Wildlife Management Area, an area located just north of the Truckee Canal between Fernley and Hazen, primarily in Lyon County. The Pyramid Lake Paiute Indian Tribe argued against the plan claiming that TCID had already spilled approximately 70,000 acre-feet of Truckee River water from Lahontan Reservoir this year³¹⁹ and the water released from Donner Lake during the forthcoming winter and spring should be used instead to support endangered and threatened fish species in Pyramid Lake.³²⁰
- 1995 (September 15)** Based on the Western Water Policy Act of 1992 (Public Law 102–575, Title XXX) which was passed by Congress on October 30, 1992, the President appointed and the Secretary of the Interior chartered the Western Water Policy Review Advisory Commission. As the original legislation required a report to be presented by October 20, 1995 (three years after enactment), Congress extended the term of the Commission to October 2, 1997. The Advisory Commission consists of twenty-two members, ten appointed by the President (including the Secretary of the Interior and the Secretary of the Army, or their designated representatives) and twelve members of Congress serving ex officio positions by virtue of their positions on selected Congressional committees.³²¹ The purpose of the Commission was to: (1) review water resources problems in the nineteen Western states; (2) review the need for additional water augmentation; (3) review existing institutional arrangements; (4) review the legal regime; and (5) review the activities, authorities, and programs of federal agencies with direct water resources management responsibility. One of the six major river systems designated for study was the Truckee and Carson River system. The *Truckee–Carson River Basin Study*, Final Report, prepared by Clearwater Consulting Corporation, would subsequently be released on March 6, 1997.³²²
- 1995 (November 6)** It was noted in a letter sent from the Truckee–Carson Irrigation District to the U.S. Department of the Interior’s Truckee–Carson Coordination Office (TCCO) in Carson City, Nevada, the need for an overall Environmental Impact Statement (EIS) with respect to the implementation of the Truckee River Operating Agreement (TROA) and water rights acquisition programs for Lahontan Valley wetlands and Pyramid Lake. This comprehensive, or programmatic EIS would satisfy the intent of the National Environmental Policy Act (NEPA) by looking at the cumulative impacts of these actions. Up to this time it was noted that at least nine known Environmental Assessments and/or EISs have been put in place to implement Public Law 101–618.³²³ It was also noted that repeatedly in public forums and in written correspondence this requirement had been noted.³²⁴
- 1995 (November 14)** Based on an over-ruling of the State Engineer’s decision to deny the Truckee–Carson Irrigation District additional Truckee River water under its (September 8, 1930) water rights application 9330, a hearing was begun on TCID’s intention to obtain a state water right for 100,000 acre-feet of unallocated (flood) waters of the Truckee River to be stored in Lahontan Reservoir (after modifications to increase its capacity) and used by Fallon area farmers. Previously, on May 18, 1995, the U.S. Department of the Interior

had stated its refusal to allow federal facilities to be used for the conveyance and storage of additional Truckee River waters.

- 1995 (December 1)** Churchill County filed a lawsuit in U.S. Federal Court seeking a preliminary injunction to prevent the federal government from acquiring and transferring water rights to the Lahontan Valley wetlands and/or to Pyramid Lake. The injunction called for a more comprehensive “programmatic Environmental Impact Study (EIS)” to be completed to assess the cumulative impacts of a number of federal government actions taking place simultaneously.³²⁵ Claiming that none of the studies thus far had done a particularly good job of assessing the pervasive effects on Lahontan Valley of the Truckee–Carson–Pyramid Lake Water Rights Settlement Act (Public Law 101–618), the county claimed that water rights transfers would dry up local aquifers and adversely affect homes and businesses.³²⁶
- 1995 (December 8)** One week after Churchill County filed for an injunction to prevent further acquisition of Newlands Project water rights by the federal government for Lahontan Valley wetlands and/or Pyramid Lake, the U.S. Justice Department, on the behalf of the U.S. Secretary of the Interior, filed a suit in Reno federal district court against TCID demanding full return of approximately 1,057,000 acre-feet³²⁷ of waters diverted from the Truckee River between 1973 and 1987 (15 years) in violation of existing OCAPs.³²⁸ In addition to the recoupment amount, the suit also sought “in-kind interest.” According to the complaint, the recoupment figure is derived from:³²⁹
- [1] 151,130 acre-feet of water diverted during the 15-year time frame that was sent to Lahontan Reservoir at the same time that water was being released [spilled] from Lahontan Dam as a precaution to prevent flooding;
 - [2] 188,368 acre-feet of water that was diverted during the 15-year time frame in the winter months and stored in Lahontan Reservoir and then later spilled as precautionary releases and was over OCAP allowances;
 - [3] 682,215 acre-feet of diversions made to Fallon farmers in excess to the 1973 OCAP limitation;
 - [4] 32,253 acre-feet of excessive diversions to Fernley, Hazen, and Swingle Bench farmers; and
 - [5] Approximately 10,034 acre-feet in additional miscellaneous (unspecified) diversions.
- 1996 (February 5)** A status conference was held by the Nevada State Engineer regarding the remand by the U.S. Ninth Circuit Court of Appeals of the first 22 water rights transfers for Newlands Project farmlands. The conference also pertained to another group of 190 transfer applications. This remand precipitated from “Alpine III,” in which the appellate court found in May 1992 that Newlands Project water rights became vested on an individual parcel basis, not on a project-wide basis, and that the concepts of forfeiture and abandonment will apply to those rights that vested after the Nevada Water Law of 1913. Those water rights that vested before 1913, or were appropriated prior to 1913, would not be subject to forfeiture. Subsequently, on February 12, 1996, the Engineer’s Office established a definitive time schedule for hearings on this matter.³³⁰
- 1996 (February 20)** Local governmental and community entities within the Lahontan Valley provided formal notice to U.S. Secretary of the Interior Bruce Babbitt calling for the

completion of a single and cumulative “Programmatic Environmental Impact Statement (EIS)” pertaining to the implementation of the Truckee–Carson–Pyramid Lake Water Rights Settlement Act (Title II of Public Law 101–618). The signers included the City of Fallon, Churchill County, town of Fernley (Lyon County), Lahontan Valley Environmental Alliance (LVEA), Newlands Water Protective Association, and TCID. The letter specifically noted the Secretary’s responsibilities in accordance with the National Environmental Policy Act (NEPA) to undertake a comprehensive EIS with respect to the Settlement Act’s numerous major and interrelated federal actions.³³¹ It was noted that noncompliance had resulted in a number of isolated and segmented EISs and EAs on individual components, including:³³²

- [1] EIS—Acquisition of water rights for Stillwater National Wildlife Refuge, Fiscal [Years] 1991–1993 (USFWS);
 - [2] EA—Implementation of Federal Mitigation Requirements for Changes in Sewage Treatment Discharges within the Truckee–Carson Watershed (USFWS);
 - [3] EA—3,500 acre-feet acquisition for cui-ui (USFWS);
 - [4] EIS—Lahontan Valley Wetlands acquisition of up to 125,000 acre-feet (USFWS);
 - [5] EA—1996 Interim Operating Criteria and Procedures (OCAP); Bureau of Reclamation Revised Operating Criteria and Procedures for Newlands Project (USBR);
 - [6] EA—Revised Operating Criteria and Procedures for Newlands Project (USBR);
 - [7] EIS—Truckee River Operating Agreement (TROA); Public Law 101–618;
 - [8] EA—Lower Truckee River Reconnaissance (COE);
 - [9] EIS—Pinion Pine Power Plant (DOE);
 - [10] EIS—Truckee Meadows water quality (24,000 acre-feet) (USDI);
 - [11] EIS/EIR—TROA (USBR); and
 - [12] EIS— “Broad Based Water Resources Management Program” for interrelated federal actions on the Truckee and Carson River relating to the Settlement Act.
- 1996 (February 22)** In an event all too typical and highly reflective of the variable hydrology and precipitation with the Carson River Basin, as of February 19th the SNOTEL³³³ precipitation update reported that the Carson River Basin’s snowpack water content was at 84 percent of average for this time of year. After several extensive storms moved through the area, however, by February 22nd the SNOTEL update showed the Carson River Basin snowpack water content at 111 percent of average.³³⁴
- 1996 (February 29)** The U.S. Bureau of Reclamation credited the Truckee–Carson Irrigation District as having made the final payment of \$21,909.41 of the original construction costs of approximately \$3.5 million for the Newlands Irrigation Project located in Churchill and Lyon counties, Nevada.³³⁵
- 1996 (March 25)** The Director of the Nevada Department of Conservation and Natural Resources (DCNR), Peter G. Morros, initiated negotiations with two of the parties to the Negotiated Settlement: the Truckee–Carson Irrigation District and the Pyramid Lake Paiute Indian Tribe. By agreement, only two members from each interest were to participate in the new negotiations; the DCNR Director would act as facilitator and group spokesman. The negotiations would attempt to resolve the outstanding water issues.³³⁶ After meeting twelve times, the negotiations would be terminated in July 1996 when the

- parties failed to agree on which topics could be discussed.³³⁷
- 1996 (March 26)** Based on a hearing held in May 1995, the U.S. District Court in Reno, Nevada, stayed the Pyramid Lake Paiute Indian Tribe's petition to declare that certain water rights in both *U.S. v. Alpine Land and Reservoir Company, et al.*, and *U.S. v. Orr Water Ditch Company, et al.*, have been lost through non-perfection, forfeiture, or abandonment. It was ordered that the Tribe should first exhaust its administration remedies with the Federal Watermaster.³³⁸ As a result of this order, the Federal Water Master in Reno, Nevada, will be presented with a petition to review approximately 1,700 water rights for Newlands Project farmlands which the Tribe claimed to be not perfected, abandoned, or forfeited. These included 1,200 respondents as part of the Alpine Land Petition (Carson River); and 500 respondents as part of the Orr Ditch Petition (Truckee River).
- 1996 (April 1)** Another satisfying hydrologic year for the Carson River Basin. As of this date, snowpack water content within the basin was measured at 106 percent of average for this time of year, which, following 1995's 157 percent or normal recording,³³⁹ dramatically restored the basin's water resources and officially ended the 1987–1994 severe drought period.
- 1996 (April 8)** The Nature Conservancy of Nevada announced a plan to convert an old farm near the Stillwater National Wildlife Refuge into the area's first visitor center, complete with nature walks, viewing towers, a teaching area for kids, an interpretive center, and a parking lot. The project was contingent on a land swap between the federal government and a Las Vegas developer, Del Webb, which would obtain BLM land near Henderson, Nevada, in exchange for private land south of the refuge. The Nature Conservancy was working with Churchill County officials and the Churchill County Economic Development Authority to create an environment that would attract the general public to the marsh's many varied features.³⁴⁰
- 1996 (May)** In an apparent change of policy, Churchill County filed a protest with the Nevada State Engineer against the transfer by the U.S. Fish and Wildlife Service of an additional 240 acre-feet of water from a Lahontan Valley farm to the Stillwater National Wildlife Refuge. Since 1989, the federal government and the State of Nevada have purchased nearly 20,000 acre-feet of water rights for the refuge without any formal protest from the county while the State of Nevada has purchased some 10,000 acre-feet for the Carson Lake and Pasture. In its protest, the county argued that the transfer would cause the valley's aquifer level to drop, adversely affect the county's tax base, and increase problems with blowing dust. According to one Nevada Division of Wildlife official,³⁴¹ there should be no effect on the aquifer as water purchased for the wetlands still travels through the Newlands Project's canals which are a significant source of recharge.³⁴²
- 1996 (June)** The *Sierra Nevada Ecosystem Project* was released. This project was a \$6.3 million study and assessment, commissioned by the U.S. Congress, and funded by the U.S. Forest Service, intended as a tool for policy makers as they plan the future of the Sierra Nevada Mountain range and its various watersheds. The 3,200-page study, written by 107 scientists, noted that the climate in the Sierra Nevada Mountains, which is the source of much of California's and Nevada's water, may be getting drier. It was noted that "Periods of century-long droughts have occurred within the last 1,200 years and may

- recur in the near future.³⁴³
- 1996 (June)** Northern Nevada horticulturists and weed experts raised the alarm over the spread of exotic, noxious weeds into major agricultural areas in Northern Nevada's water basins. Particular concern in the Carson River Basin was due to the spread of the Russian knapweed, or diffuse knapweed (*Centaurea diffusa*) from federally-owned land in the Pine Nut Mountains into the fertile pastures of the Carson Valley. The Russian knapweed secretes a toxin that kills other plants, allowing it to take over cash crops, lawns, gardens, and pasture. The knapweed, which can grow several feet high, spreads by seed and an aggressive root system that can reach for 20 feet or more. In the Truckee River Basin and lower Carson River Basin, a primary concern was with the perennial pepperweed, commonly known as tall whitetop (*Lepidium latifolium*). The tall whitetop, like the knapweed, secretes a toxin poisonous to other plants and has reportedly taken over thousands of acres and is a particular threat to alfalfa crops along the Truckee River. It currently constitutes a major problem in the Truckee Meadows and in the Fallon area (Newlands Project) and is expected to become a problem in Douglas County (Carson Valley) as well. In locations along the Truckee River, it has proven very difficult to control as it grows near water and the use of herbicides could be a danger to the river's endangered fish species, the cui-ui. A special problem with tall whitetop is that the ideal time to spray herbicides also coincides with the cui-ui spawning season. Other problem plants include yellow starthistle (*Centaurea solstitialis*), Canada thistle (*Cirsium arvense*), puncture vine (*Tribulus terrestris*), and whitetop (*Cardaria draba*).³⁴⁴
- 1996 (June 20)** Douglas County Commissioners voted unanimously (with one member absent) to dismantle the Douglas County Water District (DCWD) and put in its place three separate water districts organized on a watershed basis: (1) Carson Valley (Carson River Basin); (2) Lake Tahoe (Truckee River Basin); and (3) Topaz (Walker River Basin). Each of the proposed districts would be granted the right to charge residents within their jurisdictions any rate up to the state-sanctioned ceiling of seven cents on every \$100 in assessed valuation (35 percent of market value) of real property.³⁴⁵ The new water districts would become effective June 30, 1997.³⁴⁶
- 1996 (July 22)** After twelve negotiation sessions between representatives of the Pyramid Lake Paiute Indian Tribe and Fallon farmers, negotiations were terminated without agreement when both parties failed to agree on which issues could be discussed. The sessions, which began on March 25, 1996, were led by the Nevada Department of Conservation and Natural Resources Director, Peter G. Morros. Some progress was made with respect to the Fallon farmers being open to the idea of storing some of their Truckee River water in Sierra Nevada Mountain reservoirs and bringing it down to Lahontan Reservoir later in the spring.³⁴⁷ This would have allowed a more accurate determination of Carson River shortfalls which would then be made up by TCID's Truckee River allocation.
- 1996 (September)** In what may prove a precursor of a potential problem associated with federal and state programs to acquire Newlands Project water rights for increasing the wetlands in the Lahontan Valley, the Fallon Naval Air Station (NAS) in the lower Carson River Basin announced that they had launched a study of the flight patterns of White Pelicans (*Pelecanus erythrorhychos*) in an effort to prevent collisions between these large birds and Navy jets.³⁴⁸ The study actually began in May 1996 when tracking devices were installed

on certain pelicans to learn more about the birds' altitude and location during specific periods. The studies are particularly important as the Navy recently relocated its Tactical Weapons School ("Top Gun") to the Fallon NAS, thereby significantly increasing military aircraft traffic in this area.³⁴⁹ After two particularly beneficially wet years in the northern Nevada watersheds, bird populations in general have been far more abundant and the White Pelicans, which normally have been more or less concentrated around Anaho Island in Pyramid Lake in the lower Truckee River Basin, have now been seen regularly in the Truckee Meadows (Virginia Lake), Washoe Lake, and more extensively throughout the Lahontan Valley wetlands.

1996 (September 12) The U.S. Fish and Wildlife Service released its Final Environmental Impact Statement (FEIS) *Water Rights Acquisition for the Lahontan Valley Wetlands*. The Truckee–Carson–Pyramid Lake Water Rights Settlement Act, Title II, Section 206, of Public Law 101–618 (November 1990) directed the Secretary of the Interior to acquire by purchase or other means, enough water and water rights to sustain, on a long-term average, approximately 25,000 acres of primary wetlands habitat in Stillwater National Wildlife Refuge, Stillwater Wildlife Management Area, Carson Lake and Pasture, and Fallon Paiute–Shoshone Indian Reservation wetlands. In order to meet the 25,000-acre wetland objective, the USFWS determined that an annual average total of up to 125,000 acre-feet of water would be needed. The USFWS had begun public scoping and planning for this document in early 1992 and released a Draft Environmental Impact Statement (DEIS) in July 1995. Based on the comments received from its DEIS, the USFWS developed five (5) alternative actions, to include a baseline condition (Alternative 1). Through the public scoping process, eight (8) significant indicators were identified:³⁵⁰

- [1] Potential effects on Newlands Project operations and infrastructure, including project operations, Operating Criteria and Procedures (OCAP) compliance, delivery system efficiency, project facilities, water delivery patterns, project drainwater, and hydropower generation;
- [2] Potential effects on water resources, including aquifers, surface water and domestic supply;
- [3] Potential effects on biological resources, including wetland and other plant communities, fish and wildlife, federally-listed endangered and threatened species, other sensitive species, and biological diversity;
- [4] Potential effects on regional agriculture, farmlands, and the local economy, measured in acreage, crops produced, revenue, income and jobs, prime farmland and farmland of statewide importance, and the erosion potential of abandoned or converted farmlands;
- [5] Potential effects on regional recreation, measured in the opportunity provided to use recreation areas, and the participation of people in outdoor recreation;
- [6] Potential effects on land use, including population density, county tax base, county services (fire, law enforcement, etc.), and changes in land use from agriculture to other uses;
- [7] Potential effects on social values, including community values about the rural lifestyle and "farm preservation values" as related to the agrarian lifestyle, growth and diversification, and recreation opportunity in the area; and

- [8] Potential effects on acquisition costs and probability of meeting the USFWS's objects, including the cost of acquiring water and land, and the probability of obtaining sufficient water to meet the 25,000-acre primary wetland habitat objective.

The USFWS developed four alternatives to the "Proposed Action" (Alternative 2). Except for the "No Action Alternative" (Alternative 1), the volume of water that would reach the wetlands under each alternative would be similar to that proposed under the "Proposed Action." The "Proposed Action" and each of the action alternatives (Alternatives 3, 4, and the "Preferred Alternative," 5) would meet the objective of Public Law 101-618 to protect and sustain 25,000 acres of primary wetland habitat. The "No Action Alternative" (Alternative 1) would not meet that objective. The alternatives included:

- [1] **Alternative 1—No Action Beyond Current 20,000 Acre-Feet Acquisition Program.** Under this scenario, actual wetland inflow would amount to about 16,500 acre-feet per year of irrigation water, 30,000 acre-feet per year of drainwater, and 8,600 acre-feet per year of water from spills, for a total of 55,100 acre-feet per year delivered to the wetlands. This would result in an average of about 12,100 acres of primary wetland habitat being maintained over the long run at Stillwater NWR and Carson Lake and Pasture.
- [2] **Alternative 2—Proposed Action.** Under this alternative, the USFWS would purchase, from willing sellers, up to 102,000 acre-feet of water rights in the Carson Division above the amount being acquired under baseline conditions (20,000 acre-feet) to meet the needed 125,000 acre-feet of annual average wetland inflow. These purchases amount to about 66 percent of the water rights currently in private ownership in the Carson Division. The wetlands would receive an annual average of about 101,000 acre-feet of irrigation water (including initial 20,000 acre-feet acquisition) and be supplemented by approximately 13,000 acre-feet of drainwater and 11,000 acre-feet of spills.
- [3] **Alternative 3—Least Cost with Maximum Use-Rate.** Under this alternative, as much as 80,000 acre-feet of water rights would be acquired above the baseline amount from willing sellers, amounting to about 53 percent of water rights in private ownership in the Carson Division. Net water deliveries to wetlands (97,700 acre-feet) combined with 18,600 acre-feet per year of drainwater and 8,700 acre-feet per year of spills would comprise remained of water sources to reach the 125,000 acre-feet per year wetland demand.
- [4] **Alternative 4—Maximum Acquisition.** Under this alternative, as much as 113,500 acre-feet of water rights would be acquired above baseline amount (20,000 acre-feet) for a combined total of 133,500 acre-feet, amounting to about 72 percent of the water rights currently in private ownership in the Carson Division. As a result of the lower use rate (less drainwater from agriculture), this amount would result in the delivery of 113,200 acre-feet per year of water to the primary wetland areas and be supplemented by an average of 11,800 acre-feet per year of water from spills.
- [5] **Alternative 5—Preferred Alternative.** This alternative would rely on the least amount of purchased water rights from the Carson Division, relying more heavily

on other water sources and spreading acquisition impacts across a greater area. Under this scenario, the USFWS would, (1) purchase up to 55,000 acre-feet of water rights in the Carson Division (in addition to 20,000 acre-feet baseline), (2) lease water from farmers, (3) purchase water rights from the Middle Carson River corridor, (4) use treated sewage effluent as available, (5) use conserved water from the Fallon Naval Air Station, and (6) pump groundwater (as a last resort). It was anticipated that this scenario would result in the acquisition of about 75,000 acre-feet of water rights (62,000 acre-feet per year net to wetlands), or 40 percent of the water rights currently in private ownership in the Carson Division. Drainflows would average 19,700 acre-feet per year, spills about 9,700 acre-feet per year, and 33,600 acre-feet would be made up from other sources.

- 1996 (September 30)** As part of a larger spending bill, Congress approved \$120,000 in funding to study water use and administration of water rights along the Carson and upper Truckee rivers. It was reported that \$60,000 of the federal funds would be used on the Newlands Project while the remainder would be used on water issues upstream of Lahontan Reservoir. The funding was to be combined with a matching contribution from the Carson Water Subconservancy District to study how water is used in the Upper Carson River Basin and specifically for computer modeling to show how water is used in a stream system in terms of plants, ground water, and return flow. It was noted that the Upper Carson River Basin had never been involved with a federal program of this nature before.³⁵¹
- 1996 (October 10)** In a public meeting held at San Francisco's California Academy of Sciences, scientists warned that climate changes caused by the buildup of greenhouse gases (global warming) could leave California, and by extension, the northern Sierra Nevada Mountains, "whipsawed between floods and drought and its elaborate water-supply and reservoir system unable to meet current and future water demands." Similar to western Nevada, California's ability to supply fresh water to its urban population and farmers throughout the summer months is critically dependent on its reservoir and aqueduct system which, in turn, is completely dependent on snowfall. Climate models currently predict that California will warm an average of 2–4°F by the middle of the next century if greenhouse gases are not reduced. It was noted that the more intense warming will occur in the winter when California (and the Sierras) typically receives more than 80 percent of its precipitation. Under this scenario, not only will the snowpack melt sooner, but much of what now falls as snow will instead fall as midwinter rain.³⁵² With respect to western Nevada, this implies that those river systems without significant main-stream storage facilities, i.e., the Carson, Walker, and Humboldt rivers, will be more prone to flooding and early runoff, with the possibility of a shortened irrigation season for agriculture.
- 1996 (October 17)** The Newlands Water Protective Association, a coalition of Newlands Project farmers and ranchers formed to address water issues in the Lahontan Valley, voted to support the Truckee–Carson Irrigation District's recommendation that the October 17, 1996 draft of the proposed Operation and Maintenance Contract between the U.S. Bureau of Reclamation and TCID be submitted to the water right owners for a vote on November 5, 1996.³⁵³
- 1996 (October 30)** The Nevada State Engineer ruled against a protest filed in May 1996 by

Churchill County and approved the U.S. Fish and Wildlife Service's request to transfer an additional 240 acre-feet of water from a Lahontan Valley farm to the Stillwater National Wildlife Refuge. In its earlier protest, the county had argued that the transfer would cause the valley's aquifer level to drop, adversely affect the county's tax base, and increase problems with blowing dust. During the hearing, the federal government showed that: (1) the affected land was not included in the primary groundwater recharge areas that affect the shallow wells; (2) the federal government has paid money to the county to make up for lost property taxes; and (3) the land that lost its water rights hasn't been irrigated since 1990 and is now covered with grasses which should preclude any problem with blowing dust.³⁵⁴

- 1996 (November 5)** Water right owners in the Newlands Project voted overwhelmingly to adopt a new contract with the federal government to continue operation of the project by the Truckee-Carson Irrigation District. The three hundred and twenty-five water rights owners cast a total of 2,236 votes based upon the amount of water they own. Seventy-seven percent voted for the contract and 23 percent against it. The contract had been in negotiation for nearly 15 months and encompassed 40 public meetings.³⁵⁵ The contract replaces a series of temporary contracts first issued on February 14, 1984 and renewed annually thereafter. Major provisions of the contract call for: (1) a *Project Improvement Plan* detailing actions and schedules for the improvement and rehabilitation of project works to assure their long-term viability; (2) an *Annual Operating Plan* with semiannual progress reports; (3) a *Water Conservation Plan* to upgrade project operations to "reasonable" levels of efficiency;³⁵⁶ (4) a *Water Conservation Fund* dedicated to the implementation of the water management program; and (5) an *Emergency Reserve Fund* to pay costs incurred during periods of special stress caused by droughts, storms, earthquakes, floods, or other unanticipated emergencies which damage or threaten project works and/or the interruption of water delivery.³⁵⁷
- 1996 (December 2)** In what portended to be the beginning of a dry winter after two previous relatively wet winters, Natural Resources Conservation Service SNOTEL (snowpack telemetry) measuring sites showed the Sierra Nevada Mountain snowpack water content at 81 percent of average for the Carson River Basin (measurements taken from October 1, 1996). However, due to higher rainfall levels, total precipitation for this time of year stood at 103 percent of normal for the Carson River Basin. It was noted that in a "normal" year, half of the Sierra snowpack accumulates during the month of December, and that it would not make for a good water year if the deficit in snowpack water content extended through January 1, 1997. It was also noted by the State Climatologist that in more than 100 years of record keeping, there has never been three back-to-back wet winters.³⁵⁸ As would come to pass, the early December shortfall in Sierra Nevada Mountain snowpack would be covered several times over by early January 1997.
- 1996 (December 9)** The U.S. Department of the Interior issued a proposed rule change adjusting the 1988 Newlands Project Operating Criteria and Procedures (OCAP). The rule change was primarily intended to keep water in the Truckee River by lowering the December storage target volume for Lahontan Reservoir from 210,000 acre-feet to 101,000 acre-feet. In this way, diversions from the Truckee River would come later in the water year and thereby reduce the possibility of unnecessary spills of Truckee River

water from Lahontan Reservoir should they be required due to particularly strong flows in the Carson River. Under the present OCAP, if Lahontan Reservoir's storage is projected to be less than 210,000 acre-feet by the end of December, then Truckee River diversions may be made at Derby Dam. Under the proposed OCAP changes, Lahontan Reservoir could fall to 101,000 acre-feet before Truckee River diversions would be permitted. In addition, new adjusted targets were established for the other months which dramatically lowered storage levels in Lahontan Reservoir and could affect Newlands Project farmers in the Carson Division from receiving their full water allotment during drought periods when water could not be brought over from the Truckee River via the Truckee Canal.³⁵⁹ The proposed rule consists of five major components: (1) reduced end-of-month Lahontan Reservoir storage targets; (2) a reduced project efficiency target to reflect the lack of Project growth that had been anticipated by the 1988 OCAP; (3) the use of better and more timely runoff forecasting information; (4) an advance in the period for upstream credit storage in the Truckee River reservoirs to begin as early as January of each year; and (5) editorial changes to the text of the OCAP to reflect experience gained in administering the OCAP.³⁶⁰

1996 (December 12) The Truckee Canal ruptured at a point approximately 15 miles from Derby Dam and flooded several blocks of a residential area along District Road in Fernley, Nevada. It was uncertain what caused the break and the Truckee-Carson Irrigation District estimated that about 200 acre-feet of water were spilled from the canal before the break was isolated and repaired. Damage was limited primarily to flooded streets, yards, and garages. A similar breach in the Truckee Canal occurred in Fernley on January 1, 1975.³⁶¹

1996 (December 13) The attorney representing the Pyramid Lake Paiute Indian Tribe (Robert S. Pelcyger of Fredericks, Pelcyger, Hester & White, LLC, Boulder, Colorado) sent a letter to Lois J. Schiffer, Assistant Attorney General, Environment and Natural Resources Division, U.S. Department of Justice, Washington, D.C., and John D. Leshy, Solicitor, U.S. Department of the Interior, Washington, D.C., requesting that the federal government take appropriate action against water users in the upper Carson River Basin (above Lahontan Reservoir) to enforce terms of the 1980 Alpine Decree (*U.S. v. Alpine Land & Reservoir Company*). The request focused on seven proposed actions: (1) Federal Water Master identify the lands in the upper Carson River Basin that are being irrigated and insure that only water righted lands receive water deliveries; (2) Federal Water Master initiate proceedings to determine the water duties for all decreed acreage in segments 2, 4, 5, 6, and 7 of the upper Carson River Basin (measured at the points of diversion) and limit diversions to no more than the maximum amounts permitted under the Alpine Decree;³⁶² (3) Federal Water Master limit diversions to the amounts actually and reasonably necessary for economical and beneficial use under Nevada law and under the Alpine Decree; (4) [Federal Water Master] insure compliance with Administrative Provision VIII of the Alpine Decree;³⁶³ (5) Federal Water Master to identify all lands in the upper Carson Basin with surface water rights with post-1902 priorities and to prevent water deliveries to those lands except when Lahontan Reservoir is spilling or is projected to spill; (6) Identify all upper Carson Basin groundwater rights with post-1902 priorities and initiate appropriate action to enforce the government's 1902 storage right for Lahontan

- Reservoir against those junior appropriators; and (7) Issue a call against upstream junior appropriators to the extent necessary to enforce the government's pre-project, direct diversion, vested water rights during time when the call would produce additional flows at the USGS Fort Churchill gauge [sic] that would satisfy some or all of those rights.³⁶⁴ The intent of these requests was to provide more Carson River water to Lahontan Reservoir and hence Newlands Project farmlands, consequently reducing diversions at Derby Dam on the lower Truckee River and thereby increasing flows into Pyramid Lake.
- 1996 (December 19)** In presentations at the American Geophysical Union Conference at the Moscone Center in San Francisco, it was proposed that solar cycles influence rainfall levels in North America. U.S. Geological Survey Research Hydrologist Charles Perry proposed that the irradiance of the sun, which varies in synch with the 11-year solar (sunspot) cycle, unusually warms tropical waters in the Pacific Ocean. These waters then circulate in a clockwise motion around the Pacific Rim, reaching the U.S. West Coast some five years later, promoting the formation of moist, eastward flowing air masses and the Pacific storms affecting the Pacific Coast states. In another presentation, Pavlos Christoforou, a doctoral student in atmospheric sciences at the State University of New York-Stony Brook, proposed that maximum solar activity forces the Aleutian Low, a large, semi-stable low-pressure cell typically located south-west of Alaska, to move dramatically westward. The void created is then filled by the Pacific High, allowing Pacific rains to enter the newly created void and strike the Pacific Northwest, California, and other western states.³⁶⁵
- 1996 (December 20)** In the initial major precipitation of the year which was to begin "The Flood of 1997," heavy snowfall began on Friday in the Sierra Nevada Mountains, blanketing Carson and Eagle valleys. Snowfall would continue through Monday, December 23, 1996, then abate and return again over the two-day period of Friday and Saturday, December 27-28, 1996. Over this period snowpack water contents rose appreciably throughout the Carson River Basin. For example, from just the weekend snowfall event at the Natural Resources Conservation Service (NRCS) Ebbetts Pass SNOTEL site (elevation 8,700 feet MSL), the snowpack water content rose from 167 percent of normal (17.2 inches of water equivalent) on Monday, December 16, 1996, to 193 percent of normal (23.5 inches) by Monday, December 23, 1996. The Monitor Pass SNOTEL site (8,350 feet MSL) nearly doubled its snowpack water content from 5.9 inches on December 16, 1996, to 9.6 inches by December 23, 1996. And at the Poison Flat SNOTEL site (elevation 7,900 feet MSL), the snowpack water content rose from 155 percent of normal (9.6 inches of water equivalent) on December 16, 1996, to 212 percent of normal (15.5 inches) by December 23, 1996.³⁶⁶
- 1996 (December 20)** Don Bently, founder and president of Bently Nevada Corporation of Minden, Nevada, obtained partial ownership of the Mud Lake Reservoir in the southern portion of Carson Valley. The purchase included 796 acres of land upon which Mud Lake is located, 1,350 acre-feet of water in the reservoir, and 1,000 acre-feet of unused storage capacity. The West Fork Water Company, formed to manage the reservoir and use its water, expressed its intention to reduce the reservoir's surface area and make it deeper, thereby increasing its storage capacity while reducing surface evaporation losses. The water is intended to be used on Bently's South Range, a conglomeration of sections of the

Settelmeyer, Dressler, Tillman, and other historic Carson Valley ranch properties. The purchase now gives Bently ownership of a contiguous strip of property nearly five miles long from the reservoir site to the Gardnerville Ranchos. Prior to this purchase, the owner of the Mud Lake Reservoir, Aqueduct I Ltd., had been negotiating with the Carson Water Subconservancy District, which included water-related entities from Douglas and Lyon counties and Carson City. However, on November 20, 1996, Aqueduct I suddenly withdrew its offer of sale and terminated negotiations with the district.³⁶⁷

1997 (January 1—The Flood of 1997) The Carson River Basin experienced its most severe and extensive flooding on record.³⁶⁸ The flood event, which significantly exceeded the prior 100-year flood records above Carson City and Eagle Valley, resulted from the combined effects of warm torrential rains on above-normal accumulated snowpack and on saturated soils (wet mantle).

The flood event may be considered to have begun on Friday, December 20, 1996, when heavy snowfall began in the Sierra Nevada Mountains and lasted through Monday, December 23, 1996. Additional snowfall was recorded over the December 27–28, 1996 period. Both these snowfall events appreciably added to the accumulated snowpack water content and were the result of more typical colder storm systems which affect this region and originate in the Gulf of Alaska.

Beginning on Monday, December 30, 1996, a warm, wet storm system moved in from the central Pacific region (the “Hawaiian Express” or “Hawaiian Hoser”), resulting in extremely warm and heavy rains throughout the Sierra Nevada Mountains, even at elevations above 10,000 feet above mean sea level (MSL). The rains melted virtually the entire accumulated snowpack at elevations below approximately 7,000 feet MSL, and tended to largely “flow through” the snowpack at higher elevations, sending torrents of water down the unregulated East and West forks of the Carson River above Carson Valley. The Ebbetts Pass Natural Resources Conservation Service (NRCS) SNOTEL (snowpack telemetry) site located at 8,700 feet MSL recorded 16.8 inches of rainfall during the rainfall event of December 31, 1996, through January 3, 1997, but the existing snowpack became quickly saturated and was able to “absorb” or retain only 4.8 inches of this direct rainfall, thereby releasing 12.0 inches for available runoff. The Spratt Creek SNOTEL site, located at 6,200 feet MSL, recorded 8.8 inches of precipitation during this event while also experiencing 2.4 inches of water released from the snowpack, thereby bringing total available runoff up to 11.2 inches.³⁶⁹

Flows on the Carson River East Fork at Markleeville, California, peaked at 21,000 cfs (stage of 11.78 feet) during the afternoon of Thursday, January 2, 1997, considerably above the previous record peak flow at this location of 15,100 cfs (stage of 10.21 feet) set in 1963. On the Carson River’s East Fork, at Gardnerville, Nevada, the peak flow reported was 20,000 cfs (stage 12.8 feet), well above the previous peak of 16,700 cfs (stage 11.88 feet) recorded in 1955. Along the Carson River’s West Fork, the peak flow at Woodfords, California, was recorded at 8,000 cfs, significantly above the previous record peak flow of 4,890 cfs attained in 1963. Extensive flooding was recorded throughout Carson Valley downstream from Minden to below the Cradlebaugh Bridge, where U.S. Highway 395 was covered by the flooding Carson River. The peak flow of the Carson River mainstem at Carson City, by contrast, did not set a record, reaching a

peak rate of flow of 27,500 cfs at the Carson City gage on the morning of Friday, January 3, 1997, slightly below the record flow of 30,000 cfs recorded in 1955. This lower reading was due primarily to the attenuating effects of the extensive flooding throughout much of Carson Valley above the USGS Carson City gaging station.

The Nevada counties of Washoe, Storey, Douglas, and Lyon, and the Independent City of Carson City, were declared federal disaster areas by the President on January 3, 1997. On January 15, 1997, this declaration was amended to include the Nevada counties of Churchill and Mineral.³⁷⁰

- 1997 (February 5)** At a special meeting of the Carson Water Subconservancy District, the Board of Directors voted to be the regional agency to receive federal disaster assistance for the rehabilitation of levees and other river-related repairs and maintenance necessary due to the 1997 flood. These repairs included irrigation and drainage systems which are pertinent to the river.³⁷¹
- 1997 (February 14)** In a situation reflective of the highly variable hydrologic conditions of the region, U.S. Fish and Wildlife Service wildlife specialists at Stillwater National Wildlife Refuge (NWR) expressed concern about an overabundance of water entering the refuge and flooding the area during the critical spring nesting season. It was noted that of the approximately 1,780 cfs of water then being released from Lahontan Reservoir, nearly 1,400 cfs was being diverted into the desert, other reservoirs, and directly to the Carson Sink, bypassing the Stillwater NWR. The remaining 400 cfs, however, was directly entering the refuge via the Diagonal Canal, the D-Line Canal, and the Stillwater Slough. While the water may prove beneficial for flushing out the marshes and eliminating salt buildup, too much water at this particular time of year can be hazardous to nesting waterfowl due to resultant changes in habitat, shelter, and life zones. It was noted that the excessive inflows into Stillwater NWR were due primarily to high releases at Lahontan Dam and the limited capacity of canals and the river channel through the Lahontan Valley. This extensive irrigation distribution system is designed principally to deliver water to agricultural water users throughout the Newlands Project and not necessarily to move water efficiently through the valley to terminus locations beyond.³⁷² With the relatively high levels of snowpack currently existing in the Sierra Nevada Mountains (187 percent of average in the Carson River Basin as of February 1, 1997), and high reservoir storage levels, it was anticipated that the problem of spring flooding would intensify.³⁷³
- 1997 (March 6)** The *Truckee-Carson River Basin Study*, Final Report, prepared by Clearwater Consulting Corporation for the U.S. Department of the Interior, was presented to the Western Water Policy Review Advisory Commission. This report, one of six to be prepared for major Western states' water basins, was required by the October 30, 1992 passage of the Western Water Policy Act (Public Law 102-575, Title XXX). The Advisory Commission was appointed by the President and chartered by the Secretary of the Interior on September 15, 1995. The report contained a number of findings and recommendations with respect to federal agency actions and Western water issues. Some of the more important findings with respect to facilitating and settling water rights issues included: (1) The negotiating playing field must be made level; where the federal government provides legal and technical assistance, it should work to equalize the balance among legitimate interests; (2) The federal government must maintain an appearance of fairness and objectivity as the highest priority;

(3) The driving force in water rights negotiations should shift the focus from water rights to mutual interests; (4) The federal government should encourage the parties representing differing interests to negotiate directly with one another (e.g., the Preliminary Settlement Agreement); (5) Consider risk-based physical solutions, trading firm water rights for an adequate margin of safety in water-short years by supporting a mix of water exchanges and flexible use of storage and water rights, maximizing use of available facilities; (6) Move to empower the local level, including local federal officials, with decision-making authority, and avoid continual changes in policies (i.e., Newlands Project revised and/or adjusted Operating Criteria and Procedures); (7) Promote good and flexible modeling and define and use a water baseline using good science, policy and the law so as to clearly bound the process by identifying when federal responsibilities, such as endangered species protection or tribal trust responsibility, have been met; (8) Recognize that the OCAP approach to water use within the Newlands Project may not be a viable strategy and produces unproductive accounting disputes, ill will, and fosters an unproductive focus on the issue of rights; and (9) The federal government should strive to promote solutions that depend on market incentives and enlightened self-interest, over those that depend on threats and intimidation, specifically avoiding federal or tribal micro-management of reclamation projects (i.e., the Newlands Project). The report also recommended the aggressive use of the Land Evaluation and Site Assessment (LESA) method with respect to the water rights acquisition program to focus irrigation [within the Newlands Project] on the most efficient canals, best soils, and most productive farmers, shrinking it [the Project] to a tight core while using land swaps to trade outliers [distant or relatively unproductive farmlands] back into the center. The report also noted that “There is no way to measure the original conditions and the effects of the original changes...[the] effects to wetlands and other water-related phenomena [with]in the basins due to the changes such as irrigation cannot be differentiated from the potential effects due to climatic change in this century.”³⁷⁴

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Notes to Part III:

1. Francis G. Newlands served first as a U.S. Representative to Congress from Nevada from 1892–1902 and then as a U.S. Senator from 1903–1917.
2. Townley, John M., *Turn this Water into Gold: The Story of the Newlands Project*, Nevada Historical Society, Reno, Nevada, 1977, page 25.
3. Closely associated with the work of Dr. Church and long in charge of the Nevada Cooperative snow Surveys and the University of Nevada, Reno, was Dr. H.P. Boardman. Both men retired in 1939 and continued to study and publish in this area of research for almost 20 years. [See Houghton, Samuel G., *A Trace of Desert Waters: The Great Basin Story*, University of Nevada Press, Reno, Nevada, 1994, page 58.]
4. *Ibid.*
5. Dangberg, Grace, *Conflict on the Carson*, Carson Valley Historical Society, Minden, Nevada, November 1975, pages 104–105.
6. *Ibid.*, page 105.
7. There had been some question as to whether the Salt River Project in Arizona or the Truckee–Carson Irrigation Project in Nevada was the first federally-approved and federally-funded reclamation project. Actually, the Truckee–Carson Project was one of five projects to be recommended by the Director of the U.S. Reclamation Service. The Truckee–Carson Irrigation Project was authorized on March 14, 1903 and the first water became available on April 1, 1905. The Salt River Project was also authorized on March 14, 1903, construction began August 24, 1903 and the first water became available May 15, 1907, 2 years after the Truckee–Carson Project. [See Hugh A. Shamberger, *Evolution of Nevada's Water Laws, as Related to the Development and Evaluation of the State's Water Resources, From 1866 to About 1960*, Water Resources Bulletin 46, U.S. Department of the Interior, Geological Survey, in cooperation with the Nevada Division of Water Resources, 1991, page 19.]
8. See June–July 1889 entry.
9. *Final Environmental Impact Statement for the Newlands Project Proposed Operating Criteria and Procedures (OCAP)*, U.S. Department of the Interior, Bureau of Reclamation, Mid-Pacific Regional Office, Sacramento, California, December 1987, page S-4.
10. See *Initial Bench & Bottom Land, Map and Criteria*, Newlands Project, Nevada, Division of Water and Power Resources Management, Water Operation and Maintenance Branch, Irrigation Section, Bureau of Reclamation, U.S. Department of the Interior, Sacramento, California, September 1990, Revised January 1992, page 11.
11. President Roosevelt went on to write in this same letter: “Mr. Newlands had absolutely nothing to do with getting the bill through, but he has since industriously worked a newspaper bureau to give him the credit. This bureau has gone so far as to publish fake interviews with the Secretary of the Interior and the Secretary of Agriculture. The chief work that has been done was not by the eastern people at all. I had to devote myself to the easterners, and all that I had to do with Newlands was to make it evident that I would not back the extreme scheme with which he had been identified, the backing of which meant that nothing whatever would be accomplished. As soon as we got the westerners to agree upon a moderate bill, and could show that we were not going to do anything like what Mr. Newlands had originally proposed, then it only remained to bring the easterners in line, and that caused hard work, but we finally did it. I write you thus at length because I have been convinced that Mr. Newlands had sought to exploit this bill for his own political purposes.” [See Smith, Frank E. [editor], *Land and Water, 1492–1900*, Chelsea House Publishers in association with Van Nostrand Reinhold Company, New York, N.Y., 1971, Volume 2, On Newlands and Roosevelt, pages 40–41.]
12. Townley, John M., *The Orr Ditch Case, 1913–1944*, Water Resources Center Publication 43007, Desert Research Institute, University of Nevada System, October 1980, pages 3-4.
13. *Biennial Report of the State Engineer, 1909–1910*, State of Nevada, State Printing Office, Carson City, Nevada, 1911, page 3.
14. Shamberger, Hugh A., *Evolution of Nevada's Water Laws, as Related to the Development and Evolution of the State's Water Resources, From 1866 to About 1960*, Water Resources Bulletin 46, U.S. Department of the Interior, Geological Survey, in cooperation with the Nevada Division of Water Resources, Department of Conservation and Natural Resources, State of Nevada, Carson City, Nevada, 1991, pages 17–20 and 31.
15. Townley, John M., *Reclamation in Nevada, 1850–1904*, (unpublished Ph.D. dissertation, Department of History, University of Nevada-Reno, 1976), pages 310–312. In fact, Section 3 of this act set forth the qualifications for the State Engineer and gave the Secretary of the Interior or the Director of the U.S. Geological Survey 30 days to approve a name submitted to become State Engineer. If no action were taken by the federal government officials, the

Governor could proceed to make the appointment. [Also see Shamberger, *Evolution of Nevada's Water Laws, as Related to the Development and Evolution of the State's Water Resources, From 1866 to About 1960*, *op. cit.*, page 18.]

16. Townley, *The Orr Ditch Case, 1913–1944*, *op. cit.*, page 18. [U.S. Congress, Senate, *Federal Reclamation by Irrigation: Report of Committee of Special Advisors on Reclamation*, 68th Congress, 1st Session, 1924, S. Doc. 92, page 183.]
17. Strong, *op. cit.*, page 44. Also see Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, page 49.
18. Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, page 47.
19. Shamberger, *op. cit.*, page 19.
20. ToolWorks electronic encyclopedia, Grolier Electronic Publishing, Inc., 1992.
21. Book 1, Certificates 1 through 376, Office of the State Engineer, Nevada Division of Water Resources, Department of Conservation and Natural Resources, Carson City, Nevada.
22. Nevada Historical Marker 43, "Derby Diversion Dam."
23. Nevada Historical Marker 178, "Hazen."
24. Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, page 67–72.
25. In 1994, the largest geothermal power producer in the State of Nevada was Oxbow Geothermal and was located in Churchill County. This plant's total revenues from geothermal power generation and sales during this year were \$60,771,155 and comprised 91.0 percent of the gross mineral proceeds of Churchill County and also accounted for 70.6 percent of total geothermal power sales in the state. [See *Net Proceeds of Minerals, 1994–95*, Division of Assessment Standards, Centrally Assessed Properties, Nevada Department of Taxation, Carson City, Nevada, June 10, 1995.]
26. Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, page 33.
27. Shamberger, *Evolution of Nevada's Water Laws, as Related to the Development and Evolution of the State's Water Resources, From 1866 to About 1960*, *op. cit.*, page 20.
28. Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, page 33.
29. Townley, *The Orr Ditch Case*, *op. cit.*, page 27.
30. *Ibid.*, page 5.
31. Nevada Historical Marker 130, "Minden."
32. Dangberg, *Conflict on the Carson*, *op. cit.*, page 135.
33. Dangberg, *Carson Valley—Historical Sketches of Nevada's First Settlement*, *op. cit.*, page 120.
34. Townley, *The Orr Ditch Case*, *op. cit.*, page 6.
35. Briefing Document, Public Law 101-618, Bureau of Indian Affairs, U.S. Department of the Interior, Carson City Office, Carson City, Nevada, February 1994.
36. Shamberger, *Evolution of Nevada's Water Laws, as Related to the Development and Evolution of the State's Water Resources, From 1866 to About 1960*, *op. cit.*, page 21.
37. *History of Flooding—Carson Valley and Carson City Watershed*, U.S. Department of Agriculture Special Report on Water and Related Land Resources, Central Lahontan Basin, Carson River Sub-Basin, Soil Conservation Service (SCS), U.S. Department of Agriculture, Carson City, Nevada, November 1973, pages 15–21.
38. Townley, *The Orr Ditch Case*, *op. cit.*, page 7.
39. Briefing Document, Public Law 101-618, *op. cit.*
40. *Indian Water Rights: Negotiating the Future*, Water Resources Research Center, University of Arizona, College of Agriculture, Tucson, Arizona, June 1993, pages 8-10.
41. *A Study of Water Rights and Their Enforcement [in the] Lake Tahoe, Truckee and Carson River Basins*, Prepared by Water Rights Study Group, Pyramid Lake Task Force, [for the] U.S. Department of the Interior, Office of the Solicitor, Sacramento Region, Sacramento, California, August 1971, page 157.
42. Townley, *The Orr Ditch Case*, *op. cit.*, page 7.
43. *Ibid.*, page 9.
44. *Ibid.*
45. *Ibid.*, page 44.

46. Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, page 49.
47. Strong, *op. cit.*, page 101. Also see Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, pages 49–50.
48. Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, pages 73–78.
49. Nevada Historical Marker 179, “First Air Flight in Nevada (June 23, 1910).”
50. Townley, *The Orr Ditch Case*, *op. cit.*, page 11.
51. *Ibid.*
52. *TRUCKEE RIVER ATLAS*, *op. cit.*, pages 32 and 41.
53. The strain of the Hearts-O-Gold cantaloupe variety was developed before World War I by Henry Morrell of Benton Harbor, Michigan, who was a commercial grower and needed a melon that would stand the strains of weather and rail shipment. O.J. Vannoy obtained samples of the seed and found that the melon was superior to other varieties he raised in comparative plantings. [See Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, page 81.]
54. *Ibid.*, pages 79–86.
55. Townley, *The Orr Ditch Case*, *op. cit.*, pages 11-12.
56. Townley, John M., *The Truckee Basin Fishery, 1844–1944*, Water Resources Center Publication 43008, Desert Research Institute, University of Nevada System, November 1980, page 70.
57. *TRUCKEE RIVER ATLAS*, *op. cit.*, page 44.
58. Strong, *op. cit.*, page 103.
59. *TRUCKEE RIVER ATLAS*, *op. cit.*, page 47.
60. In addition to crucial operating criteria for Truckee River operations, the 1935 Truckee River Agreement also contained language intended to settle the long-standing disputes over pumping Lake Tahoe by: (1) Establishing the natural conditions in the bed and banks of Lake Tahoe and of the Truckee River near Tahoe City, Placer County, California, and prohibiting any alteration of such natural conditions without the approval of the Attorney General of the State of California, and, in fact, allowing parties to the agreement the right to restore these areas to their natural condition, as necessary; (2) Prohibiting the creation of any other outlet of Lake Tahoe in addition to the present and natural outlet at the head of the Truckee River; (3) Prohibiting the removal of water from Lake Tahoe for irrigation or power uses by any means other than gravity except upon the declaration of the U.S. Secretary of the Interior; and (4) Prohibiting the removal of water from Lake Tahoe for sanitary or domestic uses by any means other than gravity, except upon the condition that the Departments of Health of the States of Nevada and California, or other officers exercising similar authority, shall first have made and filed with the Attorney General of the State of Nevada and the Attorney General of the State of California certificates showing that a necessity for such pumping of Lake Tahoe exists. [See *TRUCKEE RIVER ATLAS*, *op. cit.*, page 54.]
61. *California–Nevada Interstate Compact Between the State of California and Nevada*, Ratified by [the] State of California, September 19, 1970 (Chapter 1480, California Statutes 1970), Ratified by [the] State of Nevada, March 5, 1971 (Nevada Revised Statutes 538.600), Congressional Consent Pending, April 25, 1971.
62. Townley, *The Orr Ditch Case*, *op. cit.*, page 15.
63. *Nevada State Journal*, March 4, 1913, page 1.
64. Shamberger, *Evolution of Nevada’s Water Laws, as Related to the Development and Evolution of the State’s Water Resources, From 1866 to About 1960*, *op. cit.*, pages 23–28.
65. This figure does not include water below the presumed “normal” level of Lake Tahoe, or 6,228 feet MSL, which totals approximately 122 million acre-feet. [See *TRUCKEE RIVER ATLAS*, *op. cit.*, page 15.]
66. *CARSON RIVER ATLAS*, *op. cit.*, page 26.
67. *Ibid.*, page 97.
68. Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, pages 49–50. [Also see *Truckee River Chronology*, Part I, “Truckee River Operating Requirements and Procedures,” Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada, for a complete description of these flow rates and Truckee River operating requirements.]
69. Dangberg, *Carson Valley—Historical Sketches of Nevada’s First Settlement*, *op. cit.*, page 136.
70. Dangberg, *Conflict on the Carson*, *op. cit.*, page 157.
71. Strong, *op. cit.*, page 104.

72. Townley, *The Orr Ditch Case*, *op. cit.*, pages 28-29.
73. Strong, *op. cit.*, page 104.
74. Townley, *The Orr Ditch Case*, *op. cit.*, page 30.
75. *CARSON RIVER ATLAS*, *op. cit.*, page 69.
76. *TRUCKEE RIVER ATLAS*, *op. cit.*, page 51.
77. Nevada Historic Marker 77, "Dat-So-La-Lee."
78. Dangberg, *Conflict on the Carson*, *op. cit.*, page 273.
79. "Alpine Decree, Findings of Fact, Conclusions of Law, Tabulation and Administrative Provisions," *United States of America v. Alpine Land & Reservoir Company, a Corporation, et al.*, Civil No. D-183 BRT [Bruce R. Thompson], Final Decree, United States Federal District Court for the District of Nevada, October 28, 1980.
80. Murphy, Shane, *The Lore and Legend of the East Fork—A Historical Guide for Floating the East Carson River*, The Carson River Conservation Fund, Zephyr Cove, Nevada, 1982, pages 66-67.
81. Townley, *The Orr Ditch Case*, *op. cit.*, page 36.
82. *A Study of Water Rights and Their Enforcement [in the] Lake Tahoe, Truckee and Carson River Basins*, *op. cit.*, pages 116-119.
83. Of this total annual allocation, for the period of record of 1910-1966, approximately 239,700 acre-feet per year were diverted from the Truckee River at Derby Dam and for the period of record 1967-1994, this diversion amounted to 183,160 acre-feet per year. [See Horton, Gary A., *Truckee River Chronology—A Chronological History of Lake Tahoe and the Truckee River and Related Water Issues*, Sixth Update, Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada, [Seventh Update] March 1997.]
84. *A Study of Water Rights and Their Enforcement [in the] Lake Tahoe, Truckee and Carson River Basins*, *op. cit.*, page 103.
85. *U.S. v. Alpine Land and Reservoir Company, et al.*, "Orders on Appeals from Decisions of State Engineer on Transfer Applications," Civil No. D-184, BRT [Bruce R. Thompson], Entered October 1, 1986, U.S. District Court for Nevada, pages 5-6.
86. "Perfection" deals with the water right process whereby the uses anticipated by an applicant, and made under the water right permit, were made for "beneficial use." Usually a perfected water right is irrevocable unless voluntarily canceled or forfeited due to several consecutive years of nonuse. "Abandonment" represents the failure of a water right holder to put a water right to beneficial use for generally five or more years, whereby the owner of the water right states that the water right will not be used, or takes such actions that would prevent the water from being beneficially used. "Forfeiture" represents the invalidation of a water right because of five or more consecutive years of nonuse. [See Horton, Gary A., *WATER WORDS DICTIONARY*, Seventh Edition, Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada, Seventh Edition, June 1996.]
87. *History of Flooding—Carson Valley and Carson City Watershed*, *op. cit.*, pages 21-23.
88. *TRUCKEE RIVER ATLAS*, *op. cit.*, page 34.
89. *Ibid.*, page 51.
90. ToolWorks electronic encyclopedia, Grolier Electronic Publishing, Inc., 1992.
91. *TRUCKEE RIVER ATLAS*, *op. cit.*, page 51.
92. *Ibid.*, page 50.
93. Corrected application was filed on March 6, 1931.
94. Water Right Application File No. 9322, Office of the State Engineer, Nevada Division of Water Resources, Department of Conservation and Natural Resources, Carson City, Nevada.
95. Corrected application was filed on March 9, 1931.
96. Based on testimony provided by Truckee-Carson Irrigation District Project Manager to the Nevada State Engineer, Division of Water Resources, Department of Conservation and Natural Resources, Carson City, Nevada..
97. *Ibid.*
98. U.S. Fish and Wildlife Service, Nevada State Office, Reno, Nevada.
99. Briefing Document, Public Law 101-618, *op. cit.*
100. *TRUCKEE RIVER ATLAS*, *op. cit.*, page 52.
101. *Ibid.*, page 51.

102. *Leviathan Mine 5-Year Workplan*, California Regional Water Quality Control Board, Lahontan Region, California Environmental Protection Agency, State of California, Sacramento, California, July 1995, page 5.
103. Such provisions included: (1) Establishing the natural conditions of the bed and banks of Lake Tahoe and of the Truckee River near Tahoe City, Placer County, California, and prohibiting any alteration of such natural conditions without the approval of the Attorney General of the State of California, and, in fact, allowing parties to the agreement the right to restore these areas to their natural condition, as necessary; (2) Prohibiting the creation of any other outlet of Lake Tahoe in addition to the present and natural outlet at the head of the Truckee River; (3) Prohibiting the removal of water from Lake Tahoe for irrigation or power uses by any means other than gravity except upon the declaration of the U.S. Secretary of the Interior; and (4) Prohibiting the removal of water from Lake Tahoe for sanitary or domestic uses by any means other than gravity, except upon the condition that the Departments of Health of the States of Nevada and California, or other officers exercising similar authority, shall first have made and filed with the Attorney General of the State of Nevada and the Attorney General of the State of California certificates showing that a necessity for such pumping of Lake Tahoe exists. [See *TRUCKEE RIVER ATLAS*, *op. cit.*, page 54.]
104. *History of Flooding—Carson Valley and Carson City Watershed*, *op. cit.*, pages 23–30 and 47.
105. *Ibid.*, pages 30–32.
106. “Lyon County Reflections,” The Mason Valley News, Inc., and the Fernley Leader-Dayton Courier, 1966, pages 19–20.
107. Shamberger, *Evolution of Nevada’s Water Laws, as Related to the Development and Evolution of the State’s Water Resources, From 1866 to About 1960*, *op. cit.*, page 31.
108. “Nevada Water Supply and Use,” U.S. Geological Survey Water-Supply Paper 2350, Water Resources Division, USGS, Carson City, Nevada, 1987, page 359.
109. *Nevada Hydrographic Basin Statistical Summary*, Office of the State Engineer, Nevada Division of Water Resources, and Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada, 1988.
110. *Reno Gazette-Journal*, April 25, 1996, pages 1A and 5A.
111. Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, pages 129–132.
112. *History of Flooding—Carson Valley and Carson City Watershed*, *op. cit.*, pages 32–34.
113. *Truckee River System Briefing Data*, *op. cit.*, page 3-3.
114. *A Study of Water Rights and Their Enforcement [in the] Lake Tahoe, Truckee and Carson River Basins*, *op. cit.*, pages 116-119.
115. Information provided by the Nevada Division of Wildlife, Department of Conservation and Natural Resources, Reno, Nevada, and U.S. Fish and Wildlife Service, Nevada State Office, Reno, Nevada.
116. *History of Flooding—Carson Valley and Carson City Watershed*, *op. cit.*, pages 34–47.
117. To their credit, Anaconda made various attempts to decrease the degree of water pollution during its open-pit mining operations. Some of these efforts included diverting Leviathan Creek around the dump site, capturing the acid mine drainage in a large holding pond and treating it with lime to raise its pH level and precipitate its iron content before discharge, disposing of acid mine drainage in injection wells near Leviathan Creek, plugging up one of the tunnels (adits), and various grading efforts to cover the deposits and redirect Leviathan Creek. Unfortunately, high runoff generally circumvented all these efforts and resulted in extensive fish kills in the East Fork of the Carson River, one such recorded kill extending for approximately ten miles down the East Fork of the Carson River from Bryant Creek. [See *Leviathan Mine 5-Year Workplan*, *op. cit.*, pages 6–11.]
118. *Ibid.*, page 11.
119. *CARSON RIVER ATLAS*, *op. cit.*, pages 76–77.
120. “Washoe Project Sheet Map and Fact Sheet,” United States Department of the Interior, Bureau of Reclamation, Nevada-California, Mid-Pacific Region, map number 320-208-35, January 1956 and April 1991.
121. The word “Watasheamu” (pronounced *watt-ah-SHE-mu*, or *wah-TASH-ah-mu*) descends from Washoe vernacular and means “the river” or “main stream.” [See Murphy, *op. cit.*, page 65.]
122. Murphy, *op. cit.*, pages 67–68.
123. *A Study of Water Rights and Their Enforcement [in the] Lake Tahoe, Truckee and Carson River Basins*, *op. cit.*, page 64.

124. A major issue of contention was a phrase in the final version of the compact which stated that the use of waters by the federal government, its agencies, instrumentalities, or wards was to be against the use by the state in which it is made. This limitation, combined with new court interpretations of the federal reserved water rights (Winters Doctrine), waters required for Pyramid Lake fish species under the Endangered Species Act (ESA), and public trust doctrine issues combined to derail eventual Congressional approval. [See *WALKER RIVER ATLAS*, Department of Water Resources, The Resources Agency, State of California, Sacramento, California, June 1992, pages 69-70.]
125. *TRUCKEE RIVER ATLAS*, *op. cit.*, page 59.
126. *Water Resources Data, Nevada, Water Year 1994*, U.S. Geological Survey Water-Data Report NV-94-1, Nevada District Office, Water Resources Division, U.S. Geological Survey, U.S. Department of the Interior, Carson City, Nevada, 1995, page 206.
127. *History of Flooding—Carson Valley and Carson City Watershed*, *op. cit.*, pages 47-55.
128. *CARSON RIVER ATLAS*, *op. cit.*, page 78.
129. ToolWorks electronic encyclopedia, Grolier Electronic Publishing, Inc., 1992.
130. "Yellowboy" consists of iron oxide flocculent (clumps of solids in waste or water); usually observed as orange-yellow deposits in surface streams with excess iron content. Characterized by unsightly yellowish precipitates of ferric sulfate and hydroxide and frequently observed in many streams polluted by mine drainage. [See Horton, *WATER WORDS DICTIONARY*, *op. cit.*]
131. *Leviathan Mine 5-Year Workplan*, *op. cit.*, page 11.
132. *Ibid.*, Appendix A, page 3.
133. *Ibid.*, pages 6 and 11.
134. Murphy, *op. cit.*, page 69.
135. *History of Flooding—Carson Valley and Carson City Watershed*, *op. cit.*, page 55.
136. *Final Environmental Impact Statement for the Newlands Project Proposed Operating Criteria and Procedures (OCAP)*, *op. cit.*, page S-1.
137. *A Study of Water Rights and Their Enforcement [in the] Lake Tahoe, Truckee and Carson River Basins*, *op. cit.*, pages 150-154.
138. Major provisions of this act included: (1) Identification of native (as opposed to exotic) vertebrates in danger of extinction; (2) Direction to federal agencies to preserve habitat when "practicable and consistent;" (3) Authorization establishing National Wildlife Refuges to protect habitat; and (4) No protection for listed species except on refuges. [Fact Sheet: "Endangered Species Act History and Overview," U.S. Fish and Wildlife Service, Nevada State Office, U.S. Department of the Interior, Reno, Nevada, February 1995.]
139. *Water Resources Data*, *op. cit.*, page 314.
140. From Pyramid Lake gaging station records provided by the U.S. Geological Survey, Water Resources Division, Carson City, Nevada.
141. *Plan of Study—Truckee Meadows Investigation, Nevada*, *op. cit.*, page 7.
142. Houghton, *op. cit.*, page 84.
143. *Water Resources Data*, *op. cit.*, pages 522-523.
144. *CARSON RIVER ATLAS*, *op. cit.*, page 81.
145. *A Study of Water Rights and Their Enforcement [in the] Lake Tahoe, Truckee and Carson River Basins*, *op. cit.*, page 154.
146. *Final Environmental Impact Statement for the Newlands Project Proposed Operating Criteria and Procedures (OCAP)*, *op. cit.*, page S-1.
147. "Operating Criteria and Procedures; Truckee and Carson Rivers," Newlands Reclamation Project, Nevada, Office of the Secretary, U.S. Department of the Interior, September 27, 1967. [As presented in the Federal Register, Volume 32, No. 190, page 13733.]
148. Data provided by Sierra Hydrotech, the consulting firm which tabulated Truckee Canal diversions from the Federal Water Master's gage for water years 1910-1966 from Truckee-Carson Irrigation District files. The average annual diversion for this period of record was 239,700 acre-feet. [From information provided by U.S. Bureau of Reclamation, Lahontan Basin Area Office, Carson City, Nevada.]
149. *Water Resources Data, Nevada*, U.S. Geological Survey.
150. *Pyramid Lake Task Force Final Report*, December 1971, page I.

151. Major provisions of this act included: (1) Identified vertebrates and invertebrates in danger of worldwide extinction; (2) Prohibited interstate commerce of illegally taken species; (3) Prohibited import or subsequent sale within U.S. with only few exceptions; and (4) Required an international agreement on trade in endangered species. [See Fact Sheet: "Endangered Species Act History and Overview," *op. cit.*]
152. Briefing Document, Public Law 101-618, *op. cit.*
153. *A Study of Water Rights and Their Enforcement [in the] Lake Tahoe, Truckee and Carson River Basins*, *op. cit.*, pages 158-160.
154. *California-Nevada Interstate Compact Between the State of California and Nevada*, Ratified by [the] State of California, September 19, 1970 (Chapter 1480, California Statutes 1970), Ratified by [the] State of Nevada, March 5, 1971 (Nevada Revised Statutes 538.600), Congressional Consent Pending, April 25, 1971.
155. *Federal Register*, Volume 35, page 13520.
156. *California-Nevada Interstate Compact Between the State of California and Nevada*, *op. cit.*
157. Houghton, Samuel G., *A Trace of Desert Waters: The Great Basin Story*, University of Nevada Press, Reno, Nevada, 1994, page 98.
158. *Pyramid Lake Task Force Final Report*, *op. cit.*, page vi.
159. *Ibid.*, page viii.
160. Mahannah, C.N., J.C. Guitjens, and C.R. York, *Western Nevada Water Controversy*, Cooperative Extension Service, Max C. Fleischmann College of Agriculture, University of Nevada, Reno, January 1975, page 4.
161. *Ibid.*, page 35.
162. Major enforceable provisions of the CWA included: (1) Technology-based effluent standards for point sources of pollution; (2) State-run control program for nonpoint pollution sources; (3) A construction grants program to build or upgrade municipal sewage treatment plants; (4) Regulatory system for spills of oil and other hazardous wastes; and (5) A controversial wetlands preservation program (Section 404). The CWA Section 404 wetland provisions has become a crucial factor in the future preservation efforts of wetlands by the COE throughout the United States. It also has created considerable controversy over the definition and value placed on such areas. [See Horton, *WATER WORDS DICTIONARY*, *op. cit.*]
163. *WALKER RIVER ATLAS*, *op. cit.*, page 7.
164. *California Water Plan Update*, Bulletin 160-93, Department of Water Resources, The Resources Agency, State of California, October 1994, Volume 1, pages 28-33, and Volume 2, page 214.
165. Personal communication, Pamela B. Wilcox, Administrator and State Land Registrar, Division of State Lands, Department of Conservation and Natural Resources, State of Nevada, Carson City, Nevada, April 29, 1996.
166. Mahannah, *op. cit.*, page 19. Aerial survey was conducted by Cornell, Howland, Hayes and Merryfield Clair A. Hill & Associates (CH2M/Hill).
167. Sill, R., T. Mudd, S. Francis and T. Swedberg, "Progress Report," Sierra Club Pyramid Lake Task Force, August 1972.
168. Mahannah, *op. cit.*, pages 4-5.
169. De Bruyn, David, *Potential Water Conservation Measures—Newlands Project*, Prepared under the Request of the Special Assistant to the Secretary of the Interior on Matters Dealing with Public Law 101-618 [Negotiated Settlement], April 1992, page 23.
170. It is generally recognized that water management on the Newlands Project is inefficient by modern standards, a reflection of the project's age and its lack of modernization and major maintenance since its construction in the early 1900's. [See *CARSON RIVER ATLAS*, *op. cit.*, page 82.] By one estimate [De Bruyn, David, *Potential Water Conservation Measures—Newlands Project*, Prepared under the Request of the Special Assistant to the Secretary of the Interior on Matters Dealing with Public Law 101-618 [Negotiated Settlement], April 1992] it was calculated that with upgraded facilities, canal lining, and more precise diversion measuring capabilities, total potential water conservation within the Newlands Project could total as much as 212,000 acre-feet per year out of a total annual water diversion of 375,000 acre-feet. It was estimated that total farm consumptive use was 155,000 acre-feet per year and the agriculture leaching requirement was approximately 8,000 acre-feet per year. Admittedly, however, this optimum level of water savings came at an extremely high price. For example, lining the central 20 miles of the Truckee Canal's 32.5 mile length, where losses were estimated at 30,000 acre-feet per year, was estimated to cost \$40 million with an additional on-going \$3.55 million annual operations and maintenance cost.
171. *CARSON RIVER ATLAS*, *op. cit.*, page 81.

172. *Ibid.*, pages 90-91. Major provisions of this act included: (1) Emphasis on the conservation of ecosystems upon which species depend; (2) Consolidating existing U.S. and foreign lists; (3) Establishing and defining categories of "endangered" and "threatened"; (4) Lowering the listing threshold to "in danger of extinction in a significant portion of range"; (5) Making eligible all classes of vertebrates, invertebrates, and plants; (6) Defining and prohibiting "take" of endangered vertebrates and invertebrates; (7) Establishing prohibitions on take of threatened species available by special regulation; (8) Restricting import and export; (9) Requiring federal agencies to undertake conservation programs; (10) Prohibiting federal agencies from authorizing, funding, or carrying out actions that may jeopardize the continued existence of listed species; (11) Authorizing the establishment of National Wildlife Refuges (NWR) to protect critical habitat; (12) Establishing a state grant program; and (13) Appropriating funding for programs through 1978 (5-year funding cycle). [See Fact Sheet: "Endangered Species Act History and Overview," *op. cit.*]
173. *CARSON RIVER ATLAS*, *op. cit.*, page 92, and *TRUCKEE RIVER ATLAS*, *op. cit.*, page 73.
174. Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, page 149.
175. *Ibid.*
176. *Final Environmental Impact Statement for the Newlands Project Proposed Operating Criteria and Procedures (OCAP)*, *op. cit.*, page S-1.
177. The Nevada parties included the Truckee-Carson Irrigation District, the State of Nevada, the cities of Reno and Sparks, and some 13,000 other Nevada Truckee River water users holding water rights per the 1944 Orr Ditch Decree. This case is better known as *United States v. TCID*; however, several joint law suits were consolidated by the U.S. Supreme Court, hence the new, if somewhat confusing (i.e., reversed) name (i.e., *Nevada v. U.S.*). [See "Litigation and Decreed Legal Entitlements on the Truckee and Carson River System, A Summary," *op. cit.*]
178. *TRUCKEE RIVER ATLAS*, *op. cit.*, page 63.
179. By the Winters Rights Decision, national parks, forests, monuments, recreation areas, grasslands, refuges, etc., are also considered "reservations" and entitled to their own federal reserved water rights.
180. *TRUCKEE RIVER ATLAS*, *op. cit.*, page 63.
181. Personal correspondence, Lynne L. Hartung, Secretary-Treasurer, Truckee-Carson Irrigation District, June 3, 1996.
182. *Federal Register*, Volume 40, page 29864.
183. *Leviathan Mine 5-Year Workplan*, *op. cit.*, pages 11-12.
184. Horton, *WATER WORDS DICTIONARY*, *op. cit.*
185. *Water Resources Data, Nevada, Water Year 1994*, U.S. Geological Survey Water-Data Report NV-94-1, Nevada District Office, Water Resources Division, U.S. Geological Survey, U.S. Department of the Interior, Carson City, Nevada, 1995, page 206.
186. *WALKER RIVER ATLAS*, *op. cit.*, page 53.
187. Major changes included: (1) Established cabinet level exception from jeopardy standard; (2) Critical habitat defined and designation required for listing; (3) Economic impacts to be considered when designating critical habitat; (4) Distinct population of vertebrates could be listed; (5) Required recovery plans for species listed as endangered; and (6) Appropriated funding for programs through 1982. [See Fact Sheet: "Endangered Species Act History and Overview," *op. cit.*]
188. Briefing Document, Public Law 101-618, *op. cit.*
189. Murphy, *op. cit.*, page 66.
190. Equivalent to a net consumptive use of 2.99 acre-feet per acre per year (based on the water duty of alfalfa).
191. Equivalent to a net consumptive use of 2.5 acre-feet per acre per year (based on the water duty of alfalfa). ["Alpine Decree, Findings of Fact, Conclusions of Law, Tabulation and Administrative Provisions," *United States of America v. Alpine Land & Reservoir Company, a Corporation, et al.*, Civil No. D-183 BRT [Bruce R. Thompson], Final Decree, United States Federal District Court for the District of Nevada, October 28, 1980, page 3.]
192. *Ibid.*, page 11.
193. The issue here is that if the water rights were established on a total project basis, then the priority date would have been 1902 when the Newlands Project was authorized and water rights obtained from both the Carson and Truckee rivers. However, as individual water rights (appurtenant to the land), the priority date becomes the date when the water was put to beneficial use (perfected) on the individual parcels of land. This affects issues of forfeiture and abandonment should, at some future date, the water not been put to beneficial use for a certain period (five years).
194. *Ibid.*, pages 3-4 .

195. *Leviathan Mine 5-Year Workplan, op. cit.*, pages 38–39.
196. The hydrologic water year runs from October 1st through September 30th.
197. Natural Resources Conservation Service, U.S. Department of Agriculture, Reno, Nevada, May 1996.
198. Major changes included: (1) Listing based solely on best biological information available; (2) Critical habitat designation concurrent with listing only to maximum extent prudent and determinable; (3) Established time requirements for listing process; (4) Established recovery priority system; (5) Designation of experimental populations; (6) Limited prohibition on take of endangered plants; (7) Incidental take permits for development of private land; (8) Incidental take provision incorporated within Biological Opinions; and (9) Appropriated funds for programs through 1988. [See Fact Sheet: "Endangered Species Act History and Overview," *op. cit.*]
199. Rusco, Elmer, "The Truckee–Carson–Pyramid Lake Water Rights Settlement Act and Pyramid Lake," *Dividing Desert Waters*, Nevada Public Affairs Review, Number 1, 1992, Senator Alan Bible Center for Applied Research, University of Nevada, Reno, page 12.
200. Stampede Dam and Reservoir, constructed by the U.S. Bureau of Reclamation in 1970 as part of the Washoe Project, is located on the Little Truckee River, drains an area of some 136 square miles, and has a total capacity of 226,000 acre-feet. Water must be used primarily for spawning flows for the endangered cui-ui fish species and the threatened Lahontan cutthroat trout of Pyramid Lake. Storage space is also part of U.S. Army Corps of Engineers flood control plan. Stampede Reservoir water may be stored only after: (1) Floriston rates and Truckee River diversion (Newlands Project) rights have been satisfied; (2) Boca Reservoir (located below stampede Reservoir) is full; and (3) Independence Lake (located above Stampede Reservoir on Independence Creek) is full. Due to its relatively junior water rights, this reservoir seldom fills and therefore has been targeted as a prime storage location for Reno–Sparks municipal water as part of the Negotiated Settlement (Public Law 101–618) and the implementation of a new Truckee River Operating Agreement. The State of California requires a minimum flow of 30 cfs downstream from the dam for maintaining fish habitat (although this agreement has expired, the rates of flow have been maintained). [See Horton, *Truckee River Chronology, op. cit.*]
201. Murphy, *op. cit.*, page 69.
202. *Water Resources Data, Nevada, Water Year 1994, op. cit.*, page 222.
203. *Ibid.*, page 177.
204. *Ibid.*, page 192.
205. *U.S. v. Alpine Land and Reservoir Company, et al.*, 503 F.Supp. at 893, *aff'd* 697 F.2d at 858. [See *U.S. v. Alpine Land and Reservoir Company, et al.*, "Orders on Appeals from Decisions of State Engineer on Transfer Applications," *op. cit.*, page 6.]
206. *U.S. v. Alpine Land and Reservoir Company, et al.*, "Orders on Appeals from Decisions of State Engineer on Transfer Applications," *op. cit.*, page 6.
207. Natural Resources Conservation Service, *op. cit.*
208. The original lawsuit was actually based on *U.S. v. TCID*; however, the U.S. Supreme Court consolidated several lawsuits and gave it this new, if not somewhat confusing, name. Main parties in the lawsuits were the United States (USDI), TCID, State of Nevada, and the Pyramid Lake Paiute Tribe.
209. *TRUCKEE RIVER ATLAS, op. cit.*, page 63.
210. *Leviathan Mine 5-Year Workplan, op. cit.*, pages 27 and 46.
211. *Ibid.*, pages 27–30.
212. *Ibid.*, page 28.
213. According to the Nevada Division of Wildlife, a considerable portion of these inflows into the Carson Sink and Stillwater Marsh actually came from the Humboldt River via the Humboldt Slough. [Personal communication, Norm Saake, Waterfowl Specialist, Game Bureau, NDOW, Fallon, Nevada, May 1996.]
214. Rowe, Timothy G., and Ray J. Hoffman, "Wildlife Kills in the Carson Sink, Western Nevada, Winter 1986–87," U.S. Geological Survey Water-Supply Paper 2350 (Selected Events), USGS Water Resources Division, Carson City, Nevada, 1988. By comparison to this temporary 330 square mile lake created within the Carson Sink, Lake Tahoe's total surface area, shared between California and Nevada, is 193 square miles (123,520 acres, of which approximately 58 square miles (36,800 acres) lie within Nevada); the surface area of Pyramid Lake is 169 square miles (108,160 acres); and that portion of Lake Mead (behind Hoover Dam), shared between Nevada and Arizona, is 247 square miles (157,900 acres, of which approximately 140 square miles (90,000 acres) lie within Nevada. [See *Nevada Water Facts—1980*, Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada, page 10, and *Hoover Dam*, Bureau of Reclamation, U.S. Department of the Interior, U.S.

Government Printing Office, Washington, D.C., 1985, page 44.]

215. *Temporary Operation and Maintenance Agreement*, Contract Number 4-07-20-X0268, between Truckee-Carson Irrigation District and the United States, February 14, 1984.

216. The hearings were held on November 26, 27, 28, and 29, 1984; February 4 and 5, 1985; and June 24, 1985.

217. United States District Court, District of Nevada, Order, A-3-LDG [Lloyd D. George], *U.S. (Plaintiff) and Pyramid Lake Paiute Tribe of Indians (Petitioner) v. Orr Water Ditch Company, et al., (Defendants)*, April 8, 1996, page 6.

218. The approvals were issued in three separate rulings: 58 water rights transfers were approved on March 15, 1985; 44 transfers were approved on May 16, 1985; and 27 transfers were approved on September 30, 1985.

219. *U.S. v. Alpine Land and Reservoir Company, et al.*, "Orders on Appeals from Decisions of State Engineer on Transfer Applications," *op. cit.*, page 9.

220. *Final Environmental Impact Statement for the Newlands Project Proposed Operating Criteria and Procedures (OCAP)*, *op. cit.*, page S-1.

221. *Ibid.*, page S-4.

222. *CARSON RIVER ATLAS*, *op. cit.*, page 95.

223. "Resolution of Differences, Newlands Project Water Rights, Report on Milestone 2," Prepared for U.S. Bureau of Reclamation by Chilton Engineering, Chartered, Reno, Nevada, August 20, 1985, page 8.

224. *Reconnaissance Investigation of Water Quality, Bottom Sediment and Biota Associated with Irrigation Drainage in and near Stillwater Wildlife Management Area, Churchill County, Nevada, 1986-87*, Water-Resources Investigations Report 89-4105, U.S. Geological Survey, U.S. Department of the Interior, prepared in cooperation with the U.S. Fish and Wildlife Service and U.S. Bureau of Reclamation, Carson City, Nevada, 1990, page 8.

225. *Reno Gazette-Journal*, April 28, 1996, page 8A.

226. Now the Bureau of Health Protection Services, Health Division, Department of Human Resources.

227. *Adjusted 1988 Newlands Project Operating Criteria and Procedures*, Churchill and Lyon Counties, Nevada, Draft Environmental Assessment, U.S. Department of the Interior, Truckee Carson Coordination Office, Carson City, Nevada, December 1996, pages 22-23.

228. Milne, Wendy, *A Comparison of Reconstructed Lake-Level Records Since the Mid-1800's of Some Great Basin Lakes*, Department of Geology and Geologic Engineering, Colorado School of Mines, Golden, Colorado, December 1987, page 78.

229. Highstand figure obtained for U.S. Geological Survey, Water Resources Division, Carson City, Nevada.

230. *Final Environmental Impact Statement for the Newlands Project Proposed Operating Criteria and Procedures (OCAP)*, *op. cit.*, page 1-1.

231. *WALKER RIVER ATLAS*, *op. cit.*, pages 69-70.

232. *Ibid.*, page 70.

233. Natural Resources Conservation Service, *op. cit.*

234. The concepts of abandonment and forfeiture would apply to only certain project water rights transfers. The Nevada law is clear and unequivocal that Nevada Revised Statute (NRS) 533.060(2) is not applicable to vested water rights acquired before the statute was enacted in 1913. For vested rights before 1913, it is necessary to establish the owner's intention to abandon and relinquish such right before an abandonment can be found. [See NRS 533.060, page 12890, Nevada Cases, Re Waters of Franktown Creek, 77 Nev. 348, 364 P.2d 1069 (1961).]

235. *U.S. v. Alpine Land and Reservoir Company, et al.*, "Orders on Appeals from Decisions of State Engineer on Transfer Applications," *op. cit.*, pages 22-23.

236. "Notice of Appeal," Pyramid Lake Paiute Tribe of Indians, *United States of America v. Alpine Land and Reservoir Company, et al.*, Civil No. D-184 BRT [Bruce R. Thompson], U.S. District Court for the District of Nevada, February 17, 1987.

237. In this way, it was argued by the Truckee-Carson Irrigation District that by allowing the full water right to be transferred, only not fully used, the variance (the difference of 1.0 acre-foot per acre per year) would not be lost to the stream and storage system. [See "Notice of Appeal," Truckee-Carson Irrigation District, *United States of America v. Alpine Land and Reservoir Company, et al.*, Civil No. D-184 BRT [Bruce R. Thompson], U.S. District Court for the District of Nevada, February 27, 1987.]

238. Rowe, *op. cit.*

239. Natural Resources Conservation Service, *op. cit.*
240. Although approximately 406,000 acre-feet of water deliveries have been contracted for the Newlands Project on a maximum irrigated acreage of 74,500 acres, typically considerably less water is actually used. For example, in 1989, the last year that Newlands Project farmers were eligible to receive their full water entitlements due to the lingering drought which began in 1987, total project diversions amounted to 344,311 acre-feet while project headgate deliveries totaled 213,688 acre-feet (per TCID depletion records) resulting in a project efficiency of 62.1 percent. [See *Newlands Project Efficiency Study*, Draft Copy, U.S. Bureau of Reclamation, Department of the Interior, Carson City District Office, Carson City, Nevada, September 1993, page 19.]
241. *Final Environmental Impact Statement for the Newlands Project Proposed Operating Criteria and Procedures (OCAP)*, *op. cit.*, page 1-2.
242. *Ibid.*, page 1-7.
243. Major changes included: (1) Prohibited recovery preference based on taxonomy; (2) Required monitoring of recovered and candidate species; (3) Established recovery plan content requirements; (4) Required public review and comment on recovery plans; (5) Required reporting of recovery expenditures and species status; (6) Strengthened take prohibitions for endangered plants; and (7) Appropriated funds for programs through 1992. [See Fact Sheet: "Endangered Species Act History and Overview," *op. cit.*]
244. Horton, *WATER WORDS DICTIONARY*, *op. cit.*
245. *TRUCKEE RIVER ATLAS*, *op. cit.*, page 95.
246. The 1988 "Final OCAP" had no expiration date. The date of December 31, 1997 was from Section 209(j) of Public Law 101-618. For the purpose of evaluating environmental impacts, the project irrigated acreage was assumed to increase from 60,300 acres in 1987 to 64,850 acres in 1992 and remain at that level thereafter. This projected increase included 2,600 acres of additional irrigation on the Fallon Indian Reservation and an additional 1,950 acres due to future water right transfers. However, the 1988 OCAP does not set the project irrigated acreage at any particular level. [Olson, *op. cit.*]
247. Olson, *op. cit.*
248. Natural Resources Conservation Service, *op. cit.*
249. *Reno Gazette-Journal*, April 28, 1996, page 8A.
250. *Water Resources in the Walker River Basin: A Search for Water to Save Walker Lake*, Public Resource Associates, Reno, Nevada, November 1994, page 28.
251. These transfer approvals included 24 water rights transfers approved on February 12, 1987; 52 transfers approved on June 2, 1988; and 62 transfers approved on April 14, 1989.
252. The Nevada law is clear and unequivocal that Nevada Revised Statute (NRS) 533.060(2), pertaining to the concepts of abandonment and forfeiture, is not applicable to vested water rights acquired before the statute was enacted in 1913. For vested rights before 1913, it is necessary to establish the owner's intention to abandon and relinquish such rights before an abandonment can be found. [See NRS 533.060, page 12890, Nevada Cases, Re Waters of Franktown Creek, 77 Nev. 348, 364 P.2d 1069 (1961).]
253. "Orders Re Water Right Transfers," *U.S. v. Alpine Land and Reservoir Company, et al.*, CV-D-184 BRT [Bruce R. Thompson], entered July 25, 1990, U.S. District Court for Nevada, pages 2-3.
254. These transfer approvals included 24 water rights transfers approved on February 12, 1987; 52 transfers approved on June 2, 1988; and 62 transfers approved on April 14, 1989.
255. "Orders Re Water Right Transfers," *U.S. v. Alpine Land and Reservoir Company, et al.*, CV-D-184 BRT [Bruce R. Thompson], entered July 25, 1990, U.S. District Court for Nevada, page 1, and "Order Remanding Transfer Applications," *U.S. v. Alpine Land and Reservoir Company, et al.*, CV-D-184 BRT [Bruce R. Thompson], entered July 25, 1990, U.S. District Court for Nevada, page 3.
256. "Carson River Mercury Superfund Site," U.S. Environmental Protection Agency, Region IX, San Francisco, California, December 1994.
257. Cooper, James J., Richard O. Thomas, S. Michael Reed, *Total Mercury in Sediment, Water, and Fishes in the Carson River Drainage, West-Central Nevada*, Nevada Division of Environmental Protection (NDEP), Department of Conservation and Natural Resources, State of Nevada, Carson City, Nevada, December 1985, page 1.
258. "Carson River Mercury Superfund Site," December 1994, *op. cit.*
259. These transfer approvals included 24 water rights transfers approved on February 12, 1987; 52 transfers approved on June 2, 1988; and 62 transfers approved on April 14, 1989.

260. "ORDER," *U.S. v. Alpine Land and Reservoir Company, et al.*, Case No. D-184-HDM [Howard D. McKibben], entered June 9, 1994, U.S. District Court for Nevada, page 2.
261. Horton, *WATER WORDS DICTIONARY, op. cit.*
262. *Public Law 101-618*, U.S. Congress, November 1990.
263. *Ibid.*
264. *CARSON RIVER ATLAS, op. cit.*, page 84. In addition, Section 205(c) of Public Law 101-618 revoked the authority to construct a reservoir at the Watasheamu site.
265. U.S. Fish and Wildlife Service, Nevada State Office, Reno, Nevada.
266. See Rowe, *op. cit.*
267. Natural Resources Conservation Service, *op. cit.*
268. *Reno Gazette-Journal*, April 28, 1996, page 8A.
269. *Ibid.*
270. *Leviathan Mine 5-Year Workplan, op. cit.*, pages 39-40.
271. The full quote from Professor Luthin: "One of the most startling things is the rapidity with which drainage problems can develop over large areas after irrigation water is applied. At first glance it would seem that pervious surface soils underlain with sandy layers at shallow depths, having been dry and idle for the centuries, would be safe from waterlogging. Experience has shown the fallacy of this reasoning. The Newlands Project at Fallon, Nevada, was one of the first projects constructed by the Bureau of Reclamation in 1902. A dam was built and irrigation started in 1906 on about 70,000 acres. Waterlogging of the lands began soon after the start of irrigation, and by the end of 1918 more than 35,000 acres of land had the water table less than 6 feet below the ground surface. The construction of deep open drains started in 1921, and by the end of 1923 there were over 150 miles of open drains to carry away both surface waste water from irrigation as well as subsurface waters. Although additional drainage ditches have been provided since then, the area continues to be plagued by the high water table." [See James N. Luthin, *Drainage Engineering*, 1978.]
272. Of this total acreage of 73,789 acres reported within the Newlands Project, 67,833 acres were found to be within the Carson Division (3,828 acres of bench lands and 64,005 acres of bottom lands) and 5,956 acres were reported within the Truckee Division (5,728 acres of bench lands and 228 acres of bottom lands). [See *Initial Bench & Bottom Land, Map & Criteria*, Newlands Project, Nevada, Division of Water and Power Resources Management, Water Operation and Maintenance Branch, Irrigation Section, Bureau of Reclamation, U.S. Department of the Interior, Sacramento, California, September 1990, Revised January 1992, page 7.]
273. De Bruyn, *op. cit.*, pages 22-25. The U.S. Department of the Interior, however, has officially established this amount at 1,058,000 acre-feet. See entries under April 1994 and December 1995.
274. United States Court of Appeals for the Ninth Circuit, *U.S. v. Alpine Land and Reservoir Company, et al.*, No. 90-16460, D.C. No. CV-D-BRT [Bruce R. Thompson] Opinion, Argued and Submitted June 26, 1991, filed May 26, 1992.
275. *Water Resources Data, op. cit.*
276. Congressional committees for the U.S. Senate included Energy and Natural Resources, Environment and Public Works, and Appropriations; committees for the U.S. House of Representatives included Interior and Insular Affairs (now Natural Resources), Public Works and Transportation, Merchant Marine and Fisheries, and Appropriations.
277. Correspondence, Western Water Policy Review Advisory Commission, "Plan of Research," and "What is the Western Water Policy Review Advisory Commission?", Denver Colorado, September 20, 1996.
278. *Lahontan Valley News*, September 5, 1995, page 1.
279. These "190 transfer applications," as they became commonly called, included an original 25 water rights transfers contested by the Pyramid Lake Paiute Indian Tribe and previously approved by the State Engineer, as well as the 24 transfers approved by the State Engineer on February 12, 1987, 52 transfers approved on June 2, 1988, and 62 transfers approved on April 14, 1989. [U.S. Bureau of Reclamation Correspondence, Lahontan Basin Projects Office, Carson City, Nevada, May 5, 1993 and June 11, 1993.]
280. "Order," *U.S. v. Alpine Land and Reservoir Company, et al.*, entered June 9, 1994, *op. cit.*
281. In a related matter, the Pyramid Lake Paiute Indian Tribe would also file a motion with the U.S. District Court to rule on the forfeiture and abandonment issue on other project farmlands for which transfer applications had not been filed. On March 26, 1996, the Court ordered this determination to the Federal Watermaster in Reno, Nevada, for resolution. This involved approximately 1,700 respondents, of which the Tribe named approximately 500 respondents

- in the Orr Ditch Petition (Truckee River waters) and approximately 1,200 respondents in the Alpine Land Petition (Carson River waters). [See United States District Court, District of Nevada, Order, A-3-LDG [Lloyd D. George], *U.S. (Plaintiff) and Pyramid Lake Paiute Tribe of Indians (Petitioner) v. Orr Water Ditch Company, et al., (Defendants)*, April 8, 1996, pages 8-9.]
282. Hartung, *op. cit.*
283. *The Reno Gazette-Journal*, March 4, 1995, pages 4A-5A.
284. *Ibid.*
285. Rieke, Elizabeth Ann, Assistant Secretary, Water and Science, U.S. Department of the Interior, Statements before the Subcommittee on Water and Power, Committee on Energy and Natural Resources, United States Senate, Oversight Hearing on Public Law 101-618, *The Fallon Paiute Shoshone Water Rights Settlement Act of 1990 and The Truckee-Carson-Pyramid Lake Water Rights Settlement Act*, April 1994.
286. Water Right Application File 9330, Office of the State Engineer, Division of Water Resources, Department of Conservation and Natural Resources, State of Nevada, Carson City, Nevada.
287. This section states that "...the Preliminary Settlement Agreement as modified by the Ratification Agreement, and the [Truckee River] Operating Agreement, shall not take effect until the Pyramid Lake Tribe's claim to the remaining waters of the Truckee River which are not subject to vested or perfected rights has been finally resolved in a manner satisfactory to the State of Nevada and the Pyramid Lake Tribe..."
288. This motion was granted summarily without ruling on whether there exists unappropriated water, whether this application would interfere with existing rights, or whether the application would threaten to prove detrimental to the public interest. [See Water Right Application File 9330, *op. cit.*]
289. *Ibid.*
290. Resolve, Center for Environmental Dispute Resolution, 2828 Pennsylvania Avenue, NW, Suite 402, Washington, D.C., 20007.
291. *Census of Agriculture*, various issues, *op. cit.*
292. ORDER, *United States of America v. Alpine Land and Reservoir Company, et al.*, U.S. District Court, District of Nevada, Case No. D-185-HDM, August 10, 1994.
293. The Lahontan Valley Environmental Alliance is an inter-local agreement between the City of Fallon, Town of Fernley, Churchill County, Truckee-Carson Irrigation District, Lahontan Conservation District, and the Stillwater Conservation District. LVEA representatives represented all residents of the Project including the Newlands Water Protective Association (NWPA), which represents many water right owners. [Hartung, *op. cit.*]
294. Truckee-Carson Settlement Negotiations Meeting Notes, Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada, April 1995.
295. In their study, the U.S. Environmental Protection Agency felt that the exposure pathways that were *not* to be of concern included: ingestion of groundwater from affected areas, consumption of vegetables grown in contaminated soil, inhalation of mercury vapors and dust, both indoors and outdoors, and ingestion of surface water and sediments while swimming. [See "Carson River Mercury Superfund Site," December 1994, *op. cit.*]
296. A special characteristic of mercury is its ability to get into the aquatic food chain and become concentrated at higher levels in the food chain. This process is referred to as "bioaccumulation." Thus, mercury that is deposited in the sediments of the Carson River system and Washoe Lake is taken up by small organisms and then further concentrated in the bodies of fish that consume these organisms. Rather than being excreted, mercury is accumulated in the body tissue of these fish which are then consumed by fish and/or birds and other animals linked to this food chain which then tend to have elevated mercury concentrations in their bodies.
297. "Carson River Mercury Superfund Site," December 1994, *op. cit.*
298. *Net Proceeds of Minerals, 1994-95*, Division of Assessment Standards, Centrally Assessed Properties, Nevada Department of Taxation, Carson City, Nevada, June 10, 1995.
299. The Truckee-Carson Irrigation District has voluntarily left a 4,000 acre-feet minimum pool in Lake Lahontan for fish habitat purposes. The negotiations addressed an additional amount of water from the Nevada Division of Wildlife water rights for the reservoir (up to 20,000 acre-feet). [Hartung, *op. cit.*]
300. On July 20, 1982, the Pyramid Lake Indian Tribe filed a suit (*Pyramid Lake Paiute Tribe of Indians v. City of Reno, et al., and James G. Watt* [Secretary of the Interior]) seeking enforcement of the Endangered Species Act (ESA) and the Clean Water Act (CWA). The U.S. Environmental Protection Agency and the U.S. Department of the Interior were also named as defendants. The suit sought declaratory and injunctive relief, as well as money damages because a Joint Water Pollution Control Project (JWPC), undertaken by Reno and Sparks pursuant to an EPA

grant, was allegedly having numerous direct and indirect serious adverse effects on water quality in the Truckee River where the endangered cui-ui and the threatened Lahontan cutthroat trout are located. Interestingly, the two cities cross-claimed against the EPA and the USDI claiming that the USDI had created the jeopardy situation in the Truckee River fishery by diverting water at Derby Dam for the Newlands Irrigation Project in Churchill County. If successful, this action by the cities would hold the USDI responsible for money damages, if awarded. [See Horton, *Truckee River Chronology, op. cit.*]

301. Truckee-Carson Settlement Negotiations Meeting Notes, *op. cit.*

302. "Carson River Mercury Superfund Site," U.S. Environmental Protection Agency, Region IX, San Francisco, California, June 1995.

303. Natural Resources Conservation Service, *op. cit.*

304. Wilson, J.W., "Report on Investigation of Interstate Pollution Leviathan Creek—East Fork Carson River with Especial Reference to the Biological Findings, California—Nevada, June 24–26, 1957, unpublished report to the Bureau of Sanitary Engineering, 1957.

305. Davis, S.P., "Pollution of Leviathan and Bryant Creeks Caused by Leviathan Mine, Alpine County," 1969, and "Pollution of Leviathan and Bryant Creeks, and East Fork Carson River Caused by Leviathan Mine, Alpine County," 1969, unpublished reports, California Department of Fish and Game, The Resources Agency, Sacramento, California.

306. Hammermeister, D.P., and S.J. Walmsley, "Hydrologic Data for Leviathan Mine and Vicinity, Alpine County, California, 1981–83," U.S. Geological Survey Open File Report 85–160.

307. Herbst, David B., Ph.D., "Aquatic Invertebrate Bioassessment Monitoring of Acid Mine Drainage Impacts in the Leviathan Creek Watershed (Alpine County, California)," Sierra Nevada Aquatic Research Laboratory, University of California, Mammoth Lakes, California, August 25, 1995.

308. Lake Tahoe volume estimates have been verified by the U.S. Geological Survey as derived from surface elevation figures and Lake Tahoe bathymetric analysis (elevation–volume relationships).

309. From information provided by the U.S. Geological Survey, Water Resources Division, Carson City, Nevada.

310. From information provided by the U.S. Bureau of Reclamation, Lahontan Basin Area Office, Carson City, Nevada.

311. Truckee River diversions at Derby Dam into the Truckee Canal for Lahontan Reservoir were virtually suspended on March 25, 1995, except for Truckee Division water rights which rely solely on water from the Truckee River. Before that cutoff date, however, in the 1995 water year (October 1, 1994–September 30, 1995), 2,560 acre-feet had been diverted in October 1994, 6,230 acre-feet in November, 8,960 acre-feet in December, 23,220 acre-feet in January 1995, 23,200 acre-feet in February, and 23,290 acre-feet in March, for a total of 87,460 acre-feet of total diversions, equivalent to approximately 47 percent of an average water year's total diversions into the Truckee Canal (for years of record 1967–1993). [Source: U.S. Bureau of Reclamation, Lahontan Basin Area Office, Carson City, Nevada.] All Truckee River diversions were made in accordance with the prevailing Operating Criteria and Procedures and were based on the most recent snow-pact water content forecasts by the Natural Resources Conservation Service. Subsequent spills from Lahontan Reservoir were based on an unusually wet spring, which was not forecasted. [Hartung. *op. cit.*]

312. *Final Environmental Impact Statement, Water Rights Acquisition for Lahontan Valley Wetlands*, Churchill County, Nevada, Executive Summary, Volume 1, and Volume 2 (Appendix), U.S. Department of the Interior, Fish and Wildlife Service, Region 1, Portland, Oregon, September 1996.

313. *Reno Gazette-Journal*, August 3, 1995, page 1B, and personal conversation with Al Olson, U.S. Bureau of Reclamation, Lahontan Basin Area Office, Carson City Office, August 29, 1995.

314. *CARSON RIVER ATLAS, op. cit.*, pages 95–96.

315. *Public Law 101–618*, Section 209.(a)(1)(B).

316. *Reno Gazette-Journal*, October 13, 1995, page 2B.

317. *Nevada Appeal* (Carson City), December 2, 1996.

318. *Reno Gazette-Journal*, September 5, 1995, page 3B.

319. Truckee River diversions at Derby Dam totaled 23,220 acre-feet in January 1995, 23,200 acre-feet in February, and 23,290 acre-feet in March before diversions to Lahontan Reservoir were terminated, for a total diversion of 69,710 acre-feet in calendar year 1995. This water was used solely to fill Lahontan Reservoir. Subsequently, due to the threat of flooding, the Truckee–Carson Irrigation District was forced to spill water from Lahontan Reservoir. [Figures provided by the U.S. Bureau of Reclamation, Lahontan Basin Area Office, Carson City, Nevada.]

320. *Reno-Gazette Journal*, September 25, 1995, page 2B.

321. The Advisory Commission members include: Professor Denise Fort, University of New Mexico, Chair; Bruce Babbitt, Secretary of the Interior [represented by Mr. Joseph L. Sax, Counselor to the Secretary]; Togo D. West, Secretary of the Army [represented by Dr. John Zirschdy, Assistant Secretary for Civil Works]; Huali Chai, Attorney, San Jose, California; Professor John Davidson, University of South Dakota; John Echohawk, Executive Director, Native American Rights Fund, Boulder, Colorado; Professor Janet Neuman, Northwestern School of Law, Lewis & Clark College; Patrick O'Toole, Rancher, Savery, Wyoming; Jack Robertson, Deputy CEO, Bonneville Power Administration, Portland, Oregon; Kenneth L. Salazar, Attorney, Denver, Colorado; Senator Mark O. Hatfield, Committee on Appropriations; Senator Robert C. Byrd, Ranking Minority Member, Committee on Appropriations; Frank M. Murkowski, Chairman, Committee on Energy and Natural Resources; Senator J. Bennett Johnson, Ranking Majority Member, Committee on Energy and Natural Resources; Senator Larry Craig, Chairman, Subcommittee on Forests and Public Land Management; Senator Bill Bradley, Ranking Minority Member, Subcommittee on Forests and Public Land Management; Representative Bob Livingston, Chairman, Committee on Appropriations; Representative David R. Obey, Ranking Minority Member, Committee on Appropriations; Representative George Miller, Ranking Minority Member, Committee on Resources; Representative Don Young, Chairman, Committee on Resources; Representative Bud Shuster, Chairman, Committee on Transportation and Infrastructure; Representative James L. Oberstar, Ranking Minority Member, Committee on Transportation and Infrastructure.
322. Correspondence, Western Water Policy Review Advisory Commission, "Plan of Research," and "What is the Western Water Policy Review Advisory Commission?," Denver Colorado, September 20, 1996.
323. *Lahontan Valley News*, November 6, 1995, page 1.
324. According to Truckee-Carson Irrigation District records, requests for a programmatic Environmental Impact Statement were made at public EA/EIS/DEIS meetings held on July 5, 1995, June 8, 1995 (2 meetings), July 28, 1995, August 9, 1995, August 22, 1995, September 6, 1995, September 19, 1995, September 21, 1995, September 28, 1995, and October 11, 1995. [Correspondence to Bruce Babbitt, Secretary of the Department of the Interior, "Truckee-Carson Pyramid Lake Water Rights Settlement Act; Failure to Comply with the National Environmental Policy Act and the Settlement Act," February 20, 1996.] In addition, in response to a DEIS, similar formal requests for a programmatic EIS were made by the Lahontan Valley Environmental Alliance to the U.S. Fish and Wildlife Service on June 14, 1995; by Churchill County to the Stillwater National Wildlife Refuge on October 18, 1995; and by the City of Fallon to the Stillwater National Wildlife Refuge on October 20, 1995.
325. The Churchill County lawsuit maintained that a "programmatic Environmental Impact Statement" had not been prepared by the federal government to assess the many federal actions in the Newlands Project and their cumulative impact on the physical and social environment within the project. The county's request for an injunction was to stop further federal government actions until such a cumulative EIS was completed under National Environmental Policy Act guidelines. At that time, it was reported that there were at least nine separate federal actions in process under the Public Law 101-618 umbrella in the Newlands Project without a programmatic EIS having been completed. [Hartung, *op. cit.*]
326. *Reno Gazette-Journal*, December 3, 1995, pages 1C and 4C.
327. In April 1994, Betsy Rieke, Assistant Secretary of Water and Science at the U.S. Department of the Interior, reported to Congress that the U.S. Bureau of Reclamation had calculated the amount of Truckee River excess water diversions by the Truckee-Carson Irrigation District from 1983 to 1987 to be 1,058,000 acre-feet and that in accordance with the Negotiated Settlement (Public Law 101-618, Section 209(h)(1)) the Secretary of the Interior was required to pursue through a negotiated settlement or litigation the recoupment of such waters. [See Rieke, *op. cit.*]
328. *Reno Gazette-Journal*, December 12, 1995, page 2B.
329. *Lahontan Valley News*, Fallon, Nevada, December 12, 1995.
330. Specifically, on or before March 21, 1996, any party to this proceeding may file a pre-hearing brief addressing the legal standards governing the law of abandonment, lack of perfection or forfeiture. On or before May 21, 1996, the Pyramid Lake Paiute Indian Tribe is to serve on the applicant, legal counsel or representative, a more definitive statement in which the Tribe is to specifically identify parcel by parcel the particular components of its protest as it relates to lack of perfection, forfeiture or abandonment along with documentary evidence. On or before July 22, 1996, the applicants are to serve on the Tribe rebuttal evidence, if any, to refute the Tribe's claims of lack of perfection, forfeiture or abandonment. On or before September 13, 1996, the applicants and protestants are to hold conferences relative to each application to discuss the facts, stipulated to any facts not in dispute and attempt to settle the related protests, if possible. On or before September 23, 1996, any party to the proceedings regarding the above-referenced applications shall also file any recommendations they may have regarding the grouping of these applications for hearing. Formal hearings were scheduled for October and November 1996. [Correspondence, Office of the State Engineer, Hearing and Adjudication Section, Department of Conservation and Natural Resources, Carson City, Nevada, February 12, 1996.]

331. An earlier letter had been sent by the Truckee–Carson Irrigation District to the U.S. Department of Interior’s Truckee–Carson Coordination Office (TCCO) in Carson City, Nevada. The TCCO was also working on an Environmental Impact Statement. However, coverage of that EIS included only three factors: (1) the effects of a management plan for water acquisition for the Stillwater National Wildlife Refuge (the plan’s effects had been excluded from the initial acquisition EIS); (2) the effects of a water acquisition plan for the Pyramid Lake endangered fish species cui-ui; and (3) the effects of the revised Operating Criteria and Procedures (“Final OCAP”), and. [Personal communication with Lynne Hartung, Secretary–Treasurer, TCID, July 29, 1996, and “Draft Summary Report, Comments Received For An Environmental Impact Statement Considering The Management Of Water Resources Of The Truckee And Carson Rivers,” U.S. Department of the Interior, Truckee–Carson Coordination Office, Carson City, Nevada, January 1996.]
332. Letter to Bruce Babbitt, Secretary of the Department of the Interior, “Truckee–Carson– Pyramid Lake Water Rights Settlement Act (“Settlement Act”); Department of Interior’s (“DOI’s”) failure to comply with the National Environmental Policy Act (“NEPA”) and the Settlement Act,” February 20, 1996. [Hartung, *op. cit.*]
333. Snow telemetry [Natural Resources Conservation Service, U.S. Department of Agriculture].
334. *Reno–Gazette Journal*, February 21, 1996, page 1, and February 23, 1996, page 9A. SNOTEL information was provided by the Natural Resources Conservation Service, U.S. Department of Agriculture.
335. Letter, “Repayment of Original Construction Costs—Newlands Project,” U.S. Department of the Interior, Bureau of Reclamation, Mid–Pacific Regional Office, Sacramento, California, July 10, 1996.
336. Director’s Office, Department of Conservation and Natural Resources, State of Nevada, Carson City, Nevada.
337. *Reno Gazette–Journal*, August 3, 1996, page 1B.
338. United States District Court, District of Nevada, Order, A–3–LDG [Lloyd D. George], *U.S. (Plaintiff) and Pyramid Lake Paiute Tribe of Indians (Petitioner) v. Orr Water Ditch Company, et al., (Defendants)*, April 8, 1996.
339. Natural Resources Conservation Service, *op. cit.*
340. *Reno Gazette–Journal*, April 8, 1995, page 1C.
341. Norm Saake, State Migratory Game Bird Coordinator, Nevada Division of Wildlife (NDOW), Department of Conservation and Natural Resources, Fallon, Nevada.
342. *Reno–Gazette Journal*, October 30, 1996, page 3C.
343. *Reno Gazette–Journal*, June 8, 1996, pages 1A and 6A.
344. *Reno Gazette–Journal*, June 17, 1996, pages 1D and 5D.
345. *Record–Courier*, June 22, 1996.
346. *Nevada Appeal*, June 21, 1996.
347. *Reno Gazette–Journal*, August 3, 1996, page 1B.
348. The American White Pelican ranges from British Columbia east to Nova Scotia and south to Nicaragua. It is a common summer resident in western Nevada, with a large breeding colony on Anaho Island in Pyramid Lake. In an encounter with an aircraft no little damage to both plane and bird could be expected: the White Pelican grows up to 50 inches long (4.2 feet) and has a wingspan of up to 110 inches (9.2 feet). [See Alcorn, J.R., *The Birds of Nevada*, Fairview West Publishing, Fallon, Nevada, 1988, pages 11–14.]
349. *Reno Gazette–Journal*, September 3, 1996, page 2C.
350. *Final Environmental Impact Statement, Water Rights Acquisition for Lahontan Valley Wetlands*, *op. cit.*, Executive Summary, pages Summary–1 through Summary–7.
351. *Reno–Gazette Journal*, October 2, 1996.
352. *Reno Gazette–Journal*, October 11, 1996, page 4A.
353. *Lahontan Valley News* (Fallon, Nevada), October 22, 1996.
354. *Reno–Gazette Journal*, October 30, 1996, page 3C, and October 31, 1996, page 4B.
355. *Reno Gazette–Journal*, November 6, 1996, page 3C.
356. The Newlands Irrigation Project Water Conservation Plan requires: (I) the appointment of a TCID water conservation coordinator; (ii) implementation of water conservation education programs for TCID water users; (iii) establishment of a water measurement and accounting system with a water measurement component for each user; (iv) and operation and maintenance charging structure to encourage water conservation; and (v) prioritization of activities to be performed under the plan along with costs and implementation schedules. [See *Contract Between the United States of America and the Truckee–Carson Irrigation District Providing for the Operation and Maintenance*

of the Newlands Project, Article 11, "Water Management," U.S. Department of the Interior, Bureau of Reclamation, LO Draft 10/17-1996.]

357. *Contract Between the United States of America and the Truckee-Carson Irrigation District Providing for the Operation and Maintenance of the Newlands Project*, U.S. Department of the Interior, Bureau of Reclamation, LO Draft 10/17-1996.

358. *Reno Gazette-Journal*, December 3, 1996.

359. The new targets relative to the 1988 OCAP for all months were: January-June—215,000 acre-feet to 174,000 acre-feet; July—160,000 acre-feet to 139,000 acre-feet; August—140,000 acre-feet to 95,000 acre-feet; September—120,000 acre-feet to 64,000 acre-feet; October—80,000 acre-feet to 52,000 acre-feet; November—160,000 acre-feet to 74,000 acre-feet, and December—210,000 acre-feet to 101,000 acre-feet. See *Federal Register*, Volume 61, Number 237, Monday, December 9, 1996, Proposed Rules, Department of the Interior, Bureau of Reclamation, 43 CFR Part 418, "Adjustments to 1988 Operating Criteria and Procedures (OCAP) for the Newlands Irrigation Project in Nevada," page 64836.

360. Chisholm, Graham, "Interior Issues Revised Newlands Project Diversion Rules," *The Truckee River Times*, Vol. 6, No. 5, December 1996, page 3; Personal communication, Al Olson, U.S. Bureau of Reclamation, Lahontan Basin Area Office, Carson City, Nevada, January 8, 1997.

361. *Reno-Gazette Journal*, December 13, 1996, pages 1A and 6A.

362. For purposes of administering the Alpine Decree, the Carson River and its tributaries were divided into eight segments as follows: (1) Segment 1—The East Fork of the Carson River from the California-Nevada state line up to the headwaters of the East Fork in the Sierra Nevada Mountains; (2) Segment 2—The East Fork of the Carson River from the California-Nevada state line to the confluence of the East and West Forks of the Carson River; (3) Segment 3—The West Fork of the Carson River from the gauge at Woodfords, California upstream to the headwaters in the Sierra Nevada Mountains; (4) Segment 4—The West Fork of the Carson River from the gauge at Woodfords to the California-Nevada state line; (5) Segment 5—The West Fork of the Carson River (and Brockliss Slough) between the California-Nevada state line and the confluence of the East and West Forks of the Carson River; (6) Segment 6—The main stream of the Carson River from the confluence of the East Fork, West Fork and Brockliss Slough to the gauge at Carson City; (7) Segment 7—The main stream of the Carson River from the Carson City gauge to Lahontan Reservoir. This segment is further subdivided for administration into autonomous subsegments: (a) Mexican Ditch, Dayton and the reach between Rose Ditch and Cardelli Ditch, inclusive; (b) Gee Ditch; (c) Koch Ditch; (d) Houghman and Howard Ditches; (e) Buckland Ditch. (8) Segment 8—The area below the Lahontan Dam [Lahontan Valley]. [See *Alpine Decree, Findings of Fact, Conclusions of Law, Tabulation and Administrative Provisions, op. cit.*, pages 3-4.]

363. Administrative Provision VIII of the Alpine Decree established the requirement for ditch owners diverting water directly from the Carson River, or any of its tributaries, to install and maintain a reliable regulating [i.e., measuring] headgate. As stated, "The owner or owners of each ditch or canal now or hereafter authorized to directly divert water from the Carson River or any of its tributaries, shall, at his, its, or their own expense, install and maintain in the ditch or canal a reliable, sufficient and easily operated regulating headgate, to be approved by the [Federal] Water Master, whereby the water diverted into said ditch or canal may be regulated. The owner or owners of any such ditch or canal shall have two years from the date of entry of this Decree to fulfill this provision. Those users who receive water from any particular ditch or canal shall allocate the installation costs of these devices among themselves in proportion of any user's water right acreage to the total water right acreage served by the ditch or canal. In this way the owner or owners of each canal or ditch shall receive proportionate contribution from all those users who benefit from the use of the ditch or canal, whether by use of the direct flows or by use of the return flows. Upon failure of any owner or owners of any such ditch or canal to install these devices within the prescribed time, the Water Master, upon ten days' notice, may cut off the water from any such ditch or canal until the required devices are installed and maintained. Upon the failure of any user to contribute his fair and proportionate share of the cost to the owner or owners of any canal or ditch, the Water Master, upon ten days' notice, may cut off that user's water until the contribution has been made."

364. Mr. Pelcyger stated on page 10 of his letter that the Nevada State Engineer had granted additional post-1902 water rights in Nevada for the irrigation of approximately 17,000 acres (along with another 700 irrigated acres and at least 4,800 acre-feet of storage which was also reported to have been authorized by state officials in California). On January 13, 1997, the Nevada State Engineer responded to this statement as being "absolutely incorrect" and representing a complete misinterpretation of the data and computer printouts that had been provided by the Office of the State Engineer to Mr. Pelcyger on or about December 9, 1996. Based on the misinformation in the Pelcyger letter, the State Engineer, R. Michael Turnipseed, P.E., requested that the December 13, 1996 letter be recalled since it was "blatantly incorrect and inaccurate."

365. *Reno Gazette-Journal*, December 22, 1996, page 18C.

366. Natural Resources Conservation Service (NRCS), *op. cit.*
367. *Record-Courier* (Gardnerville, Nevada), December 21, 1996, pages 1 and 10, *Nevada Appeal* (Carson City), December 8, 1996, pages A1 and A5, and December 22, 1996, *Reno Gazette-Journal*, December 27, 1996.
368. For an extensive analysis of this flood event and its effects on the waterbasins of western Nevada, see Horton, Gary A., *The Flood of 1997—Final Report: An Analysis of Snowpack Water Content and Precipitation Changes in the Waterbasins of Western Nevada and the Effects on Runoff and Stream Flows, December 16, 1996—January 6, 1997*, Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada, January 1997, revised and updated, February 28, 1997.
369. Available runoff is not the same as effective or actual runoff. The Natural Resources Conservation Service (NRCS) has estimated that on saturated soils (a wet mantle event) up to 80 percent of available runoff becomes effective runoff and enters the stream system. [See Horton, Gary A., *The Flood of 1997—Preliminary Report: An Analysis of Snowpack Water Content and Precipitation Changes in the Waterbasins of Western Nevada and the Effects on Runoff and Stream Flows, December 16, 1996—January 6, 1997, op. cit.*]
370. The disaster declaration number (contract number) assigned to this disaster declaration was FEMA-1153-DR-NV.
371. Personal communication, Peggy Twedt, legal counsel representing the Carson Water Subconservancy District, April 15, 1997.
372. *Lahontan Valley Times* (Fallon, Nevada), February 14, 1997, page 1.
373. As of February 1, 1997, the Natural Resources Conservation Service (NRCS) reported that snowpack conditions in the Carson River Basin were well above average with snow water content at 187 percent of normal (i.e., 87 percent above normal) for this time of year and at 204 percent of the level of the previous year (i.e., 104 percent above last year's level). *Nevada Basin Outlook Report*, February 1, 1997, Natural Resources Conservation Service, U.S. Department of Agriculture, Reno, Nevada.
374. *Truckee-Carson River Basin Study*, Western Water Policy Review Advisory Commission, Final Report, prepared for the U.S. Department of the Interior, Bureau of Reclamation, prepared by Clearwater Consulting Corporation, March 6, 1997, pages 1-6.

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Part IV—Bibliography

- Adjusted 1988 Newlands Project Operating Criteria and Procedures*, Churchill and Lyon Counties, Nevada, Draft Environmental Assessment, U.S. Department of the Interior, Truckee Carson Coordination Office, Carson City, Nevada, December 1996.
- Alcorn, J.R., *The Birds of Nevada*, Fairview West Publishing, Fallon, Nevada, 1988.
- "Alpine Decree, Findings of Fact, Conclusions of Law, Tabulation and Administrative Provisions," *United States of America v. Alpine Land & Reservoir Company, a Corporation, et al.*, Civil No. D-183 BRT [Bruce R. Thompson], Final Decree, United States Federal District Court for the District of Nevada, October 28, 1980.
- Ammon, Elizabeth, "Historical Changes in Biodiversity Along the Lower Truckee," *The Truckee River Times*, Volume 6, Number 2, May 1996, page 2.
- Basso, Dave, editor, *Nevada Historical Marker Guidebook*, Third Edition, Falcon Hill Press, Sparks, Nevada, 1986.
- Benson, Larry V., "Preliminary Paleolimnologic Data for the Walker Lake Sub-Basin, California and Nevada," *Water Resources Investigations Report 87-4258*, U.S. Geological Survey, U.S. Department of the Interior, Denver, Colorado, 1988.
- Benson, Larry V., "Fluctuation in the Level of Pluvial Lake Lahontan During the Last 40,000 Years," *Quaternary Research*, Volume 9, Number 3, University of Washington, 1978.
- Biennial Report of the State Engineer, 1909-1910*, State of Nevada, State Printing Office, Carson City, Nevada, 1911.
- Briefing Document, Public Law 101-618, Bureau of Indian Affairs, U.S. Department of the Interior, Carson City Office, Carson City, Nevada, February 1994.
- California-Nevada Interstate Compact Between the State of California and Nevada*, Ratified by [the] State of California, September 19, 1970 (Chapter 1480, California Statutes 1970), Ratified by [the] State of Nevada, March 5, 1971 (Nevada Revised Statutes 538.600), Congressional Consent Pending, April 25, 1971.
- (The) California Water Plan Update*, Bulletin 160-93, Volumes 1 and 2, Department of Water Resources, The Resources Agency, State of California, Sacramento, California, October 1994.
- Carlson, Helen, S., *Nevada Place Names: A Geographical Dictionary*, University of Nevada Press, Reno, Nevada, 1974.
- CARSON RIVER ATLAS*, Department of Water Resources, The Resources Agency, State of California, Sacramento, California, December 1991.
- "Carson River Mercury Superfund Site," U.S. Environmental Protection Agency, Region IX, San Francisco, California, December 1994 and June 1995.
- Census of Agriculture—1987*, Volume 1, Geographic Area Series, Part 28, Nevada State and County Data, Agriculture Division, Bureau of the Census, U.S. Department of Commerce, Washington D.C., June 1989.
- Census of Agriculture—1992*, Volume 1, Geographic Area Series, Part 28, Nevada State and

- County Data, Agriculture Division, Bureau of the Census, U.S. Department of Commerce, Washington D.C., August 1994.
- Conservation Directory—1995*, 40th Edition, National Wildlife Federation, Washington, D.C.
- Contract Between the United States of America and the Truckee-Carson Irrigation District Providing for the Operation and Maintenance of the Newlands Project*, U.S. Department of the Interior, Bureau of Reclamation, LO Draft 10/17-1996.
- Cooper, James J., Richard O. Thomas, S. Michael Reed, *Total Mercury in Sediment, Water, and Fishes in the Carson River Drainage, West-Central Nevada*, Nevada Division of Environmental Protection (NDEP), Department of Conservation and Natural Resources, State of Nevada, Carson City, Nevada, December 1985.
- Dangberg, Grace, *Carson Valley—Historical Sketches of Nevada's First Settlement*, Carson Valley Historical Society, Minden, Nevada, November 1972.
- Dangberg, Grace, *Conflict on the Carson*, Carson Valley Historical Society, Minden, Nevada, November 1975.
- De Bruyn, David, *Potential Water Conservation Measures—Newlands Project*, Prepared under the Request of the Special Assistant to the Secretary of the Interior on Matters Dealing with Public Law 101-618 [Negotiated Settlement], April 1992.
- "Draft Summary Report, Comments Received For An Environmental Impact Statement Considering The Management Of Water Resources Of The Truckee And Carson Rivers," U.S. Department of the Interior, Truckee-Carson Coordination Office (TCCO), Carson City, Nevada, January 1996.
- Fact Sheet: "Endangered Species Act History and Overview," U.S. Fish and Wildlife Service, Nevada State Office, U.S. Department of the Interior, Reno, Nevada, February 1995.
- Federal Register*, Volume 61, Number 237, Monday, December 9, 1996, Proposed Rules, Department of the Interior, Bureau of Reclamation, 43 CFR Part 418, "Adjustments to 1988 Operating Criteria and Procedures (OCAP) for the Newlands Irrigation Project in Nevada," pages 64832-64848.
- Final Environmental Impact Statement for the Newlands Project Proposed Operating Criteria and Procedures (OCAP)*, U.S. Department of the Interior, Bureau of Reclamation, Mid-Pacific Regional Office, Sacramento, California, December 1987.
- Final Environmental Impact Statement, Water Rights Acquisition for Lahontan Valley Wetlands*, Churchill County, Nevada, Executive Summary, Volume 1, and Volume 2 (Appendix), U.S. Department of the Interior, Fish and Wildlife Service, Region 1, Portland, Oregon, September 1996.
- Fowler, Catherine S., *In the Shadow of Fox Peak—An Ethnography of the Cattail-Eater Northern Paiute People of Stillwater Marsh*, Cultural Resource Series Number 5, U.S. Department of the Interior, Fish and Wildlife Service, Region 1, Stillwater National Wildlife Refuge, 1992.
- Geology and Mineral Deposits of Lyon, Douglas, and Ormsby Counties, Nevada*, Bulletin 75, Prepared Cooperatively with the United States Geological Survey, Nevada Bureau of Mines and Geology, Mackay School of Mines, University of Nevada, Reno, 1969.
- Gourley, Chad, "Historic Overview of Modifications to the Truckee River Ecosystem," *The Truckee River Times*, Volume 6, Number 2, May 1996, pages 3-4.

- Grayson, Donald K., *The Desert's Past: A Natural Prehistory of The Great Basin*, Smithsonian Institution Press, Washington, D.C., 1993.
- Harris, E.E., "Reconnaissance Bathymetry of Pyramid Lake, Washoe County, Nevada," Water Resources-Information Series, Report 20, Prepared Cooperatively by the Geological Survey, U.S. Department of the Interior, and the Division of Water Resources, Department of Conservation and Natural Resources, State of Nevada, Carson City, Nevada, 1974.
- Herbst, David B., Ph.D., "Aquatic Invertebrate Bioassessment Monitoring of Acid Mine Drainage Impacts in the Leviathan Creek Watershed (Alpine County, California)," Sierra Nevada Aquatic Research Laboratory, University of California, Mammoth Lakes, California, August 25, 1995.
- Hess, Glen W., "Progress Report on Daily-Flow Routing Simulation for the Carson River, California and Nevada," U.S. Geological Survey Open-File Report 96-211, USGS, Water Resources Division, Carson City, Nevada, 1996.
- History of Flooding—Carson Valley and Carson City Watershed*, USDA Special Report on Water and Related Land Resources, Central Lahontan Basin, Carson River Sub-Basin, Soil Conservation Service, U.S. Department of Agriculture, Carson City, Nevada, November 1973.
- Hoover Dam*, Bureau of Reclamation, U.S. Department of the Interior, U.S. Government Printing Office, Washington, D.C., 1985.
- Horne, Alex J., Ph.D., James C. Roth, Ph.D., and Nicola J. Barratt, M.S., *Walker Lake—Nevada, State of the Lake, 1992-94*, Report to the Nevada Division of Environmental Protection, Department of Civil and Environmental Engineering, University of California, Berkeley and the Environmental Engineering and Health Sciences Laboratory, Richmond, California, December, 1994.
- Horton, Gary A., *Churchill County Agricultural Analysis—An Analysis of the Churchill County Agriculture Sector Using Census Data and County Survey Results*, Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada, August 1992.
- Horton, Gary A., *Churchill County Correlation Analysis—Correlation Analysis of Churchill County's Primary Economic Indicators*, Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada, June 1992.
- Horton, Gary A., *Nevada: A Historical Perspective of the State's Socioeconomic, Resource, Environmental, and Casino Gaming Development*, Business & Economic Research Associates, Reno, Nevada, July 1995.
- Horton, Gary A., *The Flood of 1997—Final Report: An Analysis of Snowpack Water Content and Precipitation Changes in the Waterbasins of Western Nevada and the Effects on Runoff and Stream Flows, December 16, 1996—January 6, 1997*, Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada, January 1997, updated and revised May 1997.
- Horton, Gary A., *Truckee River Chronology—A Chronological History of Lake Tahoe and the Truckee River and Related Water Issues*, Sixth Update, Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada, [Seventh Update] April 1997.
- Horton, Gary A., *Walker River Chronology—A Chronological History of the Walker River and Related Water Issues*, Nevada Division of Water Planning, Department of Conservation and

- Natural Resources, Carson City, Nevada, June 1996.
- Horton, Gary A., *WATER WORDS DICTIONARY*, Seventh Edition, Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada, Seventh Edition, June 1996.
- Houghton, Samuel G., *A Trace of Desert Waters: The Great Basin Story*, University of Nevada Press, Reno, Nevada, 1994.
- Hulse, James W., *The Nevada Adventure*, Sixth Edition, University of Nevada Press, Reno, Nevada, 1990.
- Indian Water Rights: Negotiating the Future*, Water Resources Research Center, University of Arizona, College of Agriculture, Tucson, Arizona, June 1993.
- Initial Bench & Bottom Land, Map & Criteria*, Newlands Project, Nevada, Division of Water and Power Resources Management, Water Operation and Maintenance Branch, Irrigation Section, Bureau of Reclamation, U.S. Department of the Interior, Sacramento, California, September 1990, Revised January 1992.
- Janik, C. Anne, and Ronald M. Anglin, "Nevada's Unique Wildlife Oasis," *Dividing Desert Waters*, Nevada Public Affairs Review, Number 1, 1992, Senator Alan Bible Center for Applied Research, University of Nevada, Reno.
- Judson, Dean H., Ph.D., *Nevada Population Estimation Method—Annual Estimates and Review of Methodology*, State Demographer, Bureau of Business and Economic Research, University of Nevada, Reno, October 1994.
- Judson, Dean H., Ph.D., *Nevada Population Projections and Forecasts: 1995–2015 and Review of Methodology*, State Demographer, Bureau of Business and Economic Research, University of Nevada, Reno, February 1995.
- Land, Barbara and Myrick, *A Short History of Reno*, University of Nevada Press, Reno, Nevada, 1995.
- Leviathan Mine 5-Year Workplan*, California Regional Water Quality Control Board, Lahontan Region, California Environmental Protection Agency, State of California, Sacramento, California, July 1995.
- Lower Truckee River, Nevada Reconnaissance Report*, U.S. Army Corps of Engineers, Sacramento District, July 1995.
- Mack, Effie Mona, and Byrd Wall Sawyer, *Our State: Nevada*, The Caxton Printers, Ltd. Caldwell Idaho, 1948.
- Mahannah, C.N., J.C. Guitjens, and C.R. York, *Western Nevada Water Controversy*, Cooperative Extension Service, Max C. Fleischmann College of Agriculture, University of Nevada, Reno, January 1975.
- (The) Marlette Lake Water System*, A Report on the Feasibility and Desirability of Its Retention, Bulletin No. 79, Legislative Commission of the Legislative Counsel Bureau, State of Nevada, Carson City, Nevada, February 1969.
- McQuivey, Robert, "Nevada Habitat and Fisheries Historical Media File," Habitat Bureau, Nevada Division of Wildlife, Department of Conservation and Natural Resources, State of Nevada, Reno, Nevada, 1996.
- Milne, Wendy, *A Comparison of Reconstructed Lake-Level Records Since the Mid-1800's of Some*

- Great Basin Lakes*, Department of Geology and Geologic Engineering, Colorado School of Mines, Golden, Colorado, December 1987.
- Mines and Mineral Resources of Alpine County, California*, County Report 8, Division of Mines and Geology, Department of Conservation, The Resources Agency, State of California, Sacramento, California, 1977.
- Murphy, Shane, *The Lore and Legend of the East Fork—A Historical Guide for Floating the East Carson River*, The Carson River Conservation Fund, Zephyr Cove, Nevada, 1982.
- Net Proceeds of Minerals, 1994–95*, Division of Assessment Standards, Centrally Assessed Properties, Nevada Department of Taxation, Carson City, Nevada, June 10, 1995.
- Nevada Basin Outlook Report*, SNOTEL (Snow Telemetry Reporting System) Reports, Various issues, Natural Resources Conservation Service (NRCS), U.S. Department of Agriculture (USDA), Reno, Nevada.
- “Nevada Floods and Droughts,” U.S. Geological Survey Water-Supply Paper 2375, Water Resources Division, USGS, Carson City, Nevada, 1989.
- Nevada Hydrographic Basin Statistical Summary*, Office of the State Engineer, Nevada Division of Water Resources, and Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada, 1988.
- Nevada Revised Statutes (NRS) 533.060, page 12890, Nevada Cases, Re Waters of Franktown Creek, 77 Nev. 348, 364 P.2d 1069 (1961).
- Nevada Water Facts—1980*, Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada.
- “Nevada Water Supply and Use,” U.S. Geological Survey Water-Supply Paper 2350, Water Resources Division, USGS, Carson City, Nevada, 1987.
- Newlands Project Efficiency Study*, Draft Copy, U.S. Bureau of Reclamation, Department of the Interior, Carson City District Office, Carson City, Nevada, September 1993.
- “Notice of Appeal,” Pyramid Lake Paiute Tribe of Indians, *United States of America v. Alpine Land and Reservoir Company, et al.*, Civil No. D-184 BRT [Bruce R. Thompson], U.S. District Court for the District of Nevada, February 17, 1987.
- “Notice of Appeal,” Truckee–Carson Irrigation District, *United States of America v. Alpine Land and Reservoir Company, et al.*, Civil No. D-184 BRT [Bruce R. Thompson], U.S. District Court for the District of Nevada, February 27, 1987.
- “Operating Criteria and Procedures; Truckee and Carson Rivers,” Newlands Reclamation Project, Nevada, Office of the Secretary, U.S. Department of the Interior, September 27, 1967.
- “ORDER,” *U.S. v. Alpine Land and Reservoir Company, et al.*, Case No. D-184-HDM [Howard D. McKibben], entered June 9, 1994, U.S. District Court for Nevada
- “ORDER,” *U.S. v. Alpine Land and Reservoir Company, et al.*, Case No. D-184-HDM [Howard D. McKibben], entered August 10, 1994, U.S. District Court for Nevada.
- “ORDER,” United States District Court, District of Nevada, A-3-LDG [Lloyd D. George], *U.S. (Plaintiff) and Pyramid Lake Paiute Tribe of Indians (Petitioner) v. Orr Water Ditch Company, et al.*, (Defendants), April 8, 1996.
- “Order Remanding Transfer Applications,” *U.S. v. Alpine Land and Reservoir Company, et al.*, CV-D-184 BRT [Bruce R. Thompson], entered July 25, 1990, U.S. District Court for Nevada.

- "Orders Re Water Right Transfers," *U.S. v. Alpine Land and Reservoir Company, et al.*, CV-D-184 BRT [Bruce R. Thompson], entered July 25, 1990, U.S. District Court for Nevada.
- Pahl, Randy, "Reduction of Mercury Loading into Lahontan Reservoir by Controlling Flows in the Carson River with Upstream Storage Facilities," Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada, October 22, 1991.
- Pipe & Wire: A Historical Profile of Sierra Pacific Power Company*, Sierra Pacific Power Company, Reno, Nevada, 1977.
- Political History of Nevada*, 9th Edition, Secretary of State, State of Nevada, Carson City, Nevada, 1990.
- Population of Nevada Counties and Communities, 1860-1980*, compiled by Waller H. Reed, RSVP Volunteer, Nevada Historical Society, Reno, Nevada, Winter 1983-1984.
- "Population of Nevada's Counties and Incorporated Cities," Office of the State Demographer, Bureau of Business and Economic Research, College of Business Administration, University of Nevada, Reno, December 19, 1995.
- Public Law 101-618*, U.S. Congress, November 1990.
- Pyramid Lake Task Force Final Report*, December 1971.
- Reconnaissance Investigation of Water Quality, Bottom Sediment and Biota Associated with Irrigation Drainage in and near Stillwater Wildlife Management Area, Churchill County, Nevada, 1986-87*, Water-Resources Investigations Report 89-4105, U.S. Geological Survey, U.S. Department of the Interior, prepared in cooperation with the U.S. Fish and Wildlife Service and U.S. Bureau of Reclamation, Carson City, Nevada, 1990.
- "Resolution of Differences, Newlands Project Water Rights, Report on Milestone 2," Prepared for U.S. Bureau of Reclamation by Chilton Engineering, Chartered, Reno, Nevada, August 20, 1985.
- Rieke, Elizabeth Ann, Assistant Secretary, Water and Science, U.S. Department of the Interior, "Statements before the Subcommittee on Water and Power, Committee on Energy and Natural Resources, United States Senate, Oversight Hearing on Public Law 101-618," *The Fallon Paiute Shoshone Water Rights Settlement Act of 1990 and The Truckee-Carson-Pyramid Lake Water Rights Settlement Act*, April 1994.
- Rowe, Timothy G., and Ray J. Hoffman, "Wildlife Kills in the Carson Sink, Western Nevada, Winter 1986-87," U.S. Geological Survey Water-Supply Paper 2350 (Selected Events), USGS Water Resources Division, Carson City, Nevada, 1988.
- Rowley, William D., "The Newlands Project: Crime or National Commitment," *Dividing Desert Waters*, Nevada Public Affairs Review, Number 1, 1992, Senator Alan Bible Center for Applied Research, University of Nevada, Reno.
- Rusco, Elmer, "The Truckee-Carson-Pyramid Lake Water Rights Settlement Act and Pyramid Lake," *Dividing Desert Waters*, Nevada Public Affairs Review, Number 1, 1992, Senator Alan Bible Center for Applied Research, University of Nevada, Reno.
- Shamberger, Hugh A., *Evolution of Nevada's Water Laws, as Related to the Development and Evaluation of the State's Water Resources, From 1866 to About 1960*, Water Resources Bulletin 46, Prepared by the U.S. Department of the Interior, Geological Survey in cooperation with the Nevada Division of Water Resources, Department of Conservation and Natural Resources,

- Carson City, Nevada, 1991.
- Shamberger, Hugh A., *Water Supply for the Comstock*, Prepared in Cooperation with Nevada Department of Conservation and Natural Resources and U.S. Geological Survey, Carson City Nevada, 1969.
- Simpson, Captain James H., "Report of Explorations Across the Great Basin in 1859," U.S. Army Engineering Department, Washington, D.C.
- Smith, Frank E. [editor], *Land and Water, 1492–1990*, 4 Volumes, Chelsea House Publishers in Association with Van Nostrand Reinhold Company, New York, N.Y., 1971.
- Soil Survey of Douglas County Area, Nevada*, Soil Conservation Service, U.S. Department of Agriculture.
- State Historic Preservation Office, Department of Museums, Library and Arts, Historic Marker Program, State of Nevada, Capitol Complex, Carson City, Nevada.
- Status of the Sierra Nevada: Sierra Nevada Ecosystem Report, Final Report to Congress, Summary of the Sierra Nevada Ecosystem Project Report, Volume 1—Assessment Summaries and Management Strategies, Volume III—Assessments, Commissioned Reports, and Background Information*, Wildland Resources Center Reports No. 39, 36, and 38, University of California, Davis, June 1996.
- Strickland, Rose, "Stillwater: Its Friends and Neighbors," *Dividing Desert Waters*, Nevada Public Affairs Review, Number 1, 1992, Senator Alan Bible Center for Applied Research, University of Nevada, Reno.
- Strong, Douglas H., *Tahoe: An Environmental History*, University of Nebraska Press, Lincoln, Nebraska, 1984.
- (A) *Study of Water Rights and Their Enforcement [in the] Lake Tahoe, Truckee and Carson River Basins*, Prepared by Water Rights Study Group, Pyramid Lake Task Force, [for the] U.S. Department of the Interior, Office of the Solicitor, Sacramento Region, Sacramento, California, August 1971.
- "Sutter's Fort State Historic Park" (Pamphlet), The Resources Agency, Department of Parks and Recreation, State of California, April 1989.
- Temporary Operation and Maintenance Agreement*, Contract Number 4-07-20-X0268, between Truckee–Carson Irrigation District and the United States, February 14, 1984.
- Townley, John M., *The Truckee Basin Fishery, 1844–1944*, Water Resources Center Publication 43008, Desert Research Institute, University of Nevada System, November 1980.
- Townley, John M., *The Orr Ditch Case, 1913–1944*, Water Resources Center Publication 43007, Desert Research Institute, University of Nevada System, October 1980.
- Townley, John M., *Tough Little Town on the Truckee*, History of Reno Series, Volume One, Great Basin Studies Center, Reno, Nevada, 1983.
- Townley, John M., *Turn this Water into Gold: The Story of the Newlands Project*, Nevada Historical Society, Reno, Nevada, 1977.
- Truckee–Carson River Basin Study*, Western Water Policy Review Advisory Commission, Final Report, prepared for the U.S. Department of the Interior, Bureau of Reclamation, prepared by Clearwater Consulting Corporation, March 6, 1997.
- Truckee–Carson Settlement Negotiations Meeting Notes, Nevada Division of Water Planning,

- Department of Conservation and Natural Resources, Carson City, Nevada, April 1995.
- TRUCKEE RIVER ATLAS*, Department of Water Resources, The Resources Agency, State of California, Sacramento, California, June 1991.
- Truckee River System Briefing Data*, Westpac Utilities, Sierra Pacific Power Company, Reno, Nevada, April 1988.
- United States Court of Appeals for the Ninth Circuit, *U.S. v. Alpine Land and Reservoir Company, et al.*, No. 90-16460, D.C. No. CV-D-BRT [Bruce R. Thompson] Opinion, Argued and Submitted June 26, 1991, filed May 26, 1992.
- U.S. Congress, Senate, *Federal Reclamation by Irrigation: Report of Committee of Special Advisors on Reclamation*, 68th Congress, 1st Session, 1924, S. Doc. 92.
- U.S. v. Alpine Land and Reservoir Company, et al.*, "Orders on Appeals from Decisions of State Engineer on Transfer Applications," Civil No. D-184, BRT [Bruce R. Thompson], Entered October 1, 1986, U.S. District Court for Nevada.
- WALKER RIVER ATLAS*, Department of Water Resources, The Resources Agency, State of California, Sacramento, California, June 1992.
- Water Production Reliability Study*, Sierra Pacific Power Company, October 1994.
- Water Right Application File No. 9322, Office of the State Engineer, Nevada Division of Water Resources, Department of Conservation and Natural Resources, Carson City, Nevada.
- Water Right Application File No. 9330, Office of the State Engineer, Nevada Division of Water Resources, Department of Conservation and Natural Resources, Carson City, Nevada.
- Water Resource Plan 1988-2008*, Water Resources Department, Westpac Utilities, Sierra Pacific Power Company, Reno, Nevada, January 1989.
- Water Resources Data, Nevada* [various issues], U.S. Geological Survey Water-Data Report, Nevada District Office, Water Resources Division, U.S. Geological Survey, U.S. Department of the Interior, Carson City, Nevada.
- Water Treatment Master Plan*, Gas/Water Engineering & Planning Department, Sierra Pacific Power Company, March 1987.
- Wheeler, Sessions S., *The Nevada Desert*, The Caxton Printers, Ltd., Caldwell, Idaho, 1971.

Notes

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