Truckee River Chronology

A Chronological History of Lake Tahoe and the Truckee River and Related Water Issues

APRIL 1997
[Seventh Update]

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Humboldt River Chronology
Walker River Chronology

The following text was contained in the original document:

Notes to the Reader

These dates and happenings represent our best knowledge of the sequence of important events pertaining to the Truckee River Basin, Lake Tahoe and the Lake Tahoe Basin, the Truckee River, that river's tributaries, storage lakes, reservoirs, and diversions, Pyramid Lake, water diversions from the lower Truckee River at Derby Dam for the Newlands Irrigation Project, and related water supply, water quality, environmental and fishery issues.

Acknowledgments

The Division of Water Planning would like to gratefully acknowledge the work of the California Department of Water Resources and their Truckee, Carson, and Walker River Atlas series, which are quoted extensively in this' chronology. The Division would also like to express its appreciation for the historical work and chronologies of John M. Townley, noted author and historian of this area. Special appreciation is extended to Robert McQuivey of the Nevada Division of Wildlife (NDOW) for extensive historical media information on the Lake Tahoe, Truckee River, and Pyramid Lake fisheries, as well as other environmental and habitat issues. The Division would also like to extend its thanks to the U.S. Bureau of Reclamation, Lahontan Basin Area Office, Carson City, Nevada, for comments on this text, and to the U.S. Geological Survey (USGS), Water Resources Division, Carson City, Nevada, for their extensive hydrologic databases and informative research reports, which were invaluable in the completion of this chronology.

TRUCKEE RIVER CHRONOLOGY

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APRIL 1997
[Seventh Update]

A Publication in the
Nevada Water Basin Information and Chronology Series

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TRUCKEE 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)
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)
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
USFS	U.S. Forest Service (USDA)
USFWS	U.S. Fish and Wildlife Service (USDI)
USGS	U.S. Geological Survey (USDI)
USRS	U.S. Reclamation Service (now USBR)
WCWCD	Washoe County Water Conservation District
WMA	Wildlife Management Area (NDOW)

TRUCKEE RIVER CHRONOLOGY

A Chronological History of Lake Tahoe and the Truckee River and Related Water Issues

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A Chronological History of Lake Tahoe and the Truckee 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' 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.

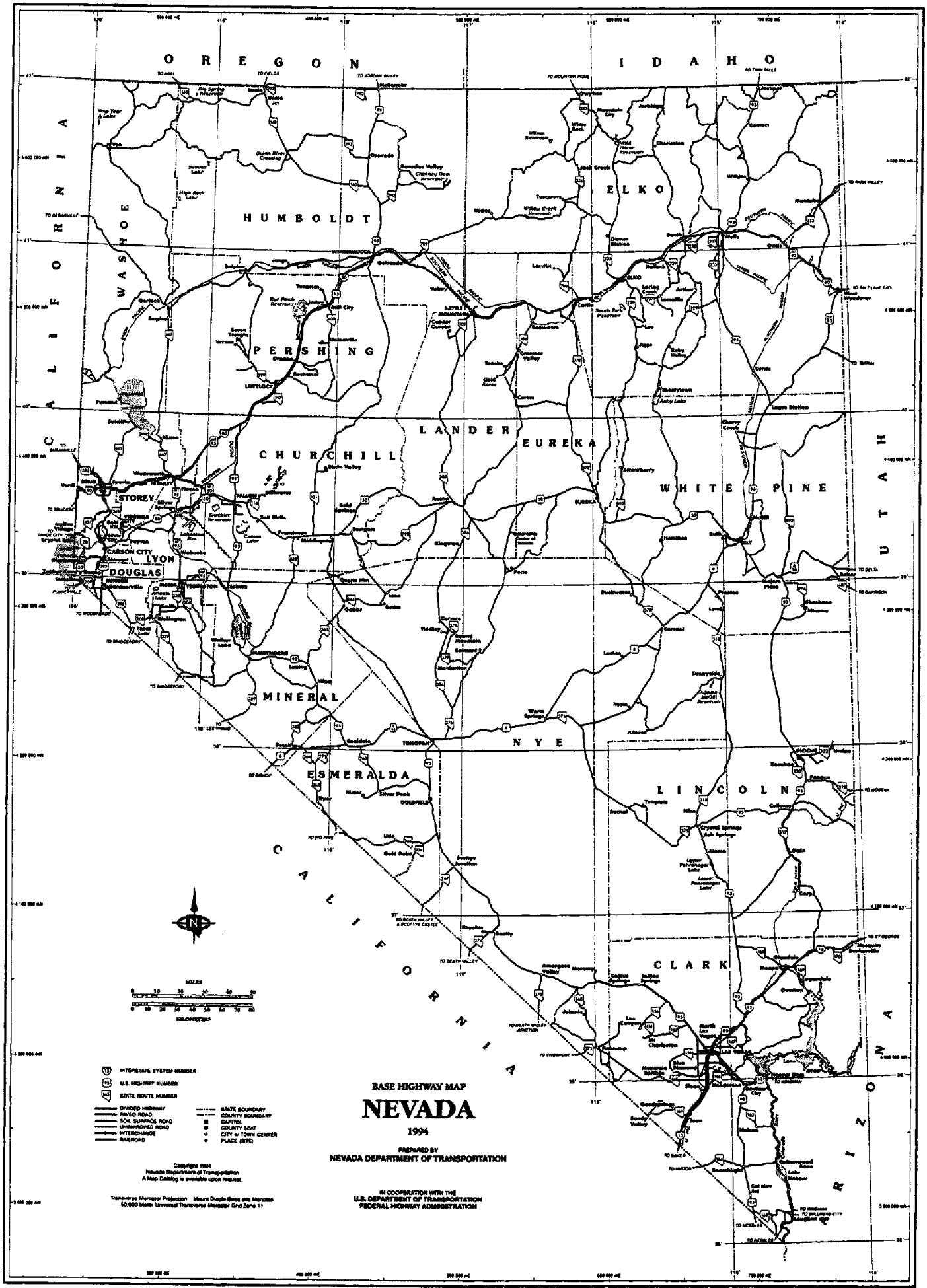
The only readily available surface waters entering this huge depression are the seasonal rivers fed by melting snow and flowing from the mountain ranges along Nevada's western frontier and out of a range of lofty peaks in north-central Nevada called the Ruby Mountains. The resultant rivers consist principally 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 Truckee and Carson River basins and the Truckee River system flow schematic diagrams showing Truckee River Basin gaging station locations were provided courtesy of U.S. Geological Survey (USGS), Water Resources Division, Nevada District Office, Carson City, Nevada.


OREGON
IDAHO
CALIFORNIA
WASHOE
HUMBOLDT
ELKO
PERSHING
LANDER
EUREKA
CHURCHILL
WHITE PINE
UTAH
STOREY
CARSON CITY
LYON
DOUGLAS
MINERAL
NYE
ESMERALDA
LINCOLN
CLARK
ARIZONA
CALIFORNIA
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 or TOWN CENTER
PLACE (STE)
BASE HIGHWAY MAP
NEVADA
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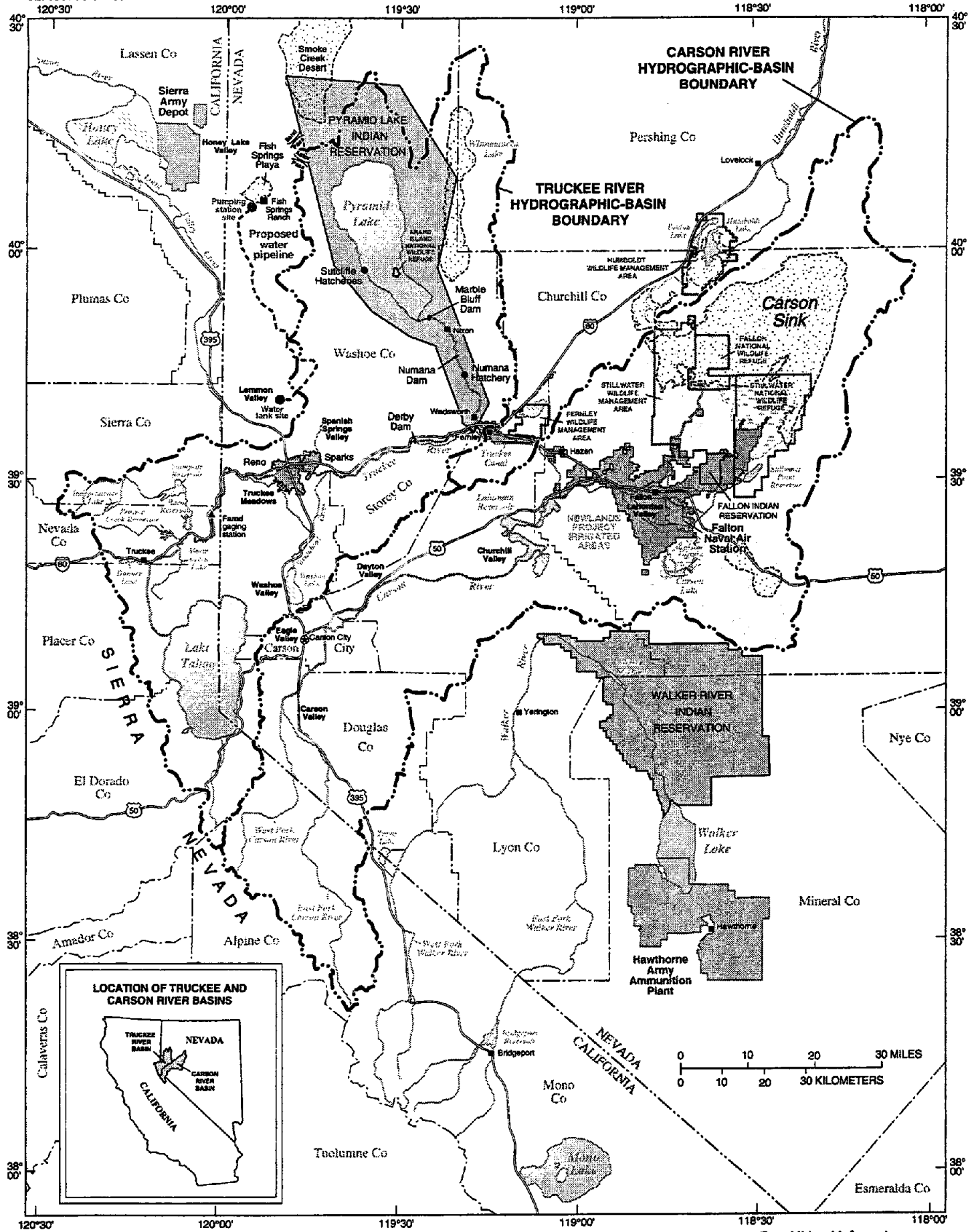

Base from U.S. Geological Survey digital data 1:100,000, 1977-85
Albers Equal-Area Conic projection
Standard parallels 29°30' and 45°30', central meridian -119°00'

V

For additional information, contact
District Chief / U.S. Geological Survey
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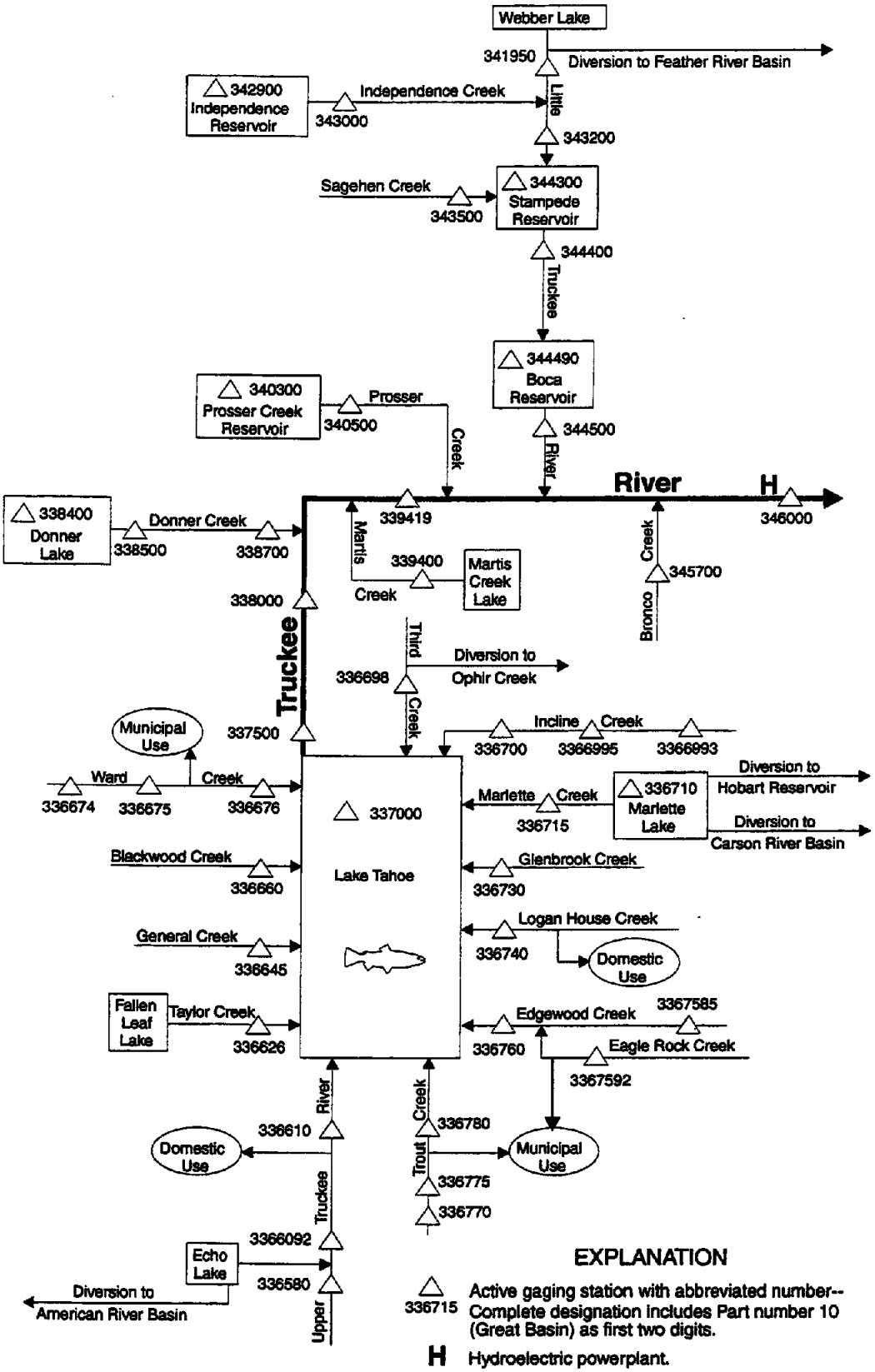
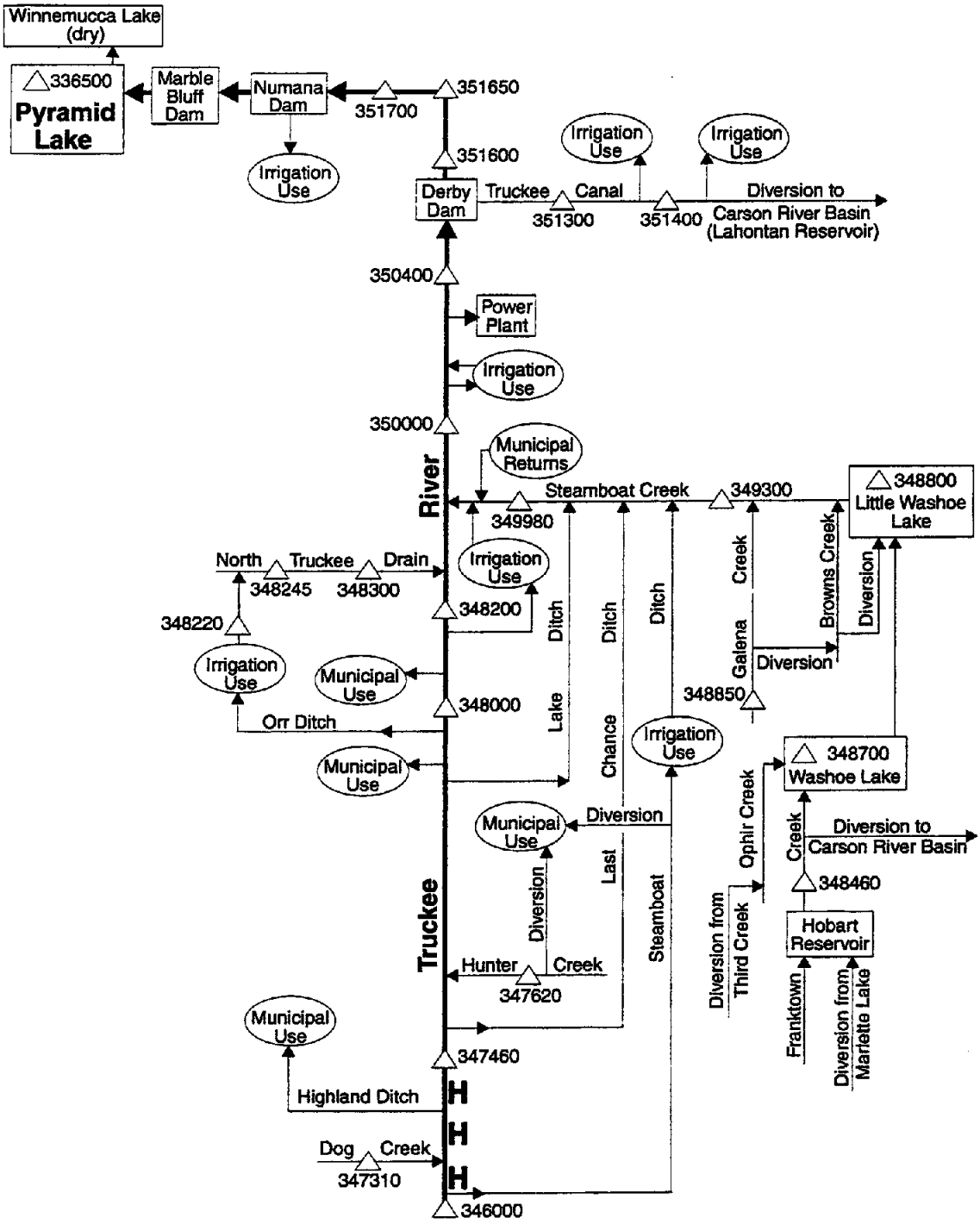
HYDROLOGIC FEATURES OF THE TRUCKEE AND CARSON RIVER BASINS *AND ADJACENT AREAS, WESTERN NEVADA AND EASTERN CALIFORNIA*



Lake Tahoe and Upper Truckee River Flow Schematic

Lake Tahoe and Truckee River Basins Listing of USGS Gaging Stations

Schematic diagram provided courtesy of
U.S. Geological Survey, Water Resources
Division, Carson City, Nevada, 1996



EXPLANATION

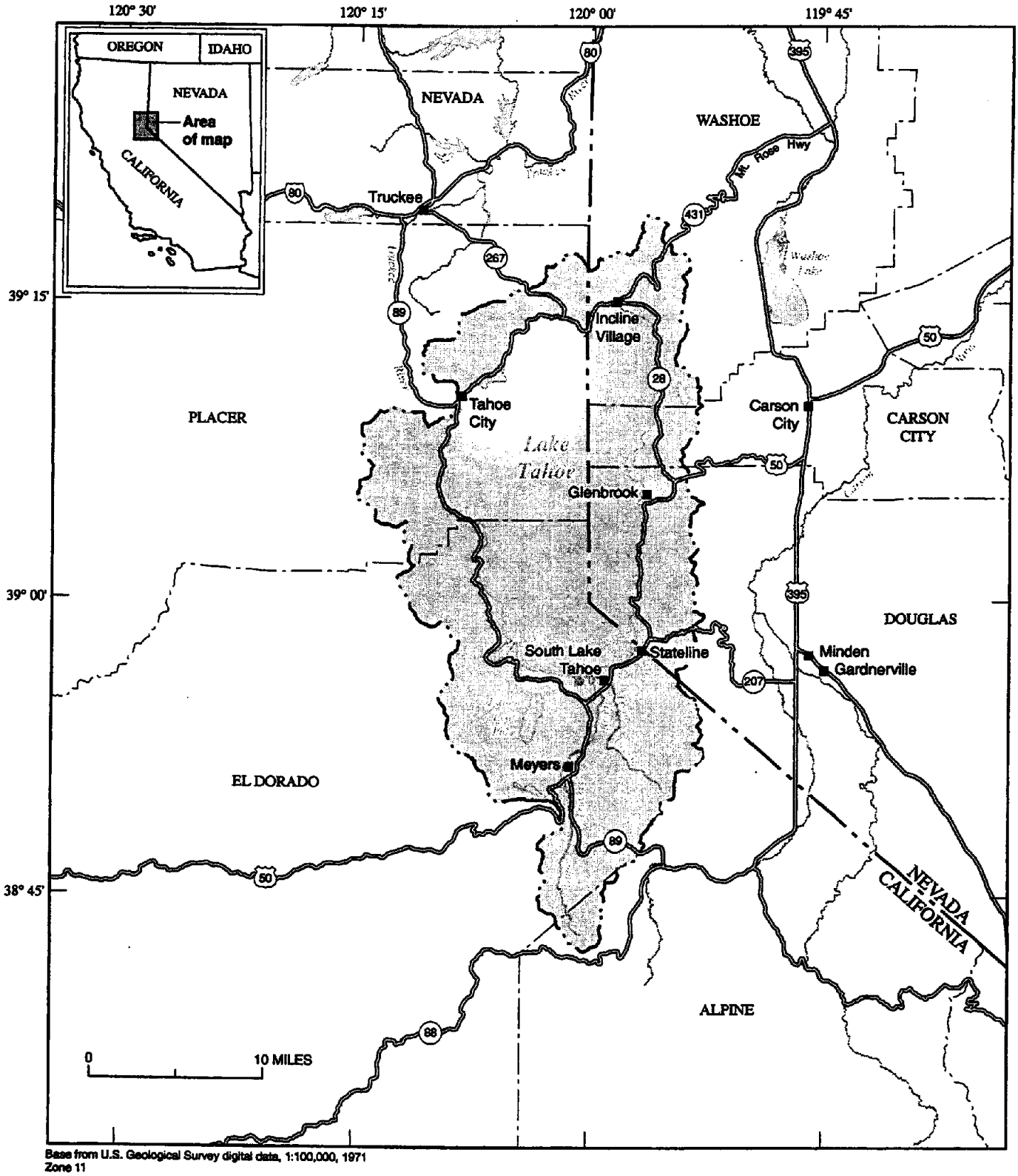
346000 △ **Active gaging station with abbreviated number--** Complete designation includes Part number 10 (Great Basin) as first two digits.

H Hydroelectric powerplant.

Lower Truckee River Flow Schematic

Truckee River Basin Listing of USGS Gaging Stations

Schematic diagram provided courtesy of U.S. Geological Survey, Water Resources Division, Carson City, Nevada, 1996



Base from U.S. Geological Survey digital data, 1:100,000, 1971
Zone 11

LAKE TAHOE BASIN

U.S. GEOLOGICAL SURVEY WATER RESOURCES DIVISION

CARSON CITY, NEVADA

Truckee River Chronology

A Chronological History of Lake Tahoe and the Truckee River and Related Water Issues

The information contained in **Part I—Overview** of this ***Truckee River Chronology*** constitutes a general background and informational description of the Truckee River Basin and its physical, geologic, and hydrologic characteristics and attributes. **Part II—Pre-Twentieth Century** and **Part III—Twentieth Century** of this chronology contain a relatively detailed listing by date of some of the more important events associated with the Truckee River Basin, Lake Tahoe and the Lake Tahoe Basin, the Truckee River, various tributaries, storage lakes and reservoirs, water diversions, Pyramid Lake, the Truckee River's interconnection with the Carson River Basin through Derby Dam and the Truckee Canal, and related water supply, water use, water rights, water development, and environmental and water quality issues.

Part I—Overview

Introduction

The Truckee River Basin encompasses an area of approximately 3,060 square miles[1] (1,958,400 acres) in the states of California and Nevada. The basin stretches in a generally north by northeast direction from Lake Tahoe, located in the Sierra Nevada Mountains on the border between California and Nevada, to Pyramid Lake, located approximately 50 air miles away in the desert of northwestern Nevada. Connecting this alpine source lake and the basin's desert terminal lake[2] is the 105-mile long Truckee River. Of the basin's total area, approximately 760 square miles (486,400 acres), or almost 25 percent of the basin, lie within the State of California, while the remaining 2,300 square miles (1,472,000 acres), or 75 percent of the basin, lie within the State of Nevada.[3] As a major sub-basin within the Truckee River Basin, the total drainage area of the Lake Tahoe Basin, to include Lake Tahoe and its tributaries, totals approximately 506 square miles (323,840 acres), and comprises 16.5 percent of the Truckee River Basin's total area.[4]

While the greater portion of the Truckee River Basin's surface area, and certainly the majority of its demands for water resources lie within the State of Nevada, most of the precipitation and virtually all of the basin's water storage lie within the State of California.[5] Not surprisingly, this extreme geographic imbalance between the basin's water supplies and its water demands and uses has tended to exacerbate some of the controversies surrounding the rights to, and the uses of, water resources within the Truckee River Basin. Based on the California–Nevada Interstate Compact approved by the California Legislature in September 1970 and the Nevada Legislature in March 1971,[6] Nevada was allocated approximately 90 percent of the Truckee River Basin's waters. By this compact water supplies were also reserved for growth in the Lake Tahoe–Truckee area of California.[7] Total annual diversions from the Lake Tahoe Basin are not to exceed 34,000 acre-feet of which 23,000 acre-feet is allocated to the State of California and 11,000 acre-feet is allocated to the State of Nevada.[8]

Table 1, Nevada Hydrographic Areas in the Truckee River Basin, presents a listing of the Truckee River Basin's hydrographic areas within Nevada, designated as Nevada Hydrographic Region [or Basin] 6, one of 14 hydrographic basins designated within the State of Nevada.[9]

Table 1—Nevada Hydrographic Areas in the Truckee River Basin

Hydrographic Areas by County, Cities, Surface Area, and Hydrographic Area Number
(Hydrographic Areas Listed in General Upstream to Downstream Order)

Hydrographic Area[1] [Nearest Cities]	County(ies)	Surface Area[1] (acres)	Surface Area[1] (sq. mi.)	Nevada Area Number
Lake Tahoe Basin [Incline Village, Glenbrook, Stateline]	Carson City, Douglas, Washoe	88,960	139	90
Truckee Canyon Segment [Verdi]	Washoe	53,760	84	91
Washoe Valley [Washoe City]	Washoe	52,480	82	89
Pleasant Valley [Reno, Washoe City]	Washoe	24,960	39	88
Truckee Meadows [Reno, Sparks]	Washoe	129,920	203	87
Sun Valley [Sun Valley, Sparks]	Washoe	6,400	10	86
Spanish Springs Valley [Sparks, Reno]	Washoe	48,640	76	85
Tracy Segment [Sparks, Fernley]	Lyon, Storey, Washoe	182,400	285	83
Warm Springs Valley [Sparks]	Washoe	158,080	247	84
Dodge Flat [Wadsworth]	Washoe	58,880	92	82
Pyramid Lake Valley [Nixon, Sutcliffe]	Washoe	430,080	672	81
Winnemucca Lake Valley [Nixon, Gerlach]	Pershing, Washoe	237,440	371	80
Total Truckee River Basin		1,472,000	2,300	

[1] Hydrographic areas and surface areas are for the Nevada portion of the Truckee River Basin only.
Source: *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.

A Hydrologic Overview of the Lake Tahoe and Truckee River Basins

Major hydrologic features of the Truckee River Basin include Lake Tahoe and the Lake Tahoe Basin, the 105-mile long Truckee River, a number of lesser upstream storage lakes and reservoirs, various tributaries, and the Truckee River's terminus,[10] Pyramid Lake. The Truckee River system (omitting Lake Tahoe and its major tributary, the 15-mile long Upper Truckee River) may be thought of as consisting of five (5) major river reaches including: (1) the 15-mile reach between the Truckee River's origin beginning at the Lake Tahoe Dam at Tahoe City, California and extending to the town of Truckee; (2) the 20-mile reach flowing through the upper Truckee River canyon between Truckee, California, and Verdi, Nevada, a reach which cuts through the Carson Range of the Sierra Nevada Mountains; (3) the 15-mile reach through the Truckee Meadows and the cities of Reno and Sparks, Nevada, to Vista; (4) the 30-mile reach from Vista to Wadsworth through the lower Truckee River canyon, and cutting through the Virginia Range; and (5) the 25-mile reach below Wadsworth, Nevada, traversing a broad alluvial valley to Pyramid Lake.

Lake Tahoe is an alpine lake located in the Sierra Nevada Mountains at an elevation of 6,223 feet (its natural rim) above mean sea level (MSL).[11] The lake is 22 miles long and between 8 and 13 miles wide, and has a shoreline of some 75 miles. In terms of ranking, Lake Tahoe is the third deepest lake in North America and the tenth deepest lake in the world. Lake Tahoe's surface water temperatures vary from a winter minimum of 40–45°F to a summer maximum of 65–75°F. At depths below 500 feet, the water remains a constant 39°F.[12] The lake lies on the border between California and Nevada at 120 degrees west longitude. This north-south border runs through a line just to the east of the approximate centerline of Lake Tahoe, turning in a southeasterly direction at 39 degrees north latitude, thereby placing approximately two-thirds of Lake Tahoe within the State of California and one-third within the State of Nevada.[13]

Lake Tahoe's surface area covers 193 square miles (123,520 acres) and its depth has been recorded at 1,645 feet (based on its "normal" lake surface level of 6,228 feet MSL),[14] giving it a total estimated volume of approximately 122 million acre-feet, enough water to cover the entire surface area of the State of Nevada to a depth of approximately 1.72 feet.[15] Lake Tahoe has an average evaporation loss of some 350,000 acre-feet per year,[16] equivalent to about 34 inches of evaporation per year. The lake was formed along an ancient fault line which later filled with water during the Pleistocene, or glacial epoch some 2 million to 500,000 years ago. Scientific examination of the lake's bottom has found that lakebed sediments extend at least 2,600 feet below the lakebed.[17] The maximum prehistoric depth has been reported to have been up to 7,000 feet.[18]

Lake Tahoe is directly fed by 63 creeks and streams which drain the Lake Tahoe Basin. The principal tributaries of Lake Tahoe include the Upper Truckee River, which drains an area extending for 15 miles due south of Lake Tahoe, Trout and Taylor creeks, also located at the south end of Lake Tahoe, and Ward and Blackwood creeks. Together, these five streams carry more than one half (averaging 166,290 acre-feet per year) of Lake Tahoe's average surface water inflows of 310,000 acre-feet per year.[19] The Lake Tahoe Basin also includes a number of other lakes, including Fallen Leaf Lake (1,400 acres), Marlette Lake (381 acres), Upper and Lower Echo Lakes (330 acres), Cascade Lake (210 acres), and Spooner Lake (97 acres). Numerous other small lakes and ponds comprise an additional 600 acres of surface water within the basin.[20]

Table 2—Lake Tahoe's Principal Gaged Stream Inflows[a]

Average Annual Runoff Volumes in Acre-Feet [Flow Rates in Cubic Feet per Second][b]

By Gaging Station Location (Listed by Gaging Station Number—See notes on respective average, low and high water years)	Average Water Year (see notes)	Low Water Year (see notes)	High Water Year (see notes)
Upper Truckee River (South Lake Tahoe, CA) (Gaging Station 10336610)[1]	**71,310** [98.5 cfs]	**21,140** [29.2 cfs]	**146,970** [203 cfs]
Taylor Creek (near Baldwin Beach, CA) (Gaging Station 10336626)[2]	**30,910** [42.7 cfs]	**6,940** [9.58 cfs]	**64,000** [88.4 cfs]
General Creek (near Meeks Bay, CA) (Gaging Station 10336645)[3]	**11,800** [16.3 cfs]	**3,590** [4.96 cfs]	**25,120** [34.7 cfs]
Blackwood Creek (near Tahoe Pines, CA) (Gaging Station 10336660)[4]	**26,280** [36.3 cfs]	**6,310** [8.71 cfs]	**53,140** [73.4 cfs]
Ward Creek (near Sunnyside, CA) (Gaging Station 10336676)[5]	**18,390** [25.4 cfs]	**3,830** [5.29 cfs]	**42,710** [59.0 cfs]
Third Creek (at Incline Beach, NV) (Gaging Station 10336698)[6]	**5,650** [7.80 cfs]	**2,110** [2.92 cfs]	**10,210** [14.1 cfs]
Incline Creek (at Incline Beach, NV) (Gaging Station 10336700)[7]	**4,740** [6.55 cfs]	**1,820** [2.51 cfs]	**11,150** [15.4 cfs]
Marlette Creek (south of Sand Harbor, NV) (Gaging Station 10336715)[8]	**1,740** [2.40 cfs]	**42** [0.058 cfs]	**6,000** [8.29 cfs]
Glenbrook Creek (at Glenbrook, NV) (Gaging Station 10336730)[9]	**890** [1.23 cfs]	**260** [0.36 cfs]	**2,180** [3.01 cfs]
Logan House Creek (north of Cave Rock, NV) (Gaging Station 10336740)[10]	**300** [0.42 cfs]	**37** [0.051 cfs]	**870** [1.20 cfs]
Edgewood Creek (near Stateline, NV) (Gaging Station 10336760)[11]	**2,300** [3.18 cfs]	**1,570** [2.17 cfs]	**3,290** [4.54 cfs]
Trout Creek (South Lake Tahoe, CA) (Gaging Station 10336780)[12]	**25,770** [35.6 cfs]	**7,380** [10.2 cfs]	**61,750** [85.3 cfs]

[a] Streams have been listed sequentially by their U.S. Geological Survey gaging station numbers. Includes only gaged streams.

[b] Gaging station 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 of approximately 723.97 acre-feet per year.

Gaging Station Notes:

[1] For years of record 1972–1995; High water year: 1983; Low water year: 1988; [2] For years of record 1969–1992; High water year: 1982; Low water year: 1977; [3] For years of record 1980–1995; High water year: 1982; Low water year: 1988; [4] For years of record 1961–1995; High water year: 1982; Low water year: 1977; [5] For years of record 1973–1995; High water year: 1983; Low water year: 1977; [6] For years of record 1970–1995; High water year: 1983; Low water year: 1988; [7] For years of record 1970–1995; High water year: 1995; Low water year: 1992 [8] For years of record 1974–1995; High water year: 1983; Low water year: 1977; [9] For years of record 1972–1995; High water year: 1995; Low water year: 1992; [10] For years of record 1984–1995; High water year: 1984; Low water year: 1992; [11] For years of record 1993–1995; High water year: 1995; Low water year: 1994; [12] For years of record 1961–1995; High water year: 1983; Low water year: 1977.

Source: *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.

Lake Tahoe's Inflows and Outflows (Water Budget)

Table 2, Lake Tahoe's Principal Stream Inflows, shows the inflows of the major streams flowing into Lake Tahoe which are monitored by the U.S. Geological Survey. This table presents average annual flows or discharges in acre-feet per year (based on annualized rates of flow in cubic feet per second) for specific river flow conditions and specific gaging station locations. Discharges and flow rates are presented for an "Average Water Year," "Low Water Year," and "High Water Year." These twelve principal streams provide a combined inflow for Lake Tahoe of approximately 192,000 acre-feet per year (based on an "average" water year and disregarding varying periods of record). This surface water inflow constitutes approximately 62 percent of the total surface water inflow into Lake Tahoe. For the purpose of assessing these inflows and their relationship to the total quantity of water generated within this basin, it may prove instructive to assess the combined inflows and outflows for the Lake Tahoe Basin. Hydrologically, this is done by developing a water budget, or an accounting of flows for the Lake Tahoe Basin by relating the various annual inflows, outflows, and the resultant change in storage. Writing this relationship to reflect a hydrologic balance, we have from the presentation of F. Eugene Rush (USGS, 1973):[21]

$$\textit{Inflows} = \textit{Outflows} \pm \textit{Change in Storage}$$

Modifying this general expression for the specific hydrologic characteristics of the Lake Tahoe Basin, yields:

$$I_{SW} + I_{GW} + P = O_{SW} + E + D \pm \Delta S$$

where the elements of inflow are: $\mathbf{I_{SW}}$ =surface water inflow; $\mathbf{I_{GW}}$ = ground water inflow; and $\mathbf{P}$ = lake-surface precipitation. The elements of outflow are: $\mathbf{O_{SW}}$ = surface water outflow into the Truckee River at Tahoe City; $\mathbf{E}$ = lake-surface evaporation; and $\mathbf{D}$ = diversions from the lake (and out of the basin). $\Delta\mathbf{S}$ represents the change in Lake Tahoe's storage associated with the water budget period. Disregarding ground water inflows and setting $\Delta\mathbf{S} = 0$ and $\mathbf{D} = 0$ yields:

$$I_{SW} + P = O_{SW} + E$$

Using figures from Rush (representing a period of record 1901–1971), $\mathbf{I_{SW}}$ = 310,000 acre-feet per year; $\mathbf{P}$ = 220,000 acre-feet per year (21.26 inches per year); Truckee River outflows at Tahoe City, $\mathbf{O_{SW}}$ = 180,000 acre-feet per year; and a lake evaporation rate of $\mathbf{E}$ = 350,000 acre-feet per year (33.83 inches per year),[22] yields a (balanced) water budget of:

$$310{,}000 + 220{,}000 = 180{,}000 + 350{,}000$$

Consequently, under this scenario of assumed no ground water inflows and a long-term general stability in storage (i.e., $\Delta\mathbf{S} = 0$), we may estimate that based on the contributions of surface water inflows and lake surface precipitation, the Lake Tahoe Basin generates approximately 530,000 acre-feet of water per year, of which approximately 350,000 acre-feet per year, or 66 percent, are lost to evaporation from the lake's surface.

The Upper Truckee River Basin

The upper Truckee River Basin, while not formally defined, may be thought of as that portion of the basin above the Truckee Meadows, an area containing the metropolitan cities of Reno and Sparks, Nevada. This upper basin includes those drainage areas encompassing the Lake Tahoe Basin, the upper Truckee River between Lake Tahoe and the town of Truckee, California, the Donner Lake drainage area to the west of Truckee, the Martis Creek drainage to the south and east of Truckee, the Prosser Creek and Little Truckee River drainage areas to the north and east of Truckee, and the upper Truckee Canyon below Hirschdale, California, and above Verdi, Nevada. The upper Truckee River Basin includes portions of the California counties of Alpine, El Dorado, Placer, Nevada, and Sierra. The Nevada portion of the upper Truckee River Basin includes parts of Carson City, and the counties of Douglas and Washoe.

The uppermost headwaters of the Truckee River begin with the Upper Truckee River above Lake Tahoe, flowing into the lake from the south. From **Table 2, Lake Tahoe's Principal Stream Inflows**, it may be seen that this river constitutes the major tributary to Lake Tahoe. Also from Table 2, it may be noted that both the Upper Truckee River and Trout Creek, another principal stream inflow, enter the lake at virtually the same location (the Truckee Marsh at South Lake Tahoe, California). The Upper Truckee River flows a total distance of approximately 15 miles from its headwaters located only about one mile northwest of Red Lake Peak (10,061 feet) in Alpine County, California. It was from this vantage point that John C. Frémont, while crossing the Sierra Nevada Mountains on his way to Sutter's Fort in present-day Sacramento, California, was reported to have first viewed the waters of Lake Tahoe on February 14, 1844.

After flowing some four miles from its origin below Red Lake Peak, the Upper Truckee River first picks up the waters flowing out of Dardanelles Lake and then, several hundred feet further downstream, the waters from Round Lake. After another two miles, the Upper Truckee River merges with Grass Lake Creek, which flows from Grass Lake and drains the area below Luther Pass on U.S. Highway 89, an area which borders Hope Valley and the Carson River Basin to the south. Just over three miles downstream from the confluence with Grass Lake Creek, the Upper Truckee River crosses U.S. Highway 50 and enters Lake Valley. After another two miles, the Upper Truckee River merges with Angora Creek, and then flows another nearly five miles (excluding extensive meanders) until it reaches Lake Tahoe at South Lake Tahoe. In earlier times, before the construction of the Tahoe Keys housing area and marina, the Upper Truckee River flowed into an area called the Truckee Marsh, an extensive wetland area which effectively filtered this river's waters, as well as those of Trout Creek, before they entered the lake. Today, by contrast, the beneficial filtration and stabilization effects once provided by this marshland have been mitigated by extensive dredging, filling, and lakeshore development.

Lake Tahoe has a single outlet consisting of the Truckee River, which flows out of the lake at Tahoe City, located on the northwestern shore of the lake in Placer County, California. Within California, Lake Tahoe is bordered (from south to north) by the counties of El Dorado and Placer. Within Nevada, Lake Tahoe is bordered by the counties of Douglas, Carson City, and Washoe. From this outlet to Lake Tahoe, the Truckee River travels a total distance of approximately 50 air miles and 105 river miles to its terminus, Pyramid Lake, located in the Nevada desert.

Table 3—Selected Upper Truckee River Basin Truckee River Inflows

Average Annual Runoff Volumes in Acre-Feet [Flow Rates in Cubic Feet per Second][a]

By Gaging Station Location (See notes below on complete period of record for average, low, and high water years)	Average Water Year (see notes)	Low Water Year (see notes)	High Water Year (see notes)
Lake Tahoe Outlet (at Tahoe City) (Gaging Station 10337500)[1]	**161,450** [223 cfs]	**110** [0.15 cfs]	**832,570** [1,150 cfs]
Donner Creek (at U.S. Highway 89) (Gaging Station 10338700)[2]	**60,890** [84.1 cfs]	**18,750** [25.9 cfs]	**102,800** [142 cfs]
Martis Creek (below Martis Dam) (Gaging Station 10339400)[3]	**19,470** [26.9 cfs]	**5,000** [6.90 cfs]	**53,940** [74.5 cfs]
Prosser Creek (below Prosser Dam) (Gaging Station 10340500)[4]	**65,950** [91.1 cfs]	**17,660** [24.4 cfs]	**154,930** [214 cfs]
Little Truckee River (below Boca Dam) (Gaging Station 10344500)[5]	**123,800** [171 cfs]	**40,250** [55.6 cfs]	**340,270** [470 cfs]
Bronco Creek (at Floriston, California) (Gaging Station 10345700)[6]	**9,920** [13.7 cfs]	**4,400** [6.06 cfs]	**15,420** [21.3 cfs]
Dog Creek[b] (at Verdi, Nevada) (Gaging Station 10347310)[7]	**7,530** [10.4 cfs]	**830** [1.14 cfs]	**14,190** [19.6 cfs]
Hunter Creek[b] (above Reno, Nevada) (Gaging Station 10347620)[8]	**5,280** [7.30 cfs]	**790** [1.09 cfs]	**9,770** [13.5 cfs]
Steamboat Creek[b] (at Steamboat, Nevada) (Gaging Station 10349300)[9]	**12,960** [17.9 cfs]	**1,400** [1.92 cfs]	**83,260** [115 cfs]
Steamboat Creek[b] (below Reno, Nevada) (Gaging Station 10349980)[10]	**31,200** [43.1 cfs]	**16,290** [22.5 cfs]	**46,190** [63.8 cfs]

[a] Gaging station 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 volume 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.

[b] Dog, Hunter, and the two Steamboat Creek gaging stations, while presented here, are actually considered to be in the lower Truckee River Basin. Steamboat Creek's gage readings below Reno do not include the effluent discharges from the Truckee Meadows Water Reclamation Facility.

Gaging Station Notes:

[1] For years of record 1909–1995; High water year: 1983; Low water year: 1994.
[2] For years of record 1993–1995; High water year: 1995; Low water year: 1994.
[3] For years of record 1972–1995; High water year: 1983; Low water year: 1977.
[4] For years of record 1964–1995; High water year: 1983; Low water year: 1977.
[5] For years of record 1970–1995; High water year: 1983; Low water year: 1992.
[6] For years of record 1993–1995; High water year: 1995; Low water year: 1994.
[7] For years of record 1992–1995; High water year: 1995; Low water year: 1994.
[8] For years of record 1993–1995; High water year: 1995; Low water year: 1994.
[9] For years of record 1962–1995; High water year: 1983; Low water year: 1992.
[10] For years of record 1993–1995; High water year: 1995; Low water year: 1994.

Source: *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.

Upon leaving Lake Tahoe, the Truckee River first heads southwest for one-half mile, then turns due west for another mile and a half. Two miles downstream from Lake Tahoe, the Truckee River eventually turns northwest and then north towards the town of Truckee, California, which is located nearly 15 miles downstream from the lake. Along this reach numerous small streams enter the Truckee River between Tahoe City and the town of Truckee, to include (those with names) Bear Creek (4.2 miles downstream), Squaw Creek (5.8 miles downstream), Deer Creek (6.6 miles downstream), Pole Creek (7.7 miles downstream), Silver Creek (8.8 miles downstream), Deep Creek (9.4 miles downstream), and Spring Cabin Creek (10.8 miles downstream).

Nearly one mile above Truckee and 13.6 miles downstream from Lake Tahoe, Donner Creek, which drains from Donner Lake (5,933 feet MSL), enters the Truckee River. One mile below the town of Truckee, the river passes the Tahoe-Truckee sewage disposal plant,[23] a technically-advanced tertiary treatment plant not only serving the town of Truckee, but also serving much of the California portion of Lake Tahoe, excluding South Lake Tahoe.[24] Treated effluent from this facility is not returned to the Truckee River, but infiltrated into the ground. Three miles below the Truckee sewage disposal plant, the waters of Martis Creek enter the Truckee River. Martis Creek drains an extensive area of some 40 square miles to the south of the Truckee River including Martis Creek, as well as West, Middle, and East Martis creeks. These combined waters feed into Martis Creek Reservoir, located just above Martis Creek's confluence with the Truckee River. This reservoir, with a storage capacity of just over 20,000 acre-feet, was constructed in 1971 by the U.S. Army Corps of Engineers (COE) for flood control purposes; however, due to a leaking dam, only temporary storage is allowed. Some 2.8 miles below the confluence of Martis Creek and the Truckee River, the waters of Prosser Creek enter the river. Just upstream on Prosser Creek is Prosser Creek Reservoir with a storage capacity of nearly 30,000 acre-feet, and some 11 miles above this reservoir is Warren Lake and the headwaters of Prosser Creek. Waters of Prosser Reservoir are decreed for use for several purposes to include COE flood control, maintenance of instream flows (the "Floriston rates"), and for spawning flows for Pyramid Lake's endangered cui-ui fish species and its threatened Lahontan cutthroat trout.

Another 2.2 miles below Prosser Creek, the Truckee River receives the waters of the Little Truckee River flowing out of Boca Reservoir, which is located less than one-half mile above the Truckee River. The Little Truckee River is the largest of the Truckee River's tributaries and drains an extensive area stretching from just below Sierraville, California, and the Sierra Valley area, both of which are located in the Feather River Basin (California). In fact, these upper basins' headwaters are so close that there exists a diversion (with a priority date of 1870) from the upper reaches of the Little Truckee River into Webber Creek for supplemental irrigation use in Sierra Valley. In addition to Boca Reservoir, the Little Truckee River sub-basin also contains Stampede Reservoir, with a storage capacity of 226,000 acre-feet, and further upstream on Independence Creek, Independence Lake (Reservoir), with a storage capacity of 17,500 acre-feet.

Just over two miles downstream from the Truckee River's confluence with the Little Truckee River, the river passes the community of Hirschdale, California. It was at this location that between 25 and 13 million years ago, in Neocene times (the late Tertiary Period encompassing both the Pliocene and Miocene Epochs), Lake Truckee was formed from a basalt lava flow which dammed the Truckee River at this point and created a lake with a surface area of approximately 73 square miles and a maximum depth of 465 feet.[25] Three miles below Hirschdale the waters of

Gray Creek intermittently, and sometimes violently, enter the Truckee River. The importance of Gray Creek to the hydrology of the Truckee River is amplified far beyond its actual contribution to the river's flow due to its periodic tendency, during particularly severe thunderstorms, to disgorge considerable quantities of mud and debris into the river. These instances have been so severe, in fact, as to have destroyed a timer-crib dam used for ice making (1880), turned the Truckee River red with mud through Reno (1890), and washed out railroad tracks and bridges at Gray Creek's confluence with the Truckee River (1884). More recently, Gray Creek has forced the closure of Reno's water treatment plants on several occasions (i.e., 1965, 1992, 1995). The Gray Creek watershed is characterized by steep terrain, extensive areas of timber cutting, over-grazing by livestock, and unstable soil conditions.[26]

Just over two miles below Gray Creek, the Truckee River encounters a diversion dam located at the community of Floriston, California. Here waters are diverted into a flume to be used some 1.8 miles further downstream at the Farad powerhouse. Floriston has had an interesting relationship with the Truckee River. It was at this location that in 1899 the Floriston Pulp and Paper Company (FP&PC) was constructed and began the daily discharge of up to 150,000 gallons of highly acidic waste directly into the river.[27] Despite court-ordered injunctions and the threat of a Nevada suit filed with the U.S. Supreme Court, direct and indirect discharges would continue through 1930 when the plant was finally closed. Somewhat inexplicably, for over 30 years, this plant persisted as the most significant source of water pollution on the Truckee River and severely degraded the quality of drinking water downstream in the Truckee Meadows and jeopardized aquatic wildlife and habitat throughout the lower reaches of the Truckee River.[28]

Approximately 0.7 miles below the Farad powerhouse, a U.S. Geological Survey (USGS) gaging station is located. This gaging station, commonly referred to as the Farad gaging station, is the most important water flow measurement site along the entire Truckee River system as it is used to insure that the river system's "Floriston rates" are met. These required rates of flow for the Truckee River originated in 1908 when the Truckee River General Electric Company, which was the predecessor of present-day Sierra Pacific Power Company (SPPCo) of Reno, Nevada, formed an agreement with the Floriston Land and Power Company and the Floriston Pulp and Paper Company to insure a minimum flow in the Truckee River throughout the year. These rates were later incorporated into the Truckee River General Electric Decree in 1915, a decree which settled a long-standing controversy over who would control and operate the Lake Tahoe Dam at Tahoe City.

In this controversy, the Truckee River General Electric Company owned the dam, but the U.S. Reclamation Service (USRS, predecessor of the U.S. Bureau of Reclamation, USBR) wanted both control over the dam and ownership of the waters of Lake Tahoe for its Truckee–Carson Irrigation Project (later renamed the Newlands Project) to be located in Churchill County, Nevada, in the Carson River Basin. The federal government eventually gained control over the operation of the dam through this 1915 decree, but not without concessions. The principal concession included the enforcement of the Floriston rates, which granted the power company minimum instream flows in order to generate electrical power at its several powerhouses along the river's reach. These rates of Truckee River flow have since been incorporated into the Truckee River Agreement (1935), which was later incorporated into the Orr Ditch Decree (1944).

Approximately 2.6 miles downstream from the Farad gaging station, the Truckee River encounters another dam which diverts water to the Fleish power station. One mile beyond this diversion, the Truckee River leaves California and enters the State of Nevada, and a mile further along it receives the return waters from the Fleish power station. Less than one mile beyond this point, some of the Truckee River's waters are diverted again, this time into the Coldrone Ditch. Below this point the Truckee River reaches Verdi, Nevada, and after another several miles, the Truckee River enters the Truckee Meadows, containing the cities of Reno and Sparks.

The Lower Truckee River Basin

The lower Truckee River Basin, while not strictly defined, may be considered as encompassing that portion of the basin including and downstream from the Truckee Meadows. This would include the Truckee Meadows and the cities of Reno and Sparks, and Pleasant Valley and Washoe Valley to the south, the latter valley containing Washoe Lake and Little Washoe Lake. Both these valleys are drained by Steamboat Creek, which then runs along the eastern portion of the Truckee Meadows and empties into the Truckee River near Vista and the beginning of the lower Truckee River canyon. Along the way, Steamboat Creek picks up the return flows of numerous irrigation ditches to the south of the Truckee River, the most important being Steamboat Ditch, Last Chance Ditch, and Lake Ditch, as well as the Boynton Slough (which picks up the waters of Cochran Ditch). The Boynton Slough is the recipient of some of these other ditches' return-flow waters as well. Also included in this lower Truckee River Basin is the lower Truckee River canyon running through the Virginia Range and extending between Vista (Sparks) and Wadsworth. The final segment of the lower Truckee River Basin lies below Wadsworth and includes a 25-mile long broad, alluvial valley stretching to Pyramid Lake. This portion of the basin also includes the Pyramid Lake Basin, and to the east over the Lake Range, the Winnemucca (dry) Lake Basin.[29]

The Truckee Meadows is a bowl-shaped valley, approximately 10 miles wide and 16 miles long, containing the cities of Reno and Sparks with a combined population of approximately 215,000 persons.[30] Several tributaries enter the Truckee River along this reach, the most important being Steamboat Creek, which also contains the treated effluent from the Truckee Meadows Water Reclamation Facility (formerly the Reno–Sparks joint sewage treatment plant). The Truckee Meadows constitutes the most important municipal and industrial use of the Truckee River's water in the basin, as well as the most important agricultural use of the Truckee River's waters *within* the basin. While municipal and industrial water use (withdrawals) in the Truckee Meadows total approximately 65,000 acre-feet per year, nearly three times this amount (172,383 acre-feet per year, 1973–1994) is diverted out of the lower Truckee River Basin at Derby Dam and into the Truckee Canal for agricultural use in the Newlands Project in the lower Carson River Basin. [See Table 5 for Truckee Canal flows.]

On the east side of the Truckee Meadows at Vista, the Truckee River enters the lower Truckee River canyon, which cuts through the Virginia Range. Nearly 2.5 miles after leaving the Truckee Meadows, the Truckee River comes abreast of Lockwood. It was at this point where Ice Age Lake Lahontan attained its maximum reach up the Truckee River during its peak highstand of some 4,380 feet MSL approximately 65,000 years ago. In fact, over the period of 65,000–12,500 years ago, referred to as the Wisconsin, or glacial age, Lake Lahontan experienced several highstands which brought it very near to this location.[31] Some 11.4 miles beyond this point the

Truckee River passes Sierra Pacific Power Company's Tracy–Clark power station cooling ponds and 3.6 miles beyond this the river reaches Derby Dam, the most significant diversion to be encountered along the entire Truckee River. From this diversion dam the Truckee Canal takes off, first paralleling the river towards the east, then turning southward along the west side of the Lahontan Valley and crossing into the Carson River Basin, heading towards the lower Carson River where it empties into Lahontan Reservoir. Each year, on the average (1967–1994), just over 183,000 acre-feet (173,380 acre-feet per year since 1973) of Truckee River water have been diverted at this point for agricultural use on Newlands Irrigation Project farmlands within the Truckee Division near Fernley, Nevada, and within the Carson Division around Fallon, Nevada.

Some 9.2 miles below Derby Dam the Truckee River enters the Pyramid Lake Paiute Indian Reservation. The reservation occupies almost 477,000 acres (745 square miles) with its dominant feature being the 108,000-acre (169 square-mile) Pyramid Lake. Reservation lands were initially withdrawn in 1859, a date which determined the priority date under the "reservation doctrine" for the Tribe's use (appropriation) of Truckee River waters for the irrigation of tribal lands. However, the Pyramid Lake Indian Tribe's history has been inextricably linked to the bounty of Pyramid Lake and the lower Truckee River fisheries. The concept of the federal reservation doctrine, under which these water rights were guaranteed and eventually adjudicated in the 1944 Orr Ditch Decree, is to reserve a sufficient supply of water to meet the intended purpose of the reservation.[32] Despite the historical importance of the Pyramid Lake fishery to the Paiute Indians and the clearly defined intent of the reservation doctrine, no water has ever been allocated to the restoration of Pyramid Lake or to the preservation of the lake's and river's fisheries.[33]

Some 1.8 miles after entering the Pyramid Lake Indian Reservation, the Truckee River passes Wadsworth. In the latter part of the 1800's, Wadsworth was an important rail center, particularly for the shipment of Pyramid Lake cutthroat trout to San Francisco markets and, beginning in 1869 with the completion of the transcontinental rail line, to points east as well. In 1888 alone, it was reported that approximately 250,000 pounds (125 tons) of Pyramid Lake cutthroat trout were shipped from Wadsworth. Further, it was also estimated that this represented only about one-half of the total catch of trout along the entire river system.[34] Eventually, over-fishing, pollution, and the blockage of upstream access for spawning spelled the doom of this sub-species of Lahontan cutthroat trout, a species which grew up to four feet in length and weighed between 40–60 pounds. After surviving for thousands of years in the waters of Lake Lahontan, Pyramid Lake, Lake Tahoe, and the Truckee River system, less than 100 years after the arrival of the first white man in 1844, this magnificent species of fish became extinct by the early 1940's.[35]

Near Wadsworth, the Truckee River turns from its eastward flow and heads northward, flowing through a broad alluvial valley that is bounded by Quaternary-age (Pleistocene) lacustrine deposits of ancient Lake Lahontan and Tertiary-age volcanic rocks. Approximately 14.5 miles below Wadsworth, measured along the course of the Truckee River, is the Numana Dam, which is the diversion dam for irrigation on the reservation. Approximately 3.5 miles below this is Nixon, and just over four miles below Nixon is the Marble Bluff Dam, which, along with the Pyramid Lake Fishway, was built 1975 in an effort to reduce further erosion in the lower Truckee River and to promote the spawning runs of the Pyramid Lake cui-ui endangered fish species.[36] Nearly four miles below Marble Bluff Dam, the Truckee River enters its terminus location, Pyramid Lake.

Pyramid Lake, as well as being the low point of the Truckee River Basin, was also the low point of the ancient Ice Age Lake Lahontan,[37] which covered some 8,655 square miles of northwestern Nevada as recently as 12,500 years ago and, at its peak surface elevation of 4,380 feet MSL (which occurred approximately 65,000 years ago), extended up the Truckee River to Lagomarsino Canyon near the present-day community of Lockwood.[38] Pyramid Lake, which is wholly contained within the Pyramid Lake Paiute Indian Reservation, is 30 miles long and ranges from 4 to 11 miles wide and covers an area of approximately 169 square miles (108,000 acres) at a surface elevation of 3,800 feet MSL.[39] At this lake-surface elevation, Pyramid Lake has a maximum depth of 335 feet and a volume of approximately 21 million acre-feet of water.[40]

In a 1970 study of Pyramid Lake's water budget (inflows, outflows, and changes to lake storage), it was estimated that the lake's surface evaporation totaled some 440,000 acre-feet per year, equivalent to approximately 4.2 feet per year. Based on this rate of evaporation, which was recorded over a 40-year period from 1929–1969, combined with average annual lake inflows of 250,000 acre-feet and precipitation of 55,000 acre-feet onto the lake's surface, it was found that Pyramid Lake had suffered an average water *deficit* of about 135,000 acre-feet per year over this period of time.[41] This condition resulted in a dramatic decline in its water level since the early 1900's from about 3,870 feet MSL in July 1910 to 3,783.9 feet MSL on February 6, 1967[42] and a resultant increase in the lake's salinity to nearly 5,100 parts per million of total dissolved solids.[43] Based upon an estimated average annual discharge of 519,270 acre-feet (1929–1969) at the Farad gaging station over this same period of record, less than half (48.1 percent) of the Truckee River's waters entering Nevada have actually made it to Pyramid Lake during this period.

More recent gaging records (1958–1994) show that an average of nearly 357,000 acre-feet have entered Pyramid Lake each year (Nixon gaging station), which, when combined with estimated lake surface evaporation and precipitation amounts above, still results in a net *deficit* of some 28,000 acre-feet per year. Using this annual "average" lake water budget deficit of 28,000 acre-feet, and Pyramid Lake's most recent highstand of nearly 3,798.94 feet MSL (April 30, 1996), along with its corresponding estimated volume of 21,605,000 acre-feet, we may estimate that for a normal series of years, the lake will decline by one foot of surface elevation every four years.[44]

Pyramid Lake is the home of the endangered cui-ui fish species (*Chasmistes cujus*), a bottom sucker found only in this lake, and the threatened Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*). The Lahontan cutthroat trout species was introduced into Pyramid Lake in the 1950's after the native sub-species, the Pyramid Lake cutthroat trout became extinct in the early 1940's. The survival of these two fish species has become a crucial issue with respect to upstream storage (Stampede and Prosser reservoirs), maintaining river flows sufficient for spawning runs, and the rights to unallocated flood waters in the Truckee River.

Immediately to the east of Pyramid Lake and over the Lake Range lies the dry lake bed of Winnemucca Lake, which, when it contained water, was nearly as long as Pyramid Lake, but not nearly as wide. Throughout recent history, and even before extensive Truckee River diversions began at Derby Dam in the early 1900's, this lake's status varied from a shallow lake to a mud flat and marsh. Finally, in 1938 the lake dried up completely, never to be filled again. Even so, when high water years in these earlier times permitted, Truckee River inflows into this area created an important wetland and feeding and nesting area to numerous waterfowl visiting this area along the

Pacific Flyway. During particularly wet years, an extensive pool of relatively shallow water forms at the northern end of this expanse, fed by local surface and ground water inflows.

Table 4—Selected Truckee River Runoff and Rates of Flow

Average Annual Runoff Volumes in Acre-Feet [Flow Rates in Cubic Feet per Second][a]

By Gaging Station Location (See notes below on complete period of record for average, low, and high water years)	Average Water Year (see notes)	Low Water Year (see notes)	High Water Year (see notes)
Truckee River at Tahoe City (Gaging Station 10337500)[1]	**161,450** [223 cfs]	**110** [0.15 cfs]	**832,570** [1,150 cfs]
Truckee River up from Donner Creek (Gaging Station 10338000)[2]	**220,810** [305 cfs]	**23,460** [32.4 cfs]	**594,380** [821 cfs]
California–Nevada Border (Farad Gage) (Gaging Station 10346000)[3]	**542,980** [750 cfs]	**133,210** [184 cfs]	**1,768,680** [2,443 cfs]
Truckee River at Reno (below Kietzke Bridge) (Gaging Station 10348000)[4]	**487,960** [674 cfs]	**76,740** [106 cfs]	**1,701,330** [2,350 cfs]
Truckee River below Reno (McCarran Bridge) (Gaging Station 10348200)[5]	**479,270** [662 cfs]	**64,220** [88.7 cfs]	**1,717,980** [2,373 cfs]
Truckee River at Vista (below Steamboat Creek) (Gaging Station 10350000)[6]	**579,180** [800 cfs]	**114,390** [158 cfs]	**2,016,980** [2,786 cfs]
Truckee River below Tracy (Gaging Station 10350400)[7]	**565,420** [781 cfs]	**111,490** [154 cfs]	**1,977,180** [2,731 cfs]
Truckee River below Derby Dam (1,500 feet) (Gaging Station 10351600)[8]	**269,320** [372 cfs]	**4,460** [6.16 cfs]	**1,759,270** [2,430 cfs]
Truckee River above Pyramid Lake (Nixon) (Gaging Station 10351700)[9]	**362,710** [501 cfs]	**17,450** [24.1 cfs]	**1,888,860** [2,609 cfs]

[a] Gaging station 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 flow or discharge 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 discharge of approximately 723.97 acre-feet per year.

Gaging Station Notes:

[1] For years of record 1909–1995; High water year: 1983; Low water year: 1994.
[2] For years of record 1945–1995; High water year: 1952; Low water year: 1994.
[3] For years of record 1909–1995; High water year: 1983; Low water year: 1931.
[4] For years of record 1907–1995; High water year: 1983; Low water year: 1931.
[5] For years of record 1977–1995; High water year: 1983; Low water year: 1992.
[6] For years of record 1900–1995; High water year: 1983; Low water year: 1992.
[7] For years of record 1972–1995; High water year: 1983; Low water year: 1992.
[8] For years of record 1918–1995; High water year: 1983; Low water year: 1931.
[9] For years of record 1958–1995; High water year: 1983; Low water year: 1992.

Source: *Water Resources Data, Nevada, Water Year 1995*, USGS 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.

Truckee River Flows

Table 4, Selected Truckee River Flows, presents average annual flows or discharges in acre-feet per year (based on annualized rates of flow in cubic feet per second) for specific river flow conditions and specific gaging station locations. Of note is that the differences between the gaging station below Tracy and the one below Derby Dam reflect primarily the diversions into the Truckee Canal. Also, the difference between the discharge recorded below Derby Dam and the gage at Nixon represents, in large part, the return flows from the Truckee Canal (Gilpin Spill and Pyramid Spill). Of particular importance are the high variability in the Truckee River's flows, not only from extreme lows to highs, but also from "average" flows to lows and highs. These variations, which realistically tend to be more "average," i.e., typical, than flows during "average" years, have tended to exacerbate Truckee River issues with respect to agricultural water needs, spawning flow requirements, municipal and industrial needs, and water quality.

Truckee River Water-Related Issues

Currently, the most significant water-related issues within the Truckee River Basin are concerned with: (1) diversions out of the basin at Derby Dam for use on Newlands Project farmlands in the Carson River Basin; (2) highly erratic periods of precipitation and river flows combined with limited upstream storage to accommodate extreme periods of drought (e.g., 1987–1994); (3) obtaining significant flows for the restoration and preservation of the Pyramid Lake fishery; (4) increasing water needs for the Reno–Sparks metropolitan area; (5) water quality problems in the lower Truckee River below the Truckee Meadows Water Reclamation Facility; and (6) the allocation of unused (unappropriated) Truckee River flood waters between the demands of the Truckee–Carson Irrigation District (TCID), operating on behalf of the Newlands Project farmers, and the demand for these waters by the Pyramid Lake Indian Tribe to restore the Pyramid Lake and lower Truckee River fisheries.

Over the years, these complex and inter-related Truckee River issues have manifested themselves in numerous lawsuits and continuing litigation involving a number of principal interest groups, including: (1) the U.S. Department of the Interior, representing varied interests (i.e., U.S. Bureau of Reclamation, Bureau of Indian Affairs, and the U.S. Fish and Wildlife Service); (2) TCID as operator of the Newlands Irrigation Project; (3) the City of Fallon and Churchill County representing domestic water needs in the Lahontan Valley; (4) the Pyramid Lake Paiute Indian Tribe; (5) water purveyors in the Truckee Meadows (i.e., Sierra Pacific Power Company and Washoe County); (6) the cities of Reno and Sparks and the effects of their treated effluent on downstream water quality; (7) the U.S. Environmental Protection Agency representing both the interests of endangered and threatened fish species in Pyramid Lake and Truckee River water quality issues; and (8) the states of Nevada and California, to name the more prominent.

Table 5, Selected Truckee River and Truckee Canal Flows, 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 consistent period of the water

years (October 1st through September 30th) 1973 through 1994. Second, due to the river 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 phreatophyte[45] usage between the specific gaging station locations.[46]

Table 5—Selected Truckee River and Truckee Canal Flows

Average Flow Volumes Calculated for the Water Years 1973–1995

Average Annual Runoff Volumes 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 1973–1994 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 (1,500 feet) (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 the 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 discharges 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 flow or discharge 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 discharge 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 consistent 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 operational losses due to evaporation, seepage, and phreatophytes between the specific gaging station locations.

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

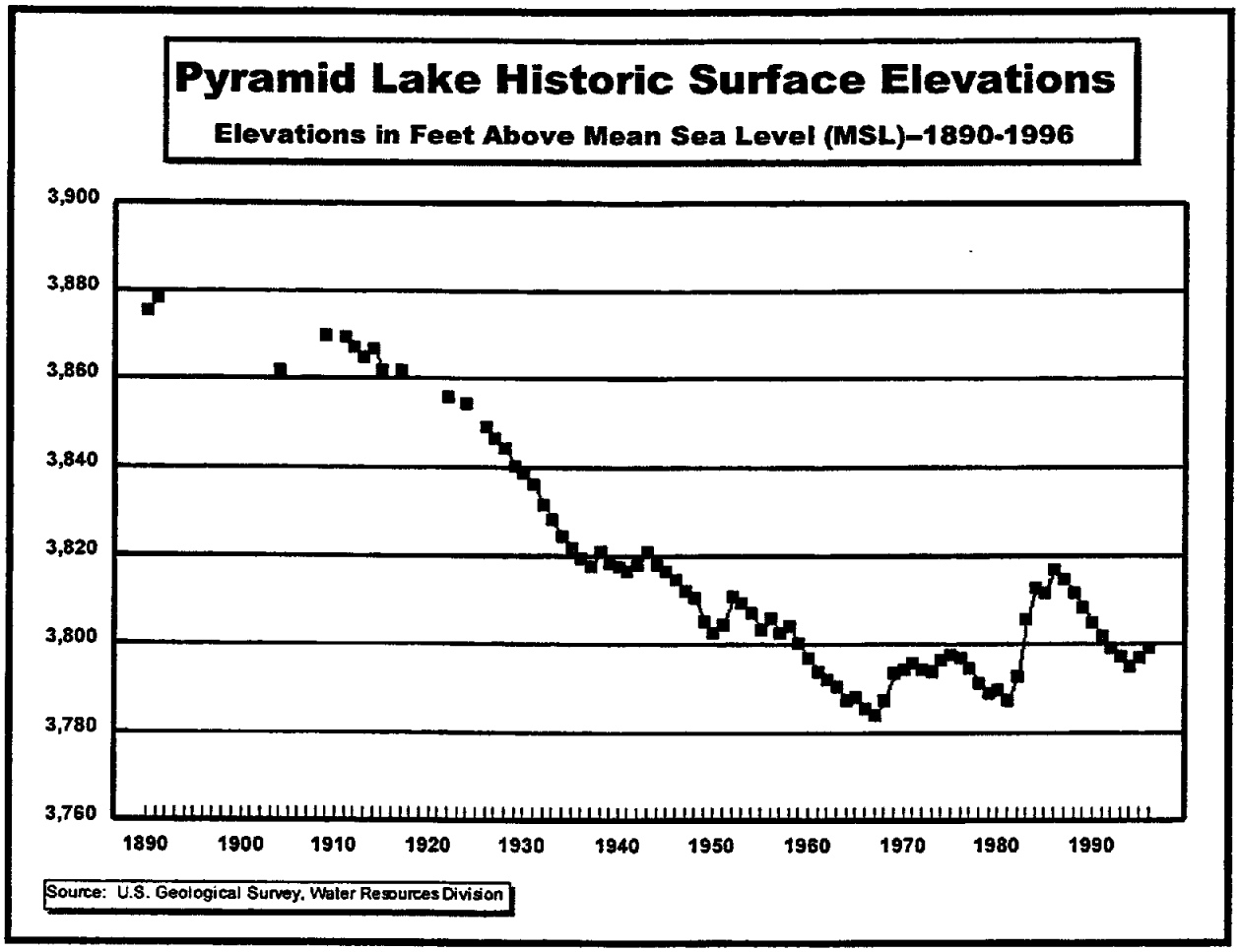
Gaging Station Notes:

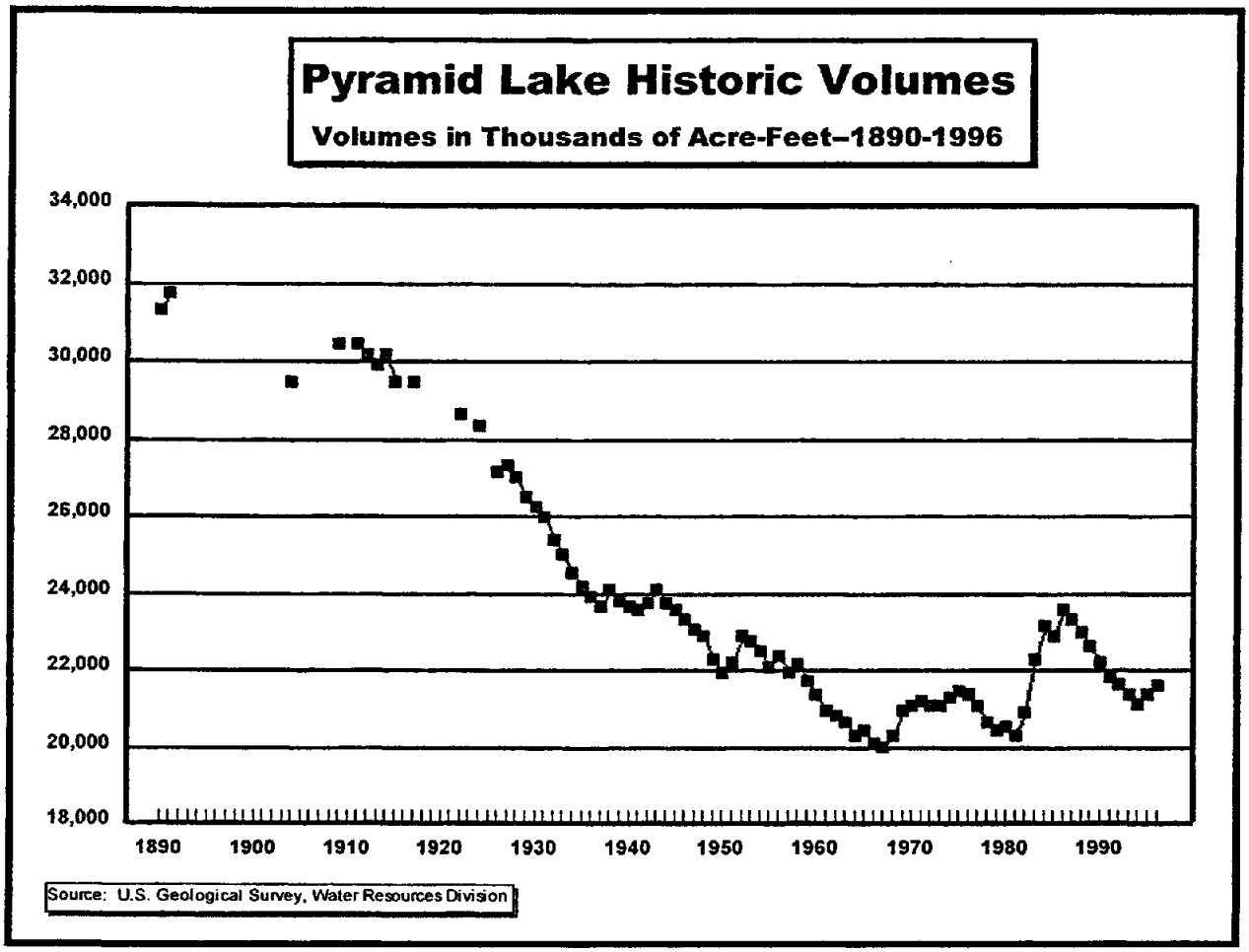
[1] For years of record 1909–1995 average equals 542,980 acre-feet; High water year: 1983; Low water year: 1931.
[2] For years of record 1973–1995 average equals 565,420 acre-feet; High water year: 1983; Low water year: 1992.
[3] For years of record 1918–1995 average equals 269,320 acre-feet; High water year: 1983; Low water year: 1931.
[4] For years of record 1967–1995 average equals 181,720 acre-feet; High water year: 1978; Low water year: 1983.
[5] For years of record 1967–1995 average equals 135,380 acre-feet; High water year: 1978; Low water year: 1983.

Source: *Water Resources Data, Nevada*, various issues, Water Resources Division, USGS, Carson City, Nevada.

It should also be noted that in comparing the figures of Table 5 and Table 4, the average annual flow ("average year") measured at the gaging station located approximately 1,500 feet below Derby Dam on the Truckee River (Table 5) of 354,660 acre-feet per year (period of record 1973–1994) is virtually the same as the average annual flow of 356,920 acre-feet per year (period of record 1958–1994) recorded even further downstream at Nixon (Table 4). Logically, one would expect that given the considerable distance between these gaging stations (i.e., approximately 35 miles), the effects of evaporation, seepage, agricultural diversions, and phreatophyte use would greatly reduce flows lower down in the river. This apparent anomaly is due, in part to the different periods of record, but more importantly, it is due to return flows from the Truckee Canal via the Gilpin Spill and the Pyramid Spill, which dump waters diverted at Derby Dam back into the Truckee River between the gaging station located just below Derby Dam and Wadsworth. These waters are returned to the Truckee River before the first gaging station on the Truckee Canal and are therefore not counted as Truckee Canal diversions.

Recordings taken at the Truckee River Farad gaging station, located just 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 5, it may be seen that during the water years of 1973–1994, approximately 65 percent of the average annual of Truckee River waters entering the State of Nevada and recorded at the USGS Farad gaging station (548,200 acre-feet)





near the California–Nevada state line during this 1973–1994 period of record were available in the river below Derby Dam (354,660 acre-feet). Not shown in this table, over this same period of time, the Nixon gaging station above Pyramid Lake recorded average annual inflows of 388,880 acre-feet, indicating that of the average Truckee River flows entering Nevada, nearly 71 percent actually made it to Pyramid Lake. Also, of the total average annual volume of Truckee River water entering the state, 31.4 percent was diverted into the Truckee Canal (an average of 172,380 acre-feet per year) during this 1973–1994 period of record.[47]

The effects of this interbasin transfer on the Truckee River's terminus, Pyramid Lake, have been profound. For example, the maximum surface elevation for Pyramid Lake was recorded in September 1891 at 3,878.2 feet MSL, while the minimum elevation was recorded during February and March of 1967 at 3,783.9 feet MSL, representing a maximum decline in Pyramid Lake's surface elevation in recent times of 94.3 feet.[48] Along with this decline in Pyramid Lake's surface elevation has come an even more significant decline in the lake's total volume, resulting in increased total dissolved solids (i.e., TDS, or salinity) concentrations, which now stand at approximately 5,100 milligrams per liter (mg/l).[49] This degradation of the water quality of Pyramid Lake, along with warmer water temperatures in the lower Truckee River due to both reduced river flows below Derby Dam and discharges from the Truckee Meadows Water Reclamation Facility, have combined to degrade the water quality in the lower basin and

jeopardize the lake's continued existence as a viable fishery. The restricted Truckee River flows into Pyramid Lake since diversions for the Newlands Project began in 1905 have been a contributing factor in the extinction of the Pyramid Lake cutthroat trout in the early 1940's.

When John C. Frémont first visited Pyramid Lake and the lower reaches of the Truckee River in January 1844, the Pyramid Lake cutthroat trout, a sub-species of the Lahontan cutthroat trout, was reported as being abundant in these waters, growing to a length of up to four feet and weighing some 40–60 pounds. In his diary of his travels, Frémont commented that "Their [Pyramid Lake cutthroat trout's] 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."[50]

These magnificent fish relied on the Truckee River for their spawning runs in late winter and early spring, traveling up the river's entire length as far as Donner Lake and Lake Tahoe. Here they used the cool, pristine waters of these upper basin lakes, and their clean gravel beds, to lay their eggs. Within 100 years of Frémont's arrival, however, due to a combination of over-fishing, river impediments to upstream spawning in the form of dams for irrigation, logging, and hydroelectric power generation, logging debris and sawdust choking the gravel beds, reduced inflows into Pyramid Lake due to diversions at Derby Dam, and extensive pollution from discharges from lumber and paper mills, and ore processing operations, this once-abundant fish species would become extinct by the early 1940's.

While some factors contributing to the extinction of the Pyramid Lake cutthroat trout have been greatly mitigated, e.g., pollution, over-fishing, and some of the river impediments, the lake itself continues to suffer from restricted Truckee River inflows due to water diversions at Derby Dam as well as other upstream water uses. Continued water diversions at Derby Dam at historical levels, as well as increasing upstream municipal and industrial consumptive uses, may well result in a persistent water deficit for Pyramid Lake.[51] Continued restricted inflows will adversely affect the endangered cui-ui fish species and the threatened Lahontan cutthroat trout, a trout form which was introduced into Pyramid Lake in the 1950's to replace the extinct Pyramid Lake sub-species. Even today, there is still no natural reproduction of Lahontan cutthroat trout in Pyramid Lake or the lower Truckee River; it continues to be artificially maintained entirely by hatchery stock.[52]

The Truckee River and the Newlands Irrigation Project

Arguably the single greatest controversy within the Truckee River Basin centers on the interbasin transfer of water from this basin into the Carson River Basin and the effects that these diversions have had on Pyramid Lake. Truckee River diversions have taken place since 1905 at Derby Dam, which is located on the lower Truckee River 11 river miles upstream from Wadsworth. The dam has been operated by the Truckee–Carson Irrigation District (TCID) since 1926 and diverts Truckee River waters into the 32.5–mile Truckee Canal for conveyance to the Carson River Basin. Derby Dam, originally constructed in 1905 by the U.S. Reclamation Service, is one of a number of impoundment, diversion, conveyance, and distribution facilities which comprise the Newlands Irrigation Project. Major components of this reclamation project include stored waters in Lake Tahoe, Donner Lake, Prosser Creek Reservoir, and Boca Reservoir, the Lake Tahoe Dam, Derby Dam, the Truckee Canal, the Truckee Division of the Newlands Project

(consisting of approximately 5,300 water-righted acres), Lahontan Dam and Reservoir on the lower Carson River, the Carson Diversion Dam located approximately six miles below Lahontan Dam, the principal "T" (T-Line) and "V" (V-Line) canals below the Carson Diversion Dam, and an extensive labyrinth of lesser canals, laterals, and ditches for distribution of project waters to the Carson Division of the Newlands Project in Lahontan Valley (consisting of approximately 60,000 water-righted acres).

Under the 1944 Orr Ditch Decree, TCID was granted the right, with a 1902 priority date (Claim 3), to divert up to 1,500 cubic feet per second (cfs) at Derby Dam, although physical canal constraints limit diversions to a nominal capacity of approximately 900 cfs. According to diversion records, from 1910 through 1966, Truckee River diversions at Derby Dam averaged approximately 240,000 acre-feet per year.[53] In 1967, the USBR eliminated the diversion of Truckee River waters solely for power generation (i.e., Lahontan Dam and a generating station on the "V" canal).[54] This action dramatically reduced Truckee River diversions at Derby Dam. As a result, over the 1967–1994 period of record, an average of 183,160 acre-feet per year of Truckee River water have been sent down the Truckee Canal towards Lahontan Reservoir in the Carson River Basin. Of this total, an average of 136,830 acre-feet per year actually reach Lahontan Reservoir each year; the remaining 46,330 acre-feet per year are either diverted to the Newlands Project's Truckee Division near Fernley, or are lost to evaporation, seepage, or phreatophytes along the canal's course.[55] These diversions, which have taken place since 1905, flow into Lahontan Reservoir to be used on Newlands Project farmlands located in the Carson Division of that reclamation project around the City of Fallon in Churchill County, Nevada.[56]

Like the Lake Tahoe Dam at the Truckee River headwaters at Tahoe City, Derby Dam is operated by the TCID under agreement with the USBR and in accordance with the Orr Ditch Decree (and incorporated Truckee River Agreement) and Newlands Project Operating Criteria and Procedures (OCAP). These operating criteria allow diversions up to 1,500 cfs from: (1) the remainder of Floriston rates and return flows from upstream diversions; (2) the right to Truckee River tributary water; and (3) any water bypassed or released to obtain space to store flood waters in reservoirs if the water right holder did not identify a use for the release.[57] Under Newlands 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.[58] Project OCAPs, based on the 1973 Gesell Opinion (U.S. District Court, Washington, D.C.), attempt to minimize the use of Truckee River waters as much as possible. The current OCAP (beginning in 1988) bases project water entitlements on actual water-righted acreage intended to be irrigated and the appropriate water duty assigned to project bottom lands (3.5 acre-feet per acre per year) and project bench lands (4.5 acre-feet per acre per year), in accordance with the 1980 Alpine Decree.[59]

Principal Storage Facilities of the Truckee River Basin

Major storage facilities of the Truckee River Basin (excluding the basin's terminus, Pyramid Lake), along with their characteristics, capacities, and operating requirements, are detailed below. River flows and water releases from these lakes and reservoirs are controlled by the Federal Watermaster in Reno, Nevada, in accordance with specific operating criteria, specifically, the 1944 Orr Ditch Decree and its incorporated 1935 Truckee River Agreement and the Floriston

rates.[60]

[1] ***Lake Tahoe***—The first dam at Lake Tahoe's exit into the Truckee River was constructed in the early 1870's, while the existing Lake Tahoe Dam, located at Tahoe City in Placer County, California, was constructed in 1913. The Lake Tahoe drainage area covers approximately 506 square miles. Water is stored only in the top 6.1 feet of Lake Tahoe, from a surface elevation of 6,223.0 feet above mean sea level (MSL), assumed to be the lake's natural rim, to an elevation of 6,229.1 feet MSL. Total storage capacity within this upper 6.1 feet equals approximately 744,600 acre-feet and is used to supplement Floriston rates in conjunction with natural runoff of other tributaries and Boca Dam releases. The Lake Tahoe Dam is owned by the USBR and operated under agreement by the TCID for the Newlands Project in Churchill County, Nevada. Lake Tahoe's storage capacity is not considered part of the U.S. Army Corps of Engineers (COE) flood control system. Lake Tahoe waters may be exchanged for water from Prosser Creek Reservoir (the Tahoe-Prosser Exchange Agreement)[61] in order to maintain a live stream below the Lake Tahoe Dam without adversely affecting Nevada water users' storage. Whenever possible, Lake Tahoe releases must be sufficient to maintain a minimum instream flow of 50–70 cfs downstream from the dam (varies with season).

[2] ***Donner Lake***—The first dam on Donner Lake was built in 1877, while the current dam was constructed in the 1930's. Donner Lake drains an area of only approximately 14 square miles. Water in Donner Lake is privately owned by Sierra Pacific Power Company (SPPCo) of Reno, Nevada, and TCID, and is not required to be used to meet Floriston rates. The dam is jointly owned and operated by SPPCo and TCID. Lake storage levels range from between 5,924.0 feet MSL and 5,935.8 feet MSL, and provides for 9,500 acre-feet of storage capacity. The SPPCo portion of the stored water is used to supplement Reno-Sparks municipal and industrial water use in the Truckee Meadows; the TCID portion is used to supplement Newlands Project irrigation water requirements. After Donner Lake fills, lake inflows are passed through to supplement Floriston rates. Lake storage is not part of COE flood control system. The State of California requires a minimum flow of 2–3 cfs downstream from the dam for maintaining fish habitat.

[3] ***Martis Creek Reservoir***—The Martis Creek Reservoir was constructed by the COE in 1971 and was intended to store waters from a 40 square mile drainage area to include not only Martis Creek, but the East, West, and Central Martis Creeks as well. In accordance with COE requirements, this reservoir, with a total storage capacity of 20,400 acre-feet, serves only flood control purposes. While legislation allows for other uses, only temporary storage is currently permitted due to an unsafe, leaking dam. Except during flood storage, reservoir outflows are set to equal inflows.

[4] ***Prosser Creek Reservoir***—The Prosser Creek Reservoir was constructed by the USBR in 1962 to store waters from a 50 square mile drainage area beginning 11 miles to the west at Warren Lake. The reservoir, with a total capacity of 29,800 acre-feet, is owned and operated by the USBR for three purposes: (a) as part of the COE Truckee River flood control program; (b) the storage of water under the terms of the

Tahoe–Prosser Exchange Agreement (which provides that a portion of this water, when available, may be used to meet Floriston rates in lieu of making such releases from Lake Tahoe); and (c) to meet the spawning flow needs of Pyramid Lake's endangered cui-ui fish species and its threatened Lahontan cutthroat trout, or for other federal purposes. The State of California generally requires a minimum of natural flow or 5 cfs, whichever is less, downstream from the dam for maintaining fish habitat.

[5] ***Independence Lake***—The original Independence Lake Dam was constructed in 1879 and created a storage capacity of 3,000 acre-feet. After SPPCo acquired ownership of the lake and dam in 1937, the dam was enlarged in 1939 to its present size with a total storage capacity of 17,500 acre-feet. Independence Lake drains an area of only eight square miles. Like Donner Lake water, the waters of Independence Lake are privately owned and are not required to be used to meet Floriston rates; the stored waters are owned by SPPCo and supplement the SPPCo water supply for the Reno–Sparks municipal and industrial water use during droughts. The lake's first storage priority is for 3,000 acre-feet of (original) storage; an additional 14,500 acre-feet of storage is permitted after Boca Reservoir is full and the Floriston rates and Truckee River diversion rights (Orr Ditch Decree rights) are satisfied. The State of California requires a minimum flow of 2 cfs downstream from the dam for maintaining fish habitat.

[6] ***Stampede Reservoir***—Stampede Dam and Reservoir, constructed by the USBR in 1970, 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 COE flood control plan. Water may be stored in Stampede Reservoir only after: (1) Floriston rates and Truckee River diversion rights have been satisfied; (2) Boca Reservoir (below Stampede Reservoir) is full; and (3) Independence Lake (above Stampede Reservoir) is full. Due to its relatively junior water rights, this reservoir seldom fills and 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 (TROA). 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).

[7] ***Boca Reservoir***—The original Boca Reservoir was built around 1868 for ice harvesting. The present, much larger dam, was constructed just upstream in 1937 and created a reservoir with a total capacity of 40,800 acre-feet and a drainage area, including the entire Little Truckee River Basin (including both Independence Lake and Stampede Reservoir) of some 172 square miles. Title to stored water is held by the USBR and the dam is operated by the Washoe County Water Conservation District (WCWCD). The reservoir's water is used in conjunction with Lake Tahoe water to maintain Floriston rates and to provide part of the required COE flood control capacity. Up to 25,000 acre-feet of water may be stored in Boca Reservoir only after Floriston rates are satisfied and Independence Lake's first storage priority of 3,000 acre-feet has been satisfied. The balance may not be filled unless the Newlands Project diversion right

at Derby Dam (on the lower Truckee River) has been satisfied. SPPCo stores a small portion (800 acre-feet) of its privately owned stored water (POSW) rights here. There are no minimum downstream flow requirement associated with Boca Reservoir.

[8] ***Derby Dam/Truckee Canal/Lahontan Reservoir***—Although Lahontan Reservoir is not a storage facility of the Truckee River Basin, it does store Truckee River waters diverted at Derby Dam on the lower Truckee River. Derby Dam, which is located approximately 11 miles upstream from Wadsworth, Nevada, is the regulating device by which Truckee River waters are diverted into the Truckee Canal for use within the Truckee Division of the Newlands Project and for storage in Lahontan Reservoir in the Carson River Basin for use within the Carson Division of the Newlands Project. The dam, originally named the Truckee River Diversion Dam, was completed by the USRS in June 1905, whereas the Truckee Canal was not completed through to the Carson River until August 1906. Lahontan Reservoir was not completed until 1915, at which time the Truckee Canal's outlet was re-routed slightly upstream so as to enter Lahontan Reservoir instead of flowing directly into the Carson River. Diversions and releases are conducted in accordance with the Truckee River Agreement, the Orr Ditch Decree, and Newlands Project Operating Criteria and Procedures (OCAP), which allow for a maximum diversion of up to 1,500 cfs (Orr Ditch Decree right, although current canal nominal capacity is only 900 cfs) from: (a) remainder of Floriston rates and return flows from upstream diversions; (b) right to Truckee River tributary water; and (c) any water bypassed or released to obtain space to store flood waters in reservoirs if water right holder did not identify a use for the release. Under the more recent project OCAP determination method begun in 1988, the quantity of water which may be diverted from the Truckee River at Derby Dam varies with the irrigation entitlement each year (water-righted acreage actually to be irrigated and the appropriate water duty for bench and bottom lands) and the predicted runoff from the Carson River and water in storage in Lahontan Reservoir.

Current Diversions from the Truckee River and Lake Tahoe Basins

There currently exist seven (7) recognized water diversions from the Truckee River Basin and/or the Lake Tahoe Basin (as part of the Truckee River Basin) as listed below:

[1] ***Lake Tahoe Basin***—The are a number of diversions of Lake Tahoe's waters out of the Lake Tahoe Basin for domestic uses; however, only three result in waters actually leaving the Truckee River Basin entirely. First, Harvey Place Reservoir, located in Alpine County, California, in the Carson River Basin, receives advanced secondary treated effluent from the South Tahoe Public Utility District (STPUD) in the Lake Tahoe Basin (Truckee River Basin).[62] Effluent exports, amounting to approximately 5,000 acre-feet per year (4.5 million gallons per day),[63] are routed from the southern end of Lake Tahoe through a pipeline over Luther Pass from El Dorado County, California, into Alpine County, California, and the Carson River Basin. These effluent exports began in 1968 when Indian Creek Reservoir was constructed by the South Tahoe Public Utility District. 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). Second, Carson Valley, located in the Carson River Basin in Douglas County, Nevada, receives the treated effluent from the Incline Village General Improvement District (IVGID) and the Douglas County Sewer Improvement District (DCSID). Together these utilities cover the wastewater treatment of the Nevada portion of the Lake Tahoe Basin (Truckee River Basin), located in Washoe County, Carson City, and Douglas County. 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 the 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 per year (2.3 million gallons per day) of treated effluent over the Kingsbury Grade (Haines Canyon) and then to a storage reservoir on the east side of the Carson Valley in the Pine Nut Range, where it receives winter storage. During the irrigation season, these stored waters are then pumped back across the Carson Valley and used for supplemental irrigation purposes. According to the California-Nevada Interstate Compact, Nevada's gross diversions of the waters of Lake Tahoe are set at a maximum of 11,000 acre-feet per year, while California's diversions of Lake Tahoe's waters cannot exceed 23,000 acre-feet per year.

[2] ***Echo Lake***—Pacific Gas and Electric Company (PG&E) diverts waters from the Lake Tahoe Basin at Echo Lake to the upper South Fork of the American River. This diversion out of the Lake Tahoe Basin totals approximately 1,500 acre-feet per year and is used for hydroelectric power generation at their El Dorado Power Plant.

[3] ***Third Creek***—Water diversions from Third Creek constitute an intrabasin diversion from a tributary of Lake Tahoe into Washoe Valley of 5.5 cubic feet per second. The Third Creek diversion actually takes water from the Lake Tahoe Basin only, as the water remains within the Truckee River Basin. Third Creek is located on the west (Lake Tahoe) side of the Mount Rose highway summit. A portion of its waters are diverted down the east side of the Carson Range by means of Ophir Creek and then into Washoe Lake, then to Steamboat Creek and eventually to the Truckee River below Reno near the Truckee Meadows Water Reclamation Facility.

[4] ***Marlette Lake***—Water in this lake, which is owned by the State of Nevada, is diverted from the Lake Tahoe Basin, pumped over the Carson Range to Hobart Creek Reservoir, enters Franktown Creek below the reservoir, and is sometimes sold for delivery to the Hobart Storage System for use by Virginia City (after being piped across Washoe Valley to Five-Mile Reservoir) and Carson City, both of which lie within the Carson River Basin. These water users have generally replaced such demands from other sources within the Carson River Basin. Diversions total approximately 3,000 acre-feet per year.

[5] ***Franktown Creek/Hobart Creek Reservoir***—A tributary of Washoe Lake, which eventually flows into the Truckee River through Steamboat Creek, Franktown Creek is the outlet stream for Hobart Creek Reservoir which is fed from Hobart Creek.

[Hobart Creek Reservoir waters are also supplemented by Marlette Lake water. See Marlette Lake diversions, above.] Waters from Franktown Creek are piped into the Hobart Storage System for use by Virginia City (Five-Mile Reservoir) and Carson City, both of which are in the Carson River Basin.

[6] *Sierra Valley*—Water is diverted by canal from the Little Truckee River, a primary tributary of the Truckee River, into Webber Creek for the Sierra Valley Water Company for supplemental irrigation use in the Sierra Valley. These waters eventually flow into the Feather River Basin in California. The maximum diversion rate is 60 cubic feet per second during the growing season (March 15th through September 30th) with a priority date of 1870. As a supplemental supply of irrigation water, these interbasin water diversions vary from 1,500 acre-feet per year to 10,000 acre-feet per year and have typically averaged approximately 5,700 acre-feet per year.

[7] ***Lower Truckee River Diversion (Derby Dam)***—Waters are taken out of the lower Truckee River at Derby Dam and transported to Lahontan Reservoir in the Carson River Basin via the Truckee Canal. TCID, representing the Newlands Project farmers, originally contracted with the USBR in 1926 for a firm supply, when available, of 406,000 acre-feet per year to be delivered to the Lahontan Reservoir outlet works and to canal headings using waters from both the Carson and Truckee rivers. More recent Operating Criteria and Procedures call for the maximum use of Carson River waters whenever possible. Diversions at Derby Dam on the lower Truckee River have averaged approximately 183,160 acre-feet per year over the 1967–1994 period of record and 172,380 acre-feet per year over the more recent 1973–1994 period of record.[64] Diversion records show that over the period of 1910–1966, when Truckee River waters were also used for power generation at Lahontan Dam and on the "V" canal below the Carson Diversion Dam, these diversions averaged a considerably greater 240,000 acre-feet per year.[65]

Based on these individual diversion amounts, the maximum potential water diversion out of the Truckee River Basin in any one year could total approximately 192,000 acre-feet, of which nearly 90 percent of the total diversions out of the Lake Tahoe and Truckee River basins would constitute diversions at Derby Dam alone. The total of these diversions also represent nearly 32 percent of the average annual flow of 548,200 acre-feet (1973–1994 period of record) of Truckee River water crossing the California–Nevada border and recorded at the Farad gaging station.

Derby Dam, the Truckee Canal, and Lahontan Reservoir

Derby Dam, located on the lower Truckee River approximately 11 miles upstream from Wadsworth, 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 USRS (renamed the USBR in 1923) in June 1905. The Truckee Canal was completed through to the lower Carson River in 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 truncated, 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 294,000 acre-feet of storage capacity (approximately 317,000 acre-feet with flash boards 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 cfs (Claim 3 of the Orr Ditch Decree with a 1902 priority date, although the canal's nominal capacity is only 900 cfs)[66] from the Truckee River at Derby Dam and water duties[67] of 3.5 acre-feet per acre per year (bottom lands) and 4.5 acre-feet per acre per year (bench lands) for project irrigated acreage, currently totaling approximately 64,000 water-righted acres and 58,000 acres actually being irrigated.

In 1968 the Pyramid Lake Paiute Indian Tribe filed a lawsuit against the 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 Irrigation 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 (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.[68] 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, final 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.[69] 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. Controversy continues to surround these diversions, however, which have been deemed excessive by the Pyramid Lake Indian Tribe.

On behalf of the Pyramid Lake Indian Tribe, the USDI now claims that between 1973 and 1987 (15 years) TCID over-diverted approximately 1,057,000 acre-feet of Truckee River water and is calling for this recoupment to be repaid to Pyramid Lake.[70] 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 date is unreasonable.[71] 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.

Of particular concern to the Newlands Project and Lahontan Valley farmers with respect to this 1990 Truckee-Carson-Pyramid Lake Water Rights Settlement Act is Section 209(h)(1), 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 halt the continued purchase of water rights in the project for transfer to the Lahontan Valley wetlands until a new Environmental Impact Statement has been completed.[72]

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 1987.[73] This controversy over Truckee River diversions may have become further 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),[74] and the recent (May 1994) resurrection of TCID's original September 1930 request for 100,000 acre-feet of unappropriated (flood) flows of the Truckee River.[75]

At issue in TCID's 1930 filing are the Truckee River's excess (unallocated, i.e., flood) flows, waters which the Pyramid Lake Paiute Indian Tribe would prefer to see flow into Pyramid Lake. Hearings before the Nevada State Engineer on this request were not held until May 1994, at which time the USDI categorically stated their objection to TCID's request and their refusal to permit any federal facilities to be used for 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 this application would interfere with existing rights, or whether the application would threaten to prove detrimental to the public interest.[76] 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 remanded the case back to the State Engineer for a re-hearing so additional evidence and testimony could be presented. These hearings were held in early 1996 and the State Engineer has yet to issue a ruling on the matter.

The Churchill County request is particularly singular as it represents the first such interbasin demand for Truckee River waters for a use other than for agriculture in the Lahontan Valley. Of importance in this respect is that 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.[77] 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."[78]

Truckee River Operating Requirements and Procedures

Truckee River flows are regulated by a number of agreements, decrees, and river operating requirements extending as far back as the turn of the century. These are monitored and enforced by a Federal Water Master in Reno, Nevada. The four most critical to present-day river operations include: (1) the 1908 Floriston rates; (2) the 1915 Truckee River General Electric Decree; (3) the 1935 Truckee River Agreement; and (4) the 1944 Orr Ditch Decree. Over time, each subsequent agreement or operating criteria has incorporated those established river operating requirements in effect before it. Specifically, the Floriston rates were incorporated into the Truckee River General Electric Decree, which was subsequently incorporated into the Truckee River Agreement which, in turn, became the river operating component of the Orr Ditch Decree. Details of these rate agreements, decrees, and operating criteria are presented below:

Floriston Rates—Currently represents the primary operational criteria of the Truckee River between its source (Lake Tahoe) and its terminus (Pyramid Lake). These river flow rates date back to a 1908 agreement among the Truckee River General Electric Company (predecessor to the present-day Sierra Pacific Power Company—SPPCo), the Floriston Land and Power Company, and the Floriston Pulp and Paper Company (FP&PC). This agreement required that "*...there shall be maintained a flow of water in the said Truckee River at Floriston [California] of not less than 500 cubic feet per second from the First day of March to the 30th day of September inclusive, in each year, and of not less than 400 cubic feet per second from the 1st day of October to the last day of February, inclusive, in each year.*" The Floriston rates were subsequently incorporated into the 1915 Truckee River General Electric Decree, by which the U.S. Reclamation Service (predecessor to the USBR) gained an easement to operate the Lake Tahoe outlet dam in return for guaranteeing these year-round flow rates for run-of-the-river users—hydropower and a pulp and paper mill.

Truckee River General Electric Decree—Represented the resolution, through a 1915 federal court consent decree, of a lengthy series of conflicts, litigation, and negotiations between the U.S. Reclamation Service (USRS) and the Truckee River General Electric Company. In 1902, the Truckee River General Electric Company, through a complicated series of real estate transactions, had obtained title to the Lake Tahoe Dam, surrounding lands, and the hydropower plants on the Truckee River. The USRS was in desperate need of Lake Tahoe water for its Truckee-Carson (Newlands) Irrigation Project, then nearing completion near Fallon in Churchill County, Nevada. This decree granted the USRS an easement, for a purchase price of $139,500, to the Lake Tahoe Dam and surrounding property owned by the power company. On its part, the USRS was required to provide certain year-round flow rates (the 1908 Floriston rates), measured at a stream gage near the state line, to support hydropower generation. While the Truckee River General Electric Decree dictated how the Lake Tahoe Dam would be operated, it did little to solve the concerns of residents of the lake and lessen California's concerns over the apportionment of Lake Tahoe's waters.[79]

Truckee River Agreement—The Truckee River Agreement, finalized in 1935, represents the current basis for the operation of the Truckee River, including its tributaries and diversions, between its source (Lake Tahoe) and its terminus (Pyramid Lake). Parties to this

agreement included TCID, serving the irrigation rights of agricultural water users of the Newlands Project in Churchill County, Nevada, Sierra Pacific Power Company, serving primarily the municipal and industrial water needs of the cities of Reno and Sparks, Nevada, and the Washoe County Water Conservation District (WCWCD), serving the agricultural water users in the Truckee Meadows. Operation of upstream reservoirs is under the supervision of a Federal Water Master in Reno, Nevada, who administers court-imposed requirements under the (1944) Orr Ditch Decree to supply water to achieve Floriston rates (mandated river flow rates) at the California–Nevada border (currently measured at the Farad gaging station). The Truckee River Agreement provides for the operation of storage facilities, especially Lake Tahoe, to satisfy these rights and required the building of Boca Dam and Reservoir. The Floriston rates essentially constitute a minimum instream flow in the river, as long as water is physically available in Lake Tahoe and Boca Reservoir to support the rates. Water may only be stored in Lake Tahoe and Boca Reservoir when rates are being met. As contained in the Truckee River Agreement the rates are defined as:

[1] ***Floriston Rates*** means the rate of flow in the Truckee River at the head of the diversion penstock at Floriston, California, measured at the Iceland gage [currently the Farad gage] consisting of an average flow of 500 cubic feet of water per second each day during the period commencing March 1 and ending September 30 of any year, and an average flow of 400 cubic feet per second each day during the period commencing October 1 and ending the last day of the next following February of any year.

[2] ***Reduced Floriston Rates*** means rates of flow in the Truckee River, measured at the Iceland gage [currently the Farad gage], effective and in force during the period commencing November 1 and ending the next following March 31 of each year, determined as follows:

(a) 350 cubic feet per second whenever the elevation of the water surface of Lake Tahoe is below 6,226.0 feet above sea level and not below 6,225.25 feet above sea level;[80] and

(b) 300 cubic feet per second whenever the water surface elevation of Lake Tahoe is below 6,225.25 feet above sea level.[81]

In addition to crucial operating criteria for Truckee River operations, the 1935 Truckee River Agreement further contained language intended to settle the long-standing disputes over pumping Lake Tahoe when if fell below its natural rim of 6,223.0 feet MSL 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.[82]

Orr Ditch Decree—The 1944 Orr Ditch Decree, which incorporates the Truckee River Agreement, affirmed numerous individual water rights (both municipal and industrial and agricultural), including Truckee River diversion rights earlier than 1939. This decree represented a tabulation or adjudication of water rights for the Truckee River *within* Nevada and its tributaries regulated through a series of reservoirs and irrigation canals, administered by the U.S. District Court Federal Water Master in Reno, Nevada. The Orr Ditch Decree represented the culmination of a "friendly suit" (*U.S. v. Orr Ditch Water Company, et al.*) filed in 1913 by the USRS to quantify water rights on the Truckee River in Nevada in order to secure Truckee River water rights for its Truckee-Carson (Newlands) Irrigation Project. In combination with the Truckee River Agreement and the Floriston rates, the Orr Ditch Decree currently represents the basis for operation of the Truckee River between its source (Lake Tahoe) and its terminus (Pyramid Lake). The Orr Ditch Decree incorporates the provisions of the Truckee River Agreement, which provides for operation of storage facilities, especially Lake Tahoe, to satisfy Truckee River water rights. The Floriston rates constitute the chief operational objective on the Truckee River today and originated as a turn-of-the-century flow requirement for original run-of-the-river users—hydropower and a pulp and paper mill. While the Orr Ditch Decree establishes water rights for entities within Nevada using the Truckee River's waters, the Truckee River Agreement, as part of that Decree, determines the operational mechanisms to satisfy those rights.[83]

Changes to Pyramid Lake Over the 1987-1994 Drought Period

Table 6, Pyramid Lake Changes Over the 1987-1994 Drought Period, shows the annual and cumulative changes in Pyramid Lake's surface elevation and its total volume over the 1987-1994 drought period. In total, the Pyramid Lake declined by 21.5 feet from a maximum lake depth of 356.6 feet in 1986 to a maximum lake depth 335.1 feet in 1994,[84] and also declined by 2,430,000 acre-feet in total volume from a lake volume of 23,500,000 acre-feet in 1986.

Table 6—Pyramid Lake Changes Over the 1987–1994 Drought Period

Changes in Lake Surface Elevation and Lake Volume From 1986—Annual and Cumulative

Water Year†	Elevation (feet-MSL)‡	Change* (feet)	Cumulative (feet)	Volume (acre-feet)	Change* (acre-feet)	Cumulative (acre-feet)
1986	3,815.6	+5.0	—	23,500,000	+580,000	—
1987	3,813.8	-1.8	-1.8	23,290,000	-210,000	-210,000
1988	3,810.4	-3.4	-5.2	22,890,000	-400,000	-610,000
1989	3,807.4	-3.0	-8.2	22,550,000	-340,000	-950,000
1990	3,804.0	-3.4	-11.6	22,170,000	-380,000	-1,330,000
1991	3,801.2	-2.8	-14.4	21,850,000	-320,000	-1,650,000
1992	3,797.9	-3.3	-17.7	21,490,000	-360,000	-2,010,000
1993	3,796.3	-1.6	-19.3	21,310,000	-180,000	-2,190,000
1994	3,794.1	-2.2	-21.5	21,070,000	-240,000	-2,430,000

† Elevations and volume recorded as of September 30th of each year; water years run from October 1st through September 30th.
‡ Feet above mean sea level (MSL).
* Lake elevation and volume changes measured from prior year.
Source Data: *Water Resources Data, Nevada, Water Year [various years]*, U.S. Geological Survey Water-Data Report, Water Resources Division, U.S. Geological Survey, U.S. Department of the Interior, Carson City, Nevada.

Effects of the 1995 Water Year

A near-record year of precipitation in 1995—168 percent of normal snow water content in the Lake Tahoe Basin as of April 1, 1995, and 184 percent of normal snow water content in the Truckee River Basin (excluding the Lake Tahoe Basin)—did much to recharge the groundwater and fill lakes and reservoirs in the Truckee River Basin after eight years of drought conditions (1987–1994). **Table 7, 1995 Water Year Impacts on Truckee and Carson River Storage,** highlights the effects of this single very wet year on the principal upstream water storage locations in the Truckee River Basin, as well as the storage change to Lahontan Reservoir in the Carson River Basin. Many 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 recovery in only one year of nearly 17 percent of the volume lost (2,430,000 acre-feet) over the previous eight years (1987–1994) [see Table 6, above].

Table 7—1995 Water Year[1] Impacts on Truckee River Basin 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][5]	**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 Reservoir[6] [294,000 acre-feet][7]	**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 between 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 volume in acre-feet required (deficit) to bring Lake Tahoe's surface elevation up to its natural rim of 6,223.0 feet MSL.

[5] Measures only usable storage in top 11.8 feet from 5,924.0 feet MSL to 5,935.8 feet MSL.

[6] Lahontan Reservoir on the lower Carson River in the Carson River Basin is listed due to its importance in terms of the use of Truckee River waters. Carson River flows 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.

[7] 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, Water Resources Division, U.S. Department of the Interior, Carson City, Nevada.

Water Basin Snowpack Water Content Trends

Table 8, 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 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 this area 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 water basins. These figures emphasize the extreme variations in snowpack water content from year to year. This presentation also shows how these Northern Nevada watersheds are generally affected by the same winter storm systems, resulting in typically similar patterns of precipitation and snowpack water content measures. These year-to-year variations 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. The graphs present the snowpack water content trends for the Lake Tahoe Basin and the Truckee River Basin, specifically.

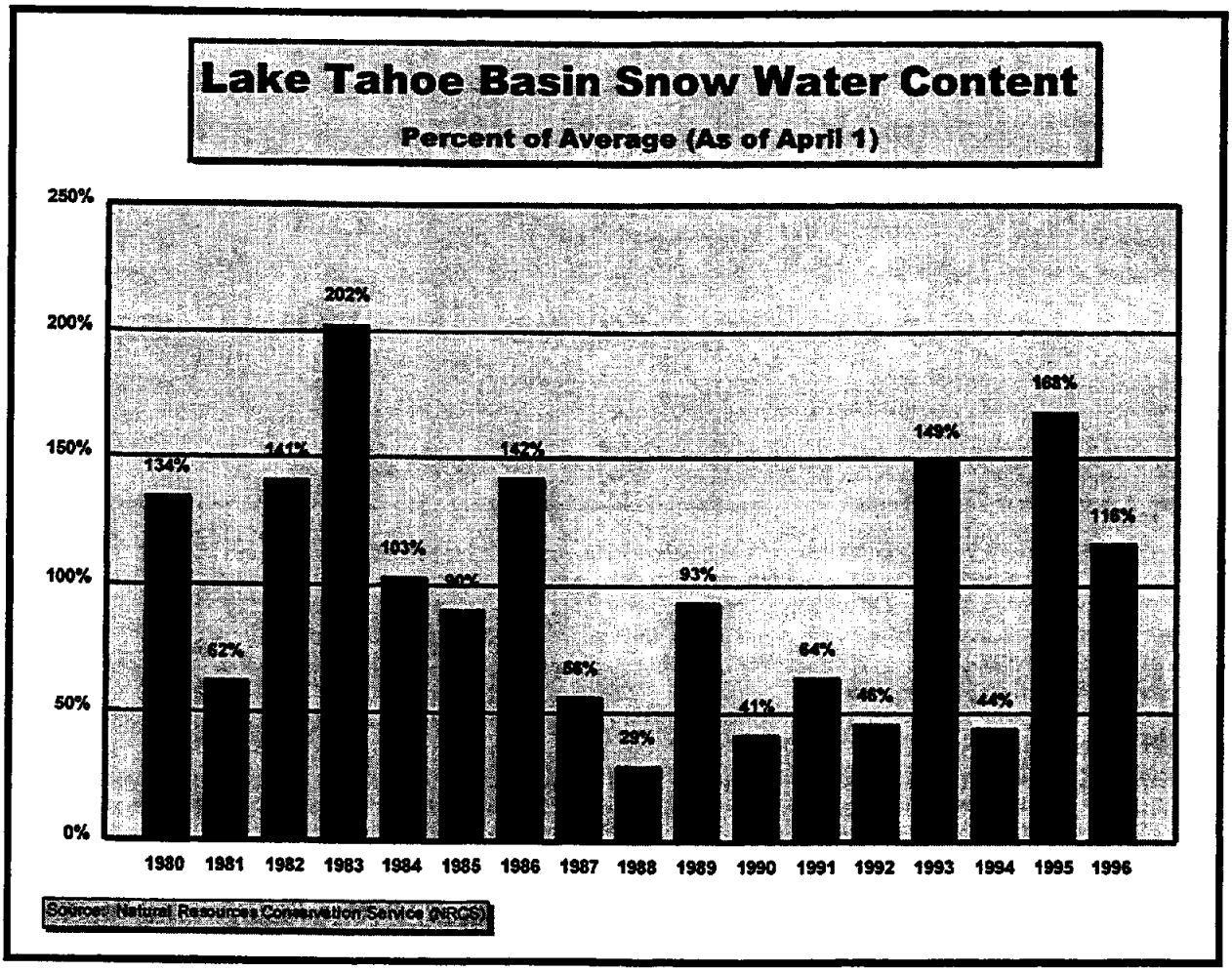


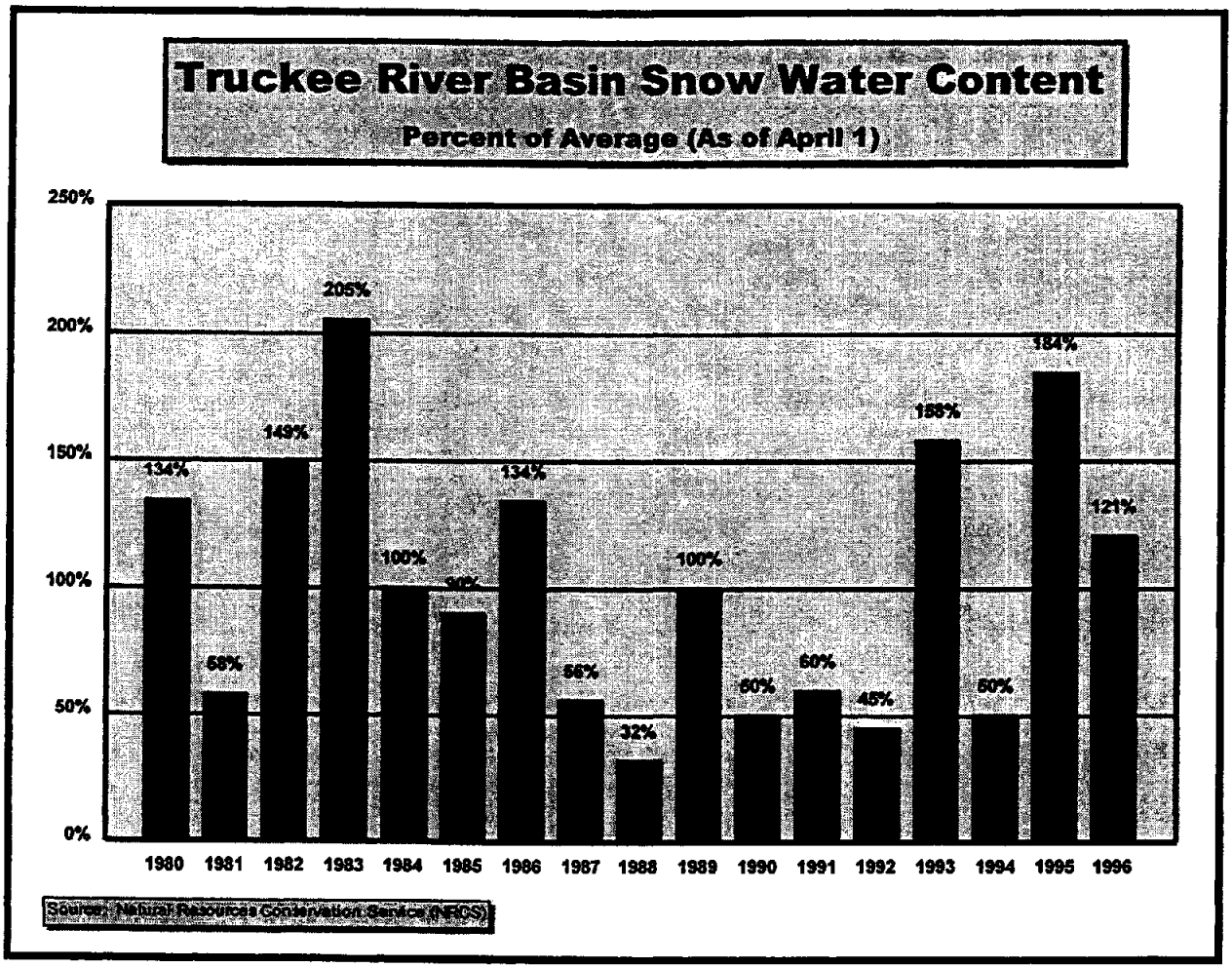
Table 8—Northern Nevada Water Basin Snowpack Water Content

Snowpack Water Equivalent as a Percent of Average for This Time of Year
As of April 1—Percent of Water Basin Average (Average = 100%)

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%
Period 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.

With respect to the figures in Table 8, despite the seemingly wide variability in the snow water content for the Lake Tahoe and Truckee River basins, the average for the entire period for these basins was very close to the entire period of record average of 100 percent. Specifically, for the Lake Tahoe Basin, the average for this 1980–1996 period was 99 percent, while the average for the Truckee River Basin (excluding the Lake Tahoe Basin) was 102 percent,[85] thereby indicating that while the values seem highly volatile, the pattern was, on the whole, "average."



A Water Budget for Pyramid Lake

Similar to the development of a water budget for Lake Tahoe, a water budget for Pyramid Lake may prove useful in assessing the hydrologic changes and conditions in this body of water which represents the terminus of the Truckee River Basin. For the purpose of assessing Pyramid Lake's inflows and outflows, we can develop an accounting of related flows by assessing the various annual inflows, outflows, and the resultant change in storage, i.e., change in lake volume. Writing this relationship to reflect a hydrologic balance, we have:

$$\textit{Inflows} = \textit{Outflows} \pm \textit{Change in Storage}$$

Modifying this expression for the hydrologic characteristics of Pyramid Lake, yields:

$$I_{SW} + I_{GW} + P = O_{SW} + E \pm \Delta S$$

where the elements of inflow are: I_{SW} = surface water inflows from the Truckee River; I_{GW} =

ground water inflows, which may be considered as negligible; and **P** = lake-surface precipitation. The elements of outflow are: O_{sw} = surface water outflow which is, of course, equal to zero for a terminus lake; **E** = lake-surface evaporation; and ΔS represents the change in Pyramid Lake's storage, i.e., change in lake volume associated with the water budget period. Disregarding ground water inflows and setting $O_{sw} = 0$, yields:

$$I_{SW} + P = E \pm \Delta S$$

Using figures developed by the Pyramid Lake Task Force, a group formed in July 1969 to study the problems associated with Pyramid Lake's recession (and using 40 years of record from 1929–1969), we have I_{sw} = 250,000 acre-feet per year; **P** = 55,000 acre-feet per year; and a lake evaporation rate of **E** = 440,000 acre-feet per year,[86] yielding a (balanced) water budget of:

$$250{,}000 + 55{,}000 = 440{,}000 - 135{,}000$$

Consequently, under this scenario of assumed no ground water inflows and no surface water outflows, this task force found that during this period of record Pyramid Lake sustained an average water budget deficit (-ΔS) of 135,000 acre-feet per year.

One major problem with this form of analysis has been that, unlike Lake Tahoe, Pyramid Lake's surface elevation has varied widely over recent history. While variations of Lake Tahoe have typically been within a more or less six-foot range from its natural rim (6,223.0 feet MSL) to its upper legal limit (6,229.1 feet MSL), surface elevation variations of Pyramid Lake have been considerably greater. For example, from 1909 to 1968, the lake level declined from an altitude of 3,869 feet MSL to 3,789 feet MSL, corresponding to a drop of 80 feet in 59 years.[87] These figures translate into a change of lake volume from 30,440,00 acre-feet in 1909 to 20,500,000 acre-feet in 1968, a decline of 9,940,000 acre-feet, or 32.6 percent. More importantly for the development of a Pyramid Lake water budget, over this same period of time Pyramid Lake's surface area declined by 34,000 acres (53 square miles), or 24 percent, from 142,100 acres (222 square miles) in 1909 to 108,000 acres (169 square miles) in 1968.

Such wide variations in lake surface area have particularly dramatic effects on lake surface precipitation and especially evaporation. For example, in 1909, using current measures for this area of lake surface evaporation (4.2 feet, or 48.24 inches per year) and precipitation (0.63 feet, or 7.53 inches per year), the lake's annual surface evaporation would have been 571,242 acre-feet in 1909 versus 434,160 acre-feet in 1968. Similarly, Pyramid Lake's annual lake-surface precipitation would have been 89,168 acre-feet in 1909 as compared to 67,770 acre-feet in 1968. Consequently, over this period of time, the lake's water budget deficit, based merely on the change in surface area and its effects on evaporation and precipitation, would have declined by 137,082 acre-feet (from reduced surface evaporation) and concurrently increased by 21,398 acre-feet (from reduced surface precipitation), resulting in a net water budget reduction for Pyramid Lake of 115,684 acre-feet (137,082 acre-feet minus 21,398 acre-feet).

Consequently, any determination of a water budget for Pyramid Lake would have to take into account the extreme variations in surface elevation, and particularly changes in lake surface area. As a terminus location for the Truckee River Basin, these variable hydrologic conditions were

true, although to a lesser degree, in the late 1800's when all flows in the Truckee River and into Pyramid Lake were essentially "natural." Records of King (1878)[88] and Russell (1885),[89] indicated that Pyramid Lake covered an estimated 140,000 acres (219 square miles), equating to a surface elevation of 3,862.5 feet MSL, and its surface elevation typically varied up to 20 feet during the year. This surface area indicates a rate of evaporation of 562,800 acre-feet per year, lake surface precipitation of 87,850 acre-feet per year, and, for an overall lake balance, i.e., $\Delta S = 0$, approximately 474,950 acre-feet of annual required Truckee River inflows.

Similarly, in order to attain and maintain a surface elevation in Pyramid Lake of 3,850 feet MSL (assuming the lake is currently at that level), we would need sufficient Truckee River inflows to cover the evaporation loss of approximately 540,000 acre-feet per year, less 84,000 acre-feet in lake surface precipitation, or, total Truckee River annual inflows equal to approximately 456,000 acre-feet per year. From **Table 4—Selected Truckee River Runoff and Rates of Flow**, it may seen that for the entire period of record for the Nixon USGS gage of 1958 to the present, inflows to Pyramid Lake have averaged 362,710 acre-feet per year, over 93,000 acre-feet less than those inflows required to maintain a surface elevation of 3,850 feet MSL. Even using the period since 1967, which corresponds to the year after which Truckee River diversions at Derby Dam were no longer allowed for power-only generation at Lahontan Dam, total inflows to Pyramid Lake have averaged 421,100 acre-feet per year. This rate of inflow would be sufficient to maintain Pyramid Lake at a level of nearly 3,831 feet MSL. On the other hand, based on the highly variable hydrology of this region, as a result of the flood of 1997 and continued precautionary discharges from upstream reservoirs, over the time period of December 4, 1996, to February 4, 1997, Pyramid Lake rose from a surface elevation of 3,800.00 feet MSL to 3,805.28 feet MSL.[90] This corresponds to a new lake volume of approximately 22,310,000 acre-feet, an increase of 590,000 acre-feet since December 4, 1996. The lake's surface area increased by some 1,784 acres (2.8 square miles) to 113,084 acres (176.7 square miles).

Pyramid Lake, Lake Fluctuations, and Climatic Changes

Pyramid Lake, as well as Walker Lake, which is located approximately 78 miles south and southeast of Pyramid Lake in the Walker River Basin, represent the last remaining major lake remnants of Ice Age Lake Lahontan. This ancient lake covered a highly irregular area throughout much of northwestern Nevada as recently as 12,500 years ago and experienced a number of fluctuations in its extent over the last 360,000 years. The importance of this lake's fluctuations lies in the corresponding climatic conditions that fostered its existence. Equally important, however, are the changes in those climatic conditions that led to its rapid ascensions and descensions and, during intervening periods, the complete desiccation (drying up) of some of its major basins, to include, it is believed, all but Pyramid Lake itself, which constituted the lowest point occupied by Lake Lahontan. Core samples taken of Pyramid Lake's lake bottom do not indicate a brine concentration, therefore suggesting that throughout Lake Lahontan's existence this lake remained in existence, although it was periodically severely restricted in size.[91]

Lake Lahontan was fed by the Truckee, Carson, Walker, Humboldt, Susan, and Quinn rivers. Lake Lahontan's extent consisted of seven major sub-basins in northwestern Nevada to include: (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 because only at water elevations above these threshold levels would the waters of Lake Lahontan, originating in the basin's lowest point—Pyramid Lake—spill over into these adjacent basins. These sills include (listed respectively according to sub-basin numbers above): (1) Pronto and Emerson Pass; (2) Darwin Pass; (3) Chocolate; (4) Adrian Pass (Valley); (5) none (Pyramid Lake was Lake Lahontan's lowest point in the basin); (6) Mud [Winnemucca] Lake Slough; and (7) Astor Pass.[92]

It was only at lake surface elevations above approximately 4,294 feet that all the basins of Lake Lahontan were joined into one continuous lake. This particular elevation represented the highest point within the Adrian Valley, a narrow pass, almost 10 miles in length, connecting the Carson River Basin to the north with the Walker River Basin to the south. Waters from an ascending Lake Lahontan flowed west up Dayton Valley in the lower Carson River basin and then south through the Adrian Valley and into the Walker River Basin. Once Lake Lahontan's waters emerged from the Adrian Valley, they raced down Campbell Valley to fill Walker Lake and the Walker Lake sub-basin and continued southward to beyond present-day town of Hawthorne in Mineral County, Nevada. Once the lower Walker River Basin was filed, waters then flowed up Mason Valley to the present-day location of the City of Yerington located in Lyon County, Nevada.

Extensive evidence based on sophisticated X-ray diffraction petrographic and radiocarbon analyses, as well as detailed analysis of Walker Lake's lakebed core samples, indicates that Lake Lahontan and its various hydrographic sub-basins have been subject to extensive fluctuations over the last 40,000 years, and that most of the sub-basins, with the possible exception of the basin's lowest point, Pyramid Lake, have desiccated on numerous occasions. This apparent repetitive cycle of ascension and descension, lake expansion and lake desiccation, and pluvial (wet) and inter-pluvial (dry) periods, has important implications on our own time period and the present hydrographic cycle, climatic conditions, and our expectations of natural versus man-caused changes within the various hydrologic basins in western Nevada.

As a general indication of climatic conditions within the Great Basin, evidence shows that between 15,000–13,500 years ago, Lake Lahontan went through a peaking enlargement (maximum stage), attaining a surface elevation of almost 4,380 feet MSL,[93] a surface area of approximately 8,600 square miles,[94] and all of its sub-basins were connected. Lake Lahontan's last highstand occurred some 12,500 years ago. Between 11,000 and 10,000 years ago, climatic conditions again changed dramatically and the region entered what may be an inter-pluvial period. Lake Lahontan's surface level fell to approximately 3,871 feet, an elevation equivalent to that which existed in Pyramid Lake during the early 1880's. Warm and arid conditions have since prevailed throughout the Great Basin from approximately 10,000 years ago to the present.[95]

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1. *Lower Truckee River, Nevada Reconnaissance Report*, U.S. Army Corps of Engineers, Sacramento District, July 1995, page 2-17. According to the U.S. Geological Survey, this total basin drainage area is 2,730 square miles (1,747,200 acres). This difference, 330 square miles (211,200 acres), cannot be explained by the USGS's exclusion of the Lake Tahoe Basin's 506 square miles (323,840 acres). [See *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.]

2. A "terminal lake" is defined as a lake without an outlet.

3. *Nevada Hydrographic Basin Statistical*, 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. Also see Houghton, Samuel G., *A Trace of Desert Waters: The Great Basin Story*, University of Nevada Press, Reno, Nevada, 1994, page 61.

4. *TRUCKEE RIVER ATLAS*, Department of Water Resources, The Resources Agency, State of California, June 1991, page 11.

5. Houghton, *op. cit.*, page 61.

6. Although this interstate compact was never ratified by Congress, its terms have been enforced through individual state legislation. California legislation is contained in Chapter 1480, California Statutes 1970; Nevada legislation is contained in Nevada Revised Statutes (NRS) 538.600. [See *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.]

7. Wilds, Leah, J., Danny A. Gonzales, and Glen S. Krutz, "Reclamation and the Politics of Change: Rights Settlement Act of 1990," *Nevada Historical Society Quarterly*, Volume 37, Number 3, Fall 1994, Reno, Nevada, pages 180-181.

8. *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, page 12.

9. 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 (areas are for Nevada portions only): (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, Gary A., *WATER WORDS DICTIONARY*, Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada.]

10. The word "terminus" refers to the location of a stream's final destination, as the terminus of a river system being a "terminal lake."

11. Due to the Lake Tahoe Dam located at Tahoe City, California, Lake Tahoe is allowed to vary its surface elevation up to a legal maximum of 6,229.1 feet MSL (Truckee River Agreement), with waters stored in the top 6.1 feet (between 6,223.0 feet MSL and 6,229.1 feet MSL) used to satisfy downstream water rights (i.e., Floriston rates and Orr Ditch Decree rights). Gage heights for Lake Tahoe are based on the U.S. Bureau of Reclamation (USBR) datum (reference level) of 6,220.00 feet above mean sea level (MSL). The corresponding National Geodetic Vertical Datum of 1929 is 6,218.86 feet MSL. The USBR datum is used for Lake Tahoe surface elevation measurements because that datum is used as the official reference point by all local, state, and federal agencies. [*Water Resources Data, Nevada, Water Year*, 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.]

12. Rush, F. Eugene, "Water Resources-Information Series Report 17: Bathymetric Reconnaissance of Lake Tahoe, Nevada and California," 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, 1973.

13. *TRUCKEE RIVER ATLAS*, *op. cit.*, page 8.

14. Other references to Lake Tahoe's dimensions use a lake surface elevation of 6,229.0 feet MSL, providing for a surface area of approximately 194 square miles (124,160 acres), a maximum depth of 1,646 feet, and a total volume of approximately 125 million acre-feet. [See Rush, *op. cit.*]

15. This figure is based on a Nevada total surface area of 110,561 square miles, or 70,758,757 acres.

16. Rush, *op. cit.* Another source presented a greater evaporation rate of 375,000 acre-feet per year. [See *TRUCKEE RIVER ATLAS*, *op. cit.*, pages 15-16.]

17. Houghton, *op. cit.*, page 52.

18. Hyne, N.J., et al., *Quaternary History of Lake Tahoe, California-Nevada: Geological Society America Bulletin*, Volume 83, 1972, page 1435.

19. Houghton, *op. cit.*, page 53. Also see Table 2 and the discussion of the development of a water budget for Lake Tahoe.

20. Rush, *op. cit.*

21. This analysis was developed using the presentation in Rush (*op. cit.*), which covered the hydrologic period of record from 1901 through 1971. Different or more recent figures which would affect this water budget include Truckee River outflows measured at Tahoe City, California, which have averaged 162,890 acre-feet per year over the 1909–1994 period of record (*Water Resources Data—Nevada, op. cit.*), a lake surface evaporation rate of 375,000 acre-feet per year as presented in the *TRUCKEE RIVER ATLAS* (*op. cit.* pages 15–16), and diversions out of the Lake Tahoe Basin totaling a maximum level of 34,000 acre-feet per year as permitted under the California–Nevada Interstate Compact of which 23,000 acre-feet annually is allocated to the State of California and 11,000 acre-feet annually is allocated to the State of Nevada (*California-Nevada Interstate Compact Between the State of California and Nevada*, *op. cit.*, page 12).

22. The precipitation and evaporation rates (inches per year) are based on Rush's (*op. cit.*) estimates of a total lake surface area of 194 square miles (124,160 acres), corresponding to a lake surface elevation of 6,229.0 feet MSL, and corresponding levels of precipitation (220,000 acre-feet per year) and evaporation (350,000 acre-feet per year).

23. Despite having won "numerous" awards for its innovative methods with respect to wastewater treatment, the Tahoe-Truckee sewage treatment plant (Tahoe-Truckee Sanitation Agency) recently (June 1996) concluded a $31,275 settlement with Nevada County, California. The settlement was the result of an investigation by the Nevada County District Attorney's Office pertaining to a spill of hydrochloric acid at the plant on April 4, 1995. The spill sent a toxic cloud of acid fumes into the air, causing several minor injuries and forcing the evacuation of about 200 people from nearby offices and homes. Both hydrochloric and sulfuric acids are used at the plant in the effluent-treatment process and for cleaning purposes. [See *Reno Gazette-Journal*, June 13, 1996, page 2D.]

24. In addition to the town of Truckee, the Truckee sewage disposal plant also receives effluent transported out of the Lake Tahoe Basin from 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 South Tahoe Public Utility District (STPUD) north to the California–Nevada state line at Crystal Bay, Nevada.

25. Houghton, *op. cit.*, page 62.

26. Joplin, Maureen (Geologist), and Hal Fiore (Hydrologist), *Gray Creek Watershed Monitoring Project*, United States Department of Agriculture, Forest Service, April 4, 1995, page 5, and *Reno Gazette-Journal*, July 22, 1995, page 1.

27. Townley, John M., *The Truckee Basin Fishery, 1844–1944*, Water Resources Center Publication 43008, Desert Research Institute, University of Nevada System, November 1980, page 51.

28. Of possible significance in the persistence of its operations was the fact that the FP&PC was owned by the Fleishhacker banking and investment firm of San Francisco, an entity which also controlled the Reno Water, Land and Light Company. Of particular interest is that Mr. Mortimer Fleishhacker served as President of the Truckee River General Electric Company in the early 1900's. [See Townley, *The Truckee Basin Fishery*, *op. cit.*, page 50, and *Pipe & Wire: A Historical Profile of Sierra Pacific Power Company*, Sierra Pacific Power Company, Reno, Nevada, 1977, page 16.]

29. Lake Winnemucca last went dry in 1938 due to insufficient Truckee River inflows. Today, due to the construction of a roadbed, there exists virtually no chance of Truckee River waters reaching this location. Even so, during particularly wet years, an extensive pool of relatively shallow water does typically form in spring and early summer at the northern end of this expanse, fed solely by precipitation and local surface and ground water inflows.

30. Judson, Dean H., Ph.D.,and Brad Ramiriz, M.S., *Nevada County Population Estimates by Race, Sex, and Hispanic Origin: 1995 Estimates, Projections and Review of Methods*, Office of the State Demographer, Bureau of Business and Economic Research, College of Business Administration, University of Nevada, Reno.

31. These are believed to have occurred at approximately 65,000, 45,000, 30,000, and as recently as 12,500 years ago. [See Houghton, *op. cit.*, page 63, and 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 2.]

32. This doctrine not only applies to Indian reservations, but to all forms of federal "reservations," including National Parks, National Forests, National Recreation Areas, National Monuments, National Wildlife Refuges, and the like.

33. For examples of the economic and cultural importance of the Pyramid Lake and lower Truckee River fisheries to the Pyramid Lake Paiute Indian Tribe, see chronology entries in Part II under January 31, 1864, March 25, 1865, March 29, 1867, January 10, 1868, March 18, 1871, August 16, 1873, February 16, 1875, January 20, 1877, August 30, 1880, August 31, 1881, August 29, 1882, August 11, 1883, August 20, 1885, August 17, 1891, September 28, 1896, and July 25, 1899.

34. Townley, John M., *The Truckee Basin Fishery, op. cit.*, page 39.

35. The last spawning run of the Pyramid Lake cutthroat trout was reported to have occurred in 1938, and this subspecies was reportedly extinct by 1940 or shortly thereafter. [See Wilds, *op. cit.*, page 181.]

36. Both of these facilities were part of the U.S. Bureau of Reclamation's Washoe Project, first proposed in 1954 to improve flood control on the Truckee River. The Washoe Project contained proposals for both the Truckee River Basin and the Carson River Basin. Those facilities proposed and eventually constructed for the Truckee River Basin included Prosser Creek Dam and Reservoir (constructed in 1962 and located on Prosser Creek), Stampede Dam and Reservoir (constructed in 1970 and located on the Little Truckee River upstream from Boca Reservoir), and Marble Bluff Dam and Pyramid Lake Fishway (constructed in 1975 and located on the Pyramid Lake Paiute Indian Reservation). None of the projects proposed for the Carson River Basin were ever funded or constructed. [See 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.]

37. Lake Lahontan was named after Baron Louis Armand de Lom d'Arce de la Hontan, born in 1666, who explored French Canada from 1683 to 1693, but never came within 1,000 miles of the ancient lake site. The naming of the lake was given credit to Clarence King, a noted geologist of the Great Basin, in 1878, although in all probability it was Arnold Hague who first linked the name with the Pluvial lake in 1877 in an article he wrote on the Truckee River region. [See Houghton, *op. cit.*, page 74.]

38. Geological studies have shown that Lake Lahontan underwent several Pluvial oscillations which included at least three peaking enlargements (highstands) occurring at about 65,000, 45,000, and 30,000 years ago, with a maximum surface height of approximately 4,380 feet and a depth of at least 886 feet at Pyramid Lake, the lowest point in the

system. Two prolonged stillstands took place at 3,873 feet and 3,855 feet, lake surface elevations not much higher than the current near-3,800 foot level of Pyramid Lake. [See Houghton, *op. cit.*, page 73.] Benson ["Preliminary Paleolimnologic Data for the Walker Lake Sub-Basin, California and Nevada," *op. cit.*, page 2] found evidence of other Lake Lahontan highstands, the latest occurring as recently as 12,500 years ago.

39. Houghton, *op. cit.*, page 76.

40. *Pyramid Lake Task Force Final Report*, December 1971, page 1.

41. *Ibid.*, page vi.

42. From surface-elevation data obtained from the U.S. Geological Survey, Water Resources Division, Carson City, Nevada.

43. Based on April 1996 lake volume of approximately 21,500,000 acre-feet and TDS concentration of 5,200 milligrams per liter printed in 1980 edition of *Nevada Water Facts*, Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada, and estimated lake volume of 20,900,000 acre-feet.

44. This estimated is based on volume and surface elevation tables by Harris, 1970.

45. 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.*]

46. The Truckee River USGS 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 and the Paiute Spill. These spills occur before the first Truckee Canal USGS gaging station [10351300] and are therefore not reflected in that measurement as Truckee Canal diversions. Anecdotal evidence indicates that these return flows have, at times, been substantial. [Personal communication with Norm Saake, Statewide Waterfowl Specialist, Game Bureau, Nevada Division of Wildlife (NDOW), Department of Conservation and Natural Resources, Fallon, Nevada, May 1996, and Al Olson, Water Planning and Operations, Lahontan Basin Projects Office, U.S. Bureau of Reclamation, Carson City, Nevada.]

47. The fact that these two amounts, the percentage of Truckee River flow into Pyramid Lake (70.9 percent) and the Truckee River flow diverted down the Truckee Canal (31.4 percent) exceed 100 percent is based on both the different periods of record (1973–1994 for Farad and the Truckee Canal gaging stations and 1958–1994 for the Nixon gaging station) and the effects of the high water years of 1982, 1983, 1984, and 1986, particularly, which distorted flow rates and total runoff volumes. If average year runoff volumes are computed for the Farad gaging station, the Truckee River at Nixon (Pyramid Lake), and the Truckee Canal at Wadsworth, specifically omitting these years, then the Farad runoff averaged 400,673 acre-feet per year, the Nixon Pyramid Lake inflow averaged 202,608 acre-feet per year (50.6 percent of the Farad flow), and the Truckee Canal flow at Wadsworth averaged 183,434 acre-feet per year (45.8 percent of the Farad flow).

48. This figure represents a measure from the "highest high" (i.e., maximum surface elevation recorded in 1891) to the "lowest low" (i.e., the minimum surface elevation recorded in 1967). The highest surface elevation for Pyramid Lake recorded in 1967 was 3,788.9 feet MSL, making this decline equal to 89.3 feet. Data on Pyramid Lake's surface water elevations was obtained from the U.S. Geological Survey (USGS), Water Resources Division, Carson City, Nevada.

49. Much has been written on the high TDS concentrations in Walker Lake, located in the Walker Lake Basin, and the degradation of that lake's fishery as TDS levels approximate 13,000 milligrams per liter (see Horton, Gary A., *Walker River Chronology*, Nevada Division of Water Planning, June 1996). However, due to Pyramid Lake's considerably greater salt loading (volume of salts in the water), if Pyramid Lake was reduced in volume from its present 21,605,000 acre-feet (April 1996) to that volume of Walker Lake (approximately 2,000,000 acre-feet), TDS concentrations in Pyramid Lake would rise from the current 5,100 mg/l to over 55,000 mg/l, making Pyramid Lake considerably saltier than sea water (35,000 mg/l) and killing all the fish in the lake.

50. 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.

51. The statement made her is based on an overall water budget for Pyramid Lake consisting of a measure of inflows, outflows, and change in storage (total lake volume). Disregarding as negligible local surface water and groundwater inflows, lake inflows consist primarily of Truckee River inflows (356,920 acre-feet per year, 1967–1994), and lake surface precipitation (55,000 acre-feet per year, estimated over the period 1929–1969). The primary outflow consists of lake surface evaporation, amounting to approximately 440,000 acre-feet per year (4.1 feet per year, estimated over the period 1929–1969). These figures yield an annual water deficit (i.e., decline in volume) for Pyramid Lake of approximately 30,000 acre-feet per year. This statement, however, may be criticized based on differing "periods of record." There is little question that based on lake surface elevation declines, Pyramid Lake experienced a deficit

during the period of the early 1900's through 1967. However, more recent periods of record, e.g., 1967–present and especially 1988–present, may well present a different picture based on reduced surface area (affecting primarily evaporation) and reduced diversions at Derby Dam.

52. Saake, *op. cit.*

53. Tabulated by Sierra Hydrotech from Truckee–Carson Irrigation District (TCID) diversion records.

54. 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 USBR and TCID. 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."]

55. See Table 5, Selected Truckee River and Truckee Canal Flows, for a more complete analysis.

56. Figure covers the period of record 1967–1994. [See *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 513.]

57. This is the right specified in the Orr Ditch Decree; however, the Truckee Canal's nominal capacity without risk of spilling is only approximately 900 cfs. [Written communication, R. Michael Turnipseed, Nevada State Engineer, Division of Water Resources, Department of Conservation and Natural Resources, Carson City, Nevada, March 15, 1996.]

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

59. The Alpine Decree represented the Federal Court adjudication of the relative water rights on the Carson River which is the primary regulatory control of Carson River operations today. The decree is administered in the field by a watermaster appointed by the federal district court. The decree, finally issued on October 28, 1980 after initial litigation was begun in 1935, established the respective water rights (to surface water only) of the parties to the original lawsuit, both in California and Nevada to Carson River water. 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, it also established the rights to reservoir storage in the high alpine reservoirs and confirmed the historical practice of operating the river on rotation, so that irrigators with more junior priorities could be served as long as possible. These upper alpine reservoirs were permitted to fill out of priority order, in accordance with historical practice. The decree also specifically recognized riparian water rights in California (as distinguished from the quantified appropriative water rights 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 Irrigation Project (i.e., below Lahontan Dam) in Churchill County near Fallon, the Alpine Decree provided for an annual net consumptive use of surface water for irrigation of 2.99 acre-feet per acre and a maximum water duty of 4.5 acre-feet per acre for water-righted bench lands and 3.5 acre-feet per acre for water-righted bottom lands *delivered to the land*. For lands above the Newlands Project (i.e., above Lahontan Reservoir), the net consumptive water use was set at 2.5 acre-feet per acre with water duties of 4.5 acre-feet per acre *diverted to the canal* for bottom lands, 6.0 acre-feet per acre diverted to the canal for the alluvial fan lands and 9.0 acre-feet per acre diverted to the canal for the bench lands. 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. 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 decree also granted landowners on the Newlands Project an appurtenant water right for the patented lands, effectively transferring water

rights to these land holders individually. [See "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.]

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

61. The Tahoe-Prosser Exchange Agreement ("Agreement for Water Exchange Operations of Lake Tahoe and Prosser Creek Reservoir") was finalized in June 1959 and designated certain waters in Prosser Reservoir as "Tahoe Exchange Water." By this agreement, when waters were to be released from Lake Tahoe for a minimum instream flow (50 cfs winter; 70 cfs summer) and when such releases from Lake Tahoe were not necessary for Floriston rates due to normal flows elsewhere in the river, then an equal amount of water (exchange water) could be stored in Prosser Reservoir and used for releases at other times. [See *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 92-95.]

62. 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.

63. *Reno Gazette-Journal*, April 30, 1996, page 3B.

64. *Water Resources Data, Nevada, Water Year 1994, op. cit.*, page 513.

65. Data collected under contract by Sierra Hydrotech, a consultant who tabulated Truckee Canal diversions from the Federal Watermaster's gage for water years 1910-1966. This tabulation showed an average annual diversion of 239,700 acre-feet. [Olson, *op. cit.*]

66. According to testimony presented in the hearing on Application 9330, the capacity of the Truckee Canal is actually about 1,100 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.*]

67. The water duty is defined as the total volume of irrigation water required 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, are also considered. The water duty 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.*]

68. 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.

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

70. According to the complaint, the recoupment figure was derived from: (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. [*Lahontan Valley News*, Fallon, Nevada, December 12, 1995.]

71. Turnipseed, *op. cit.*

72. *Reno Gazette-Journal*, December 3, 1995, pages 1C and 4C.

73. *Reno Gazette-Journal*, December 12, 1995, page 2B, and *Lahontan Valley News*, Fallon, Nevada, December 12, 1995.

74. *Reno Gazette-Journal*, August 3, 1995, page 1B, and Olson, *op. cit.*

75. Turnipseed, *op. cit.*, and *Nevada Appeal*, Carson City, Nevada, November 14, 1995, page A9.

76. Water right application file 9330, Office of the State Engineer, Nevada Division of Water Resources, Department of Conservation and Natural Resources, Carson City, Nevada.

77. *CARSON RIVER ATLAS*, Department of Water Resources, The Resources Agency, State of California, Sacramento, California, December 1991, pages 95–96.

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

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

80. On November 1, 1995, by agreement between Sierra Pacific Power Company (SPPCo) and the Pyramid Lake Paiute Indian Tribe, this reduced rate of 350 cfs for a lake-surface level between 6,225.25 feet MSL and 6,226.0 feet MSL was dropped to 300 cfs with the estimated difference of 20,000–30,000 acre-feet to be stored in Stampede Reservoir and used for spawning runs of Pyramid Lake's endangered and threatened fish species. This agreement also gave SPPCo an increased storage right of 39,500 acre-feet in Stampede Reservoir. [*Reno Gazette-Journal*, November 2, 1995, pages 1B and 4B.]

81. *Ibid.*

82. *TRUCKEE RIVER ATLAS, op. cit.*, page 54.

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

84. These figures have been calculated from the bathymetry of Pyramid Lake found in Harris, *op. cit.*

85. The Lake Tahoe Basin snow pack water content figures produced an average of 99 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 2.00. The Truckee River Basin figures produced an average of 102 percent, standard deviation of 51 percent, and a *t*-value of 1.98. Both these *t*-value figures indicate that the period average approximated the true mean (100 percent) at a level of statistical confidence of approximately 90 percent.

86. *Pyramid Lake Task Force Final Report*, December 1971, page I.

87. 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.

88. King, Clarence, *United States Geological Explorations of the Fortieth Parallel*, Volume 1, Systematic Geology, U.S. Government Printing Office, Washington, D.C., 1878.

89. Russell, I.C., *Geological History of Lake Lahontan, A Quaternary Lake of Northwestern Nevada*, U.S. Geological Survey Monograph 11, 1885.

90. U.S. Bureau of Reclamation, Lahontan Basin Area Office, Carson City, Nevada.

91. 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, pages 314–315.

92. Benson, "Preliminary Paleolimnologic Data for the Walker Lake Sub-Basin, California and Nevada," *op. cit.*, page 2.

93. Houghton, *op. cit.*, page 73.

94. Benson, "Fluctuation in the Level of Pluvial Lake Lahontan During the Last 40,000 Years," *op. cit.*, page 316.

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

Truckee River Chronology

Part II—Pre-Twentieth Century

25,000,000–13,000,000 Years Ago

In Neocene times, which occurred during the late Tertiary Period and encompassed both the Pliocene and Miocene Epochs, Lake Truckee was formed from a basalt lava flow that dammed the upper Truckee River canyon just below the present-day site of Hirshdale, California. The lake covered an area of some 73 square miles, its surface level reached an elevation of at least 6,000 feet above mean sea level (MSL), and the lake attained a maximum depth of 465 feet. Lake Truckee remained through part of the glacial (Pleistocene) period until the river eventually wore down the obstruction and subsequently drained the lake.[1]

2,000,000–500,000 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 the Lake Tahoe Basin. Scientific examination of Lake Tahoe's bottom has found that lakebed sediments extend at least 2,600 feet below the lake's floor.[2] The maximum prehistoric depth has been reported to have been 7,000 feet.[3]

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 Truckee River Basin was covered in snowpack and glaciers, while much of the lower Truckee 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.[4] 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 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.[5] 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.[6] 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.[7]

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.[8] In the Carson River Basin, Lake Lahontan extended up the 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. From this outflow to Lake Tahoe, the Truckee River begins its course, first southwest and then west, giving the impression that the lake perhaps drains westward down the western slopes of the Sierra Nevada Mountains and into the American River Basin. After flowing only about two miles, however, the Truckee River turns north toward the present-day town of Truckee, located in Nevada County, California. At this point the Truckee River turns northeast and then east, traveling through the upper Truckee River canyon towards the Truckee Meadows and the present-day cities of Reno and Sparks in Washoe County, Nevada. After passing through the Truckee Meadows, the river flows into the lower Truckee River canyon where, during several extended periods between 65,000–12,500 years ago, the Truckee River's waters would enter Lake Lahontan only a short distance downstream near present-day Lockwood. Today, however, only the faint indication of ancient shorelines remain of this ancient Ice Age lake, and the Truckee River now continues on its course for approximately 30 miles beyond the Truckee Meadows to Wadsworth, where it turns north, travels another 25 miles and finally enters Pyramid Lake, a terminal lake without any outflow.

While flowing a seemingly short distance of only 105 miles from its Lake Tahoe outlet to its terminus at Pyramid Lake, the Truckee River's importance to a variety of water users in this arid and water-starved region would be magnified many times. During particularly wet years, the Truckee River's flows in its lower reaches were generally sufficient to also feed Lake Winnemucca, a low marshy body of water located just to the east of Pyramid Lake. Lake Winnemucca, also referred to as Mud Lake, more often than not resembled more of a mud flat than a true lake. Even so, this body of water offered important wetland habitat to numerous waterfowl which visited this area during their migratory treks along the eastern edge of the Pacific Flyway. Finally, after 33 years of water diversions upstream at Derby Dam into the Carson River Basin, Lake Winnemucca completely dried up in 1938.[9]

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, corresponds 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 two 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.[10]

Pre-History

Various tribes of Paiute (Pah Ute), Shoshone, and Washoe (Washo) Indians inhabited the Lake Tahoe Basin, the Truckee Meadows, and the lower reaches of the Truckee River and the lands surrounding Pyramid Lake and Lake Winnemucca. The abundant fish in the Truckee River and Pyramid Lake, primarily the cui-ui (*Chasmistes cujus*) and the Pyramid Lake cutthroat trout (*Oncorhynchus clarki henshawi*), a strain of the Lahontan cutthroat trout, established an early heritage of dependency on the bounty of these bodies of water and their fisheries by local native American peoples. In particular, the cui-ui fish species, an omnivorous lake sucker endemic only to Pyramid Lake and the lower Truckee River, was a staple food for the people of this lake region, who were called "Kuyuidokado," or cui-ui eaters.[11]

Recent History

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, across the barren desert expanse of western Utah and Nevada, eventually flowing into San Francisco Bay.[12] 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.[13]

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, California. 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,[14] coming within seventy-five miles of the Truckee Meadows. After enduring incredible hardships crossing the central portion of Nevada in 44 days, Smith finally returned to his Great Salt Lake trapping headquarters in early July of 1827.[15]

1828 **(November)** Peter Skene Ogden, a trapper for the Hudson 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 a harsh 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.[16] 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.[17] 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.

1829 **(Spring)** Peter 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 river system 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 Truckee River, stating that it had no beaver but was abundant with salmon (trout).[18] The lack of potential commercial trapping value probably precluded further interest by Ogden in verifying the presence of the Truckee River 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 Charles 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.[19]

1833 Joseph Walker, chief lieutenant for Captain Benjamin Louis Eulale de Bonneville, both of whom were employed by the Hudson Bay Company, led a party of explorers and trappers along Ogden's "Unknown River" (the Humboldt River) 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 River or the Walker River.[20] 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 Carson Valley.[21]

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 C. Frémont to explore the territory more extensively.[22]

1841 **(Spring)** The Bartleson-Bidwell emigrant party made the first successful crossing of the Great Basin, reportedly without even a guide or a map.[23] 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.[24] 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 west.

1842 Influential U.S. Senator Thomas H. Benton of Missouri made arrangements for his son-in-law, John C. 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.[25]

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 Lake[26] and five days later, on January 15th, Frémont reached the lower Truckee River.[27] 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 weighing well over 40 pounds and attaining a length of up to four feet.[28] 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."[29] The fish 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 needed the cool, pristine waters and clean gravel beds to lay their eggs. Within 100 years, however, due to a combination of over-fishing, river impediments to upstream spawning in the form of dams for irrigation, logging, and hydroelectric power generation, sawdust choking the gravel beds, reduced inflows into Pyramid Lake due to diversions at Derby Dam, and extensive pollution from logging, paper milling, and ore processing, this once-abundant and magnificent fish species would become extinct by the early 1940s.

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.[30] 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, turned north and then 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 from present Topaz Lake.[31]

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.[32] 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. At this point 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. 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.[33] 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 recrossed Nevada through Las Vegas, perhaps camping very near the street later named in his honor in the heart of that city.[34] It was Frémont who first recognized the unique geophysical structure of the Great Basin and named it so.[35] 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.[36]

1844 (May) An emigrant party left Council Bluffs, Iowa, in May on their way to California. In crossing the Great Basin they became the first party to use the direct route to California via the Humboldt River, the Truckee River, Donner Lake and Donner Pass. Upon arriving at the headwaters of the Humboldt River they were met by a Paiute Indian named Truckee who offered to guide them.[37] Unlike earlier emigrant parties, however, when the Stevens-Murphy-Townsend party arrived at the Humboldt Sink, instead of turning southwest across the dreaded Forty-Mile Desert towards the Carson Sink and the Carson River, they turned west towards a river which their Indian guide had described. By doing so they arrived at the Truckee River near Wadsworth. Upon reaching this point, they were so appreciative of their Indian guide's services that they named the river after him.[38] It was reported that this same individual was also the chief of the entire Paiute nation and had been a guide for John Frémont, who had called him Captain Truckee. So came the Truckee River by its name, replacing that of the Salmon Trout River given it by Frémont earlier this same year. To traverse Donner Pass above Donner Lake, the emigrants had to actually dismantle their wagons, build windlasses, and hoist their livestock, wagons, and belongings, item by item, over the steep precipices.[39] During this trip, it was reported that six members of the party, one of them being Daniel Murphy, left the main body and rode up the Truckee River from Donner Creek and became the first white persons to stand upon

the shores of Lake Tahoe, probably near the present-day site of Tahoe City, California.[40]

1845 **(December)** John C. Frémont undertook his third expedition into the west and his second into the Great Basin region.[41] 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 arriving at Walker Lake nineteen days later. Three days later the Talbot-Walker group joined Frémont at the lake. From Walker Lake, Frémont sent the main party south via the Owens Valley while he took a smaller group up to the north through the upper Truckee River Canyon and over Donner Pass.[42]

1846 **(May 12)** The Donner party (Donner-Reed party)[43] left Independence, Missouri, dawdled their way west and soon became one of the last wagon trains on the trail that year. In addition to their leisurely pace, the party soon became bedeviled by a number of difficulties during their trip. First they became lost traveling through the Wasatch Mountains in Utah, failed to find the Humboldt River and added an extra 100 miles circling the southern end of the Ruby Mountains before turning north again and meeting the Humboldt River near the site of the present-day City of Elko. Subsequent feuds, a murder of one of their members (by James Reed, who was then exiled from the party), roving bands of hostile Indians, and abandoned provisions plagued this unfortunate group of emigrants across the Great Basin.[44] Finally, on October 19th the near-starved party entered the Truckee Meadows via the lower Truckee River Canyon, proceeded around the eastern hills enclosing the valley (the Virginia Range) and tarried for five days at Donner Springs on the north side of Rattlesnake Mountain. On October 21, as William Pike and his brother-in-law, William Foster, were preparing to go ahead of the party to Sutter's Fort for supplies, Pike's pepperbox pistol accidently fired, killing Pike within two hours. William Pike was laid to rest in a shallow grave near the party's camp site as snow began to fall in the Truckee Meadows. On October 25th the party again began their trek west and soon became blanketed by early heavy snowfalls around Donner Lake near the present-day town of Truckee, California.[45] By November 6, 1846, a lead group attempting to force their way over the summit encountered snowdrifts ten feet tall. The party then retreated back to Donner Lake where they built shelters against the continually falling snow. The two Donner families actually made their winter camp approximately six miles east of the lake at the junction of Prosser and Alder creeks, a site now covered by Prosser Reservoir. Here they would remain virtually entombed until Spring. Of the 87 members in the original party, only 47 would eventually be rescued through the efforts of six rescue parties sent out from Sutter's Fort, located in present-day Sacramento, California. Interestingly, the first successful rescue party to reach the stranded travelers (and the fourth party sent out by John Augustus Sutter) was led by James Reed, the same man who had been exiled earlier from the Donner party for murdering another member.[46] The last of the party's survivors were not rescued until April 21, 1847, almost six months after they had become trapped by extremely heavy snowfall in late October 1846.[47] Word of the Donner party's calamity virtually halted overland travel by means of this direct Truckee River route for the next several years. Those that did venture forth and arrived late in the Truckee Meadows would generally lay over there through the winter before attempting to traverse

Donner Summit.

1848 The Treaty of Guadelupe Hidalgo was signed with Mexico ending the Mexican War and ceding to the United States what was to become the "Southwest" United States, consisting of all or parts of the future states of California, Nevada, Arizona, New Mexico, Colorado, and Wyoming. While no fighting took place in Nevada, Americans in California, assisted by John C. Frémont, staged a successful revolt against Mexico.[48]

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, the discovery received widespread attention when President James K. Polk spoke of the rich gold fields in his message to Congress.[49]

1849 **(January)** The rush to the gold fields of California began in earnest and an unprecedented era of westward migration began, giving rise to the name "Forty-Niners" to these early California-bound fortune seekers. In January 1849 alone, more than 50 sailing ships left East Coast ports on the extended journey around South America and Cape Horn to California.[50] California's population would virtually explode over the next four years from approximately 14,000 persons in 1848 to over 100,000 persons by 1850 and to 250,000 persons by late 1852.[51] Early overland travelers used the natural transportation corridor laid down by the route of the Humboldt River through the heart of the Great Basin. At this river's terminus, the Humboldt Sink, those travelers electing the more southern route of the Emigrant Trail via 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 this area. In fact, from the present-day location of Verdi, Nevada, located approximately five miles west of Reno, to the town of Truckee, much of the upper Truckee River canyon was virtually impassable by the heavy wagons. Early travelers along this route were forced to use the more northerly Dog Valley route, which ran northwest from Verdi through Dog Valley, over two summits, then southwest through Hoke Valley and through the areas which would later become Stampede and Prosser reservoirs. From there the trail led to the future site of Truckee west and the Donner Lake area, then over Donner Summit.

1849 Compared to today, early emigrant parties traveling up the Truckee River through the lower Truckee River canyon between Wadsworth and Reno were presented a much different view of the Truckee Meadows upon reaching Vista, located at the eastern edge of this valley. Opening before them was an expansive, verdant valley, a stark contrast to the seemingly endless miles of barren desert and narrow rocky canyons they had just left behind. While there is no geologic indication that the valley was once an ancient lakebed, it was most probably inundated with water over much of its surface during pluvial periods when Lake Lahontan existed only several miles downstream. In the mid-1800s, the eastern third of the Truckee Meadows consisted of marshy lowlands generally covered in thick grasses, bulrushes, and cattails. At Vista a rock dike, commonly called the Vista reef,

partly impeded the Truckee River's exit into the lower Truckee River canyon, creating an obstruction which further inundated this area during spring flooding.[52] Fortunately, most early travelers arrived at this point in late summer or early fall, therefore avoiding hazardous high-water flood conditions. The Truckee River's course through the Truckee Meadows was bordered by expanses of low, boggy fields and marshlands, thick with willows and, further back upon more secure footing, cottonwoods.[53] Early travelers who did not wish to cross the steep-banked Steamboat Creek, located just upstream from Vista near the present-day Truckee Meadows Water Reclamation Facility (formerly the Reno–Sparks joint sewage treatment plant), and subsequently become immersed in this extensive bog, generally went south along the eastern range of hills now called the Virginia Range, and cut through Hidden Valley towards Huffaker Hills. They then turned west and skirted Rattlesnake Mountain on its north side, generally pausing there to refresh themselves at Donner Springs, as the Donner Party had done several years prior. From here they followed the present route of Peckham Lane approximately to its intersection with South Virginia Street, then turned northwest towards the river crossing near the present Mayberry Bridge. To the west, beyond this marshy floor of the Truckee Meadows, rose a barren, sandy ledge covered in sage and large rocks, extending to the very foothills of the Carson Range of the Sierra Nevada Mountains.

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.[54] 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 California became the 31st state of the Union. Eventually, California adopted the "California Doctrine" with respect to its 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.[55]

1851 During an Indian expedition organized by the State of California, Lake Tahoe received its first official name—Lake Bigler—in honor of California's third governor, John Bigler.[56] Later, in 1870, the California Legislature would officially designate the lake as Lake Bigler. It would not be until 1945 that the California Legislature would rescind the 1870 act and provide a universal consensus for the name Lake Tahoe.

1852 The first permanent settlement along the Truckee River took place when a Morman pioneer named Jamison, who was reportedly the first white settler in the Truckee Meadows, established a trading post very near the present-day site of the Truckee Meadows Water Reclamation Facility and just downstream from the inflow of Steamboat Creek and began

supplying goods to the emigrants passing through the valley. At that time the site was known as "Jamison's Station," the first of several names that would become attached to this general location.[57]

1853 California's Surveyor-General gave his formal approval to the name of Lake Bigler for Lake Tahoe; however, as John Bigler, California's third governor, was openly sympathetic to the plight of the Southern States, naming the lake after an avowed "Copperhead" did not receive universal approval and consequently other names appeared on maps of this area as well.[58]

1853 The Grosch brothers, Ethan and Hosea, arrived in Gold Canyon, located up from Dayton, Nevada, in the Carson River Basin, 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 the value of the discarded troublesome "mud"at $3,500 a ton. Amazingly, the importance of their discovery would remain a virtual secret for another several years, and even then another individual would be credited with the discovery.[59]

1855 The community of Franktown, located approximately 10 miles north of Carson City, was established by Orson Hyde, probate judge of Carson County, Utah Territory, in the Wassau (Washoe) Valley. Initially a sawmill was constructed on the site, making it an important enterprise in furnishing timber to the Comstock mines. Later the Dall Mill, a quartz mill of 60 stamps, was built on the site and employed hundreds of workmen. The creek supplying the water power was initially named Dall Creek, then Hobart Creek, and finally Franktown Creek. Fertile farms, supplied by runoff from the eastern slopes of the Carson Range, surrounded the town. Upon the completion of the Virginia & Truckee Railroad between Carson City and Virginia City in 1869, the milling business rapidly lost its importance and the once prosperous town declined.[60]

1857 The Grosch brothers, who were reportedly the first to realize the significance of the blue mud that emanated from the gold 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 Grosch's enterprise in return for keeping claim-jumpers away. Most historians agree that Comstock was unaware of the 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.[61]

1858 The first cattle were introduced into the Truckee Meadows when Granville W. Huffaker, a native of Wayne County, Kentucky, drove a herd of 500 cattle from Salt Lake City. By 1859 Huffaker had established an extensive ranching operation centrally located in the valley near the hills that now bear his name. Also at the site was located Langton's Stage Line and the first Post Office, which was operational by 1862. For ten years Huffaker's, as the community was called, was a most active stage-stop and center of activity in the

Truckee Meadows. By 1868 a school house had been constructed and the Athenian Literary Society flourished for the more cultured.[62]

1858 First recorded appropriation of water in the Truckee Meadows.

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, and 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.[63] 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.[64] 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 and the Truckee Meadows 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 timber structure, the Comstock's appetite for the region's richly-timbered forests became ravenous.[65] 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 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, 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.[66]

1859 Federal surveyors concluded that any trans-Sierra railroad route should follow the course of the Truckee River through the eastern slope of the Sierra Nevada Mountains. This decision was destined to make Reno Nevada's first major city.[67]

1859 **(November 29)** To preserve Indian rights to Pyramid Lake, located approximately 30 miles northeast of Reno, lands around the lake were withdrawn from the public domain by the

United States General Land Office. This date 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). It was argued, however, that the more appropriate date was actually March 23, 1875, as this was the date that the reservation was formally proclaimed by Executive Order of the President of the United States. Pyramid Lake Indian Reservation water rights (eventually adjudicated as Claims 1 and 2 of the 1944 Orr Ditch Decree with the 1859 priority date) became the oldest on the Truckee River and consist of almost 30,000 acre-feet of water per year based on approximately 3,130 acres of bottom lands and 2,745 acres of bench lands deemed irrigable within the reservation.[68] At the time of granting, water rights were intended solely for irrigation and not for the restoration or preservation of Pyramid Lake itself.

1860 First located by Felix Monet, Steamboat Springs, situated at the southernmost end of the Truckee Meadows, was named by early emigrants for the puffing and blowing vents which mark this location and are indicative of the area's geothermal activity. In 1861, Doctor Ellis erected a hospital with adjacent bathhouses. With the coming of the Comstock and the Virginia & Truckee Railroad in 1871, Steamboat Springs became an important rail terminal where supplies for the mines were transferred to freight wagons for the steep haul to Virginia City. Its fine hotel, commodious dance-hall and elegant bar were frequented by the legendary silver kings, politicos, gamblers and news chroniclers. The waters received national acclaim by President Ulysses S. Grant when he visited them in 1879. Waning fortunes of the Comstock reduced attendance and fire destroyed the luxurious buildings erected on the site, but the therapeutic waters remain to this day.[69]

1860 A log bridge was constructed across the Truckee River near where the present-day town of Verdi, Nevada, is now located. Known as O'Neil's Crossing, the site served as a stage stop during the 1860's on the heavily traveled Henness Pass Turnpike and Toll Road and the Dutch Flat and Donner Lake Road. In 1864, the Crystal Peak Company laid out a town on the site some two miles from Verdi's present location. The company owned mining and lumbering interests near the settlement which was then called Crystal Peak. Modern Verdi came into being with the construction of the Central Pacific Railroad through Nevada in 1867–69 when it became a major mill town and terminal for the shipment of ties and construction timbers.[70]

1860 **(May and June)** Based on the kidnaping of two young 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 were ambushed while proceeding down the Truckee River to attack the Paiute Indians near Pyramid Lake, 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.[71] No further hostilities ensued; the Indians were driven off their reservation, but later were allowed to return so long as they agreed to use peaceful means to settle disputes and grievances.[72]

1860 **(1860–1867)** Galena, located in the Sierra Nevada foothills to the southwest of the Truckee Meadows, was first established as a mining property by R.S. and Andrew Hatch. The

hatch brothers established a quartz mill and smelter which were among the earliest erected on this side of the Sierras. Local gold ore contained a heavy admixture of lead sulphide, or "galena," which made the mining operations unprofitable. By 1863, the community had developed as an important lumbering center with eleven sawmills in operation. The community soon boasted stores, lodging houses, a justice court, a school and community hall, saloons, and dozens of homes. After disastrous fires in 1865 and 1867, Galena was abandoned.[73]

1860s Early Truckee–Donner area settlement began based primarily on logging and railroad construction and operations. This began a period of extensive Truckee River pollution, primarily due to sawdust and other logging and milling debris being discharged directly into the river's waters by numerous lumber mills in the area. Silt loading from timber clear-cutting and resultant hillside runoff significantly degraded the river's water quality and seriously impact the river's native wildlife.

1860 Charles William Fuller claimed land near an obscure ford on the Truckee River and built a bridge about six feet downstream from the present site of the Virginia Street Bridge in Downtown Reno. The following year he sold the site and bridge to a Honey Lake rancher named Myron C. Lake. The winter after that (1862) the bridge was washed out after a record snowfall in the Sierra Nevada Mountains. Lake subsequently rebuilt the bridge that same year and the location became known as "Lake's Crossing," Reno's new name.[74]

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.[75]

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 located within California.[76]

1861 Work began on the first irrigation ditches in the Truckee Meadows—the Pioneer Ditch, diverting Truckee River water from a point just upstream from the present-day Greg Street Bridge and providing water to pasture lands located around what is now the University of Nevada, Reno, farmland, and the Cochran Ditch, which took water out of the Truckee River at what is now Wingfield Park in Downtown Reno to be diverted to farmland south of Reno.[77] These first diversion ditches provided irrigation waters to the lower-lying, more readily irrigable lands of the Truckee Meadows.[78]

1861 Lumbering operations began in the Glenbrook area of Lake Tahoe in this year. By 1872, the consolidation of V-flume systems in and near Clear Creek Canyon made it possible to float lumber, cordwood, and sawed material from Spooner's Summit on present-day U.S. Highway 50 to Carson City and thereby eliminate the need to use wagons to haul the Lake Tahoe Basin's lumber over the nine-year old Lake Bigler Toll Road (King's Canyon Road).

In 1873, the new Carson & Tahoe Lumber & Fluming Company assumed all operations, becoming the largest Comstock wood and lumber combine. During its time, it controlled over 50,000 acres of timberland, operated four sawmills, two lake steam tugs, two logging railroads, a planing mill and box factory in Carson City, and employed some 500 men in its logging camps. During its existence, it had taken 750 million board feet of lumber and 500,000 cords of wood from the Lake Tahoe Basin. Timber depletion and reduced Comstock mining closed the company in 1898.[79]

1861 **(July 19)** James W. Nye, Governor and Acting Superintendent of Indian Affairs for the Territory of Nevada, wrote to the Secretary of Interior: "Lake Bigler [Tahoe], lying in the county of the Washoes, and from which they formerly obtained large quantities of the best kind of fish, is now taken possession of by the whites, and has become a watering place, to which large numbers from this Territory and California resort, and from which this poor Tribe are virtually excluded."[80]

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."[81]

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 domain[82] 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.[83] 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.[84]

1862 On the advice of Dr. Henry De Groot, a noted researcher on the origins of the Washoe (Washo) Indian Tribe's naming of Lake Tahoe, William Henry Knight caused the United States Land Office to approve the name of "Tahoe" for the lake which had been previously named by California interests "Lake Bigler" in 1851. The original name—"Tah-hoe-ee," meaning big lake or water—was further researched by Dr. De Groot (1880) and subsequently abbreviated to "Ta-hoe."[85]

1862 **(December)** The Nevada Territorial Legislature granted Myron C. Lake, who owned a bridge across the Truckee River near the site of the present-day Virginia Street Bridge, a 10-year monopoly (with a 2 percent tax on gross receipts for the territorial school fund) to operate a toll road between Junction House in the south (at the present intersection of South Virginia Street and Peckham Lane), across Lake's Crossing (as the site of his bridge across the Truckee River was then known), and north to the California state line, a distance

of about 20 miles.[86]

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 the mines were exempt from its provisions.[87] Unfortunately, the law did not apply to such contamination of waters before they entered Nevada, and the sawdust in the Truckee River from upstream California logging and milling operations continued unabated.

1863 Coburn's Station—the precursor of the present town of Truckee—was founded.[88]

1863 The Hunter Creek Water Company constructed the Hunter Creek Ditch, diverting waters of a tributary to the Truckee River in the Truckee Meadows.[89]

1864 **(January 31)** As reported in the *Virginia Daily Union* (Virginia City): "Madison Chase, local Indian Agent at Pyramid Lake, yesterday brought to Virginia [City] about one thousands pounds of trout, which were caught by the Indians at a locality in the Truckee River about three miles above the lake...finest lot of fish ever brought to this market... ranged from one to five pounds each...as the business promises to be a profitable one to all interested parties, our market will hereafter receive a large supply of fish from that quarter every few days."[90]

1864 The Winter's Ranch (Rancho Del Sierra) was completed in the northern portion of Washoe Valley some 10 miles north of Carson City. The large carpenter-Gothic style structure was the ranch home of Theodore and Maggie Winters and their seven children. Originally, the area was settled by Mormons and the ranch site, consisting of some 6,000 acres, was purchased by Theodore Winters and his brother. In addition to the ranch house, the property also contained a large barn and race track. Winters raised outstanding race horses, which he race here, as well as operated a dairy business and raised beef cattle, work horses, and sheep. Winters was also active in politics and was elected to the Nevada Territorial Legislature.[91]

1864 **(June 11)** As noted in the *Virginia Daily Union* (Virginia City): "...Lake Tahoe is being rapidly depleted of fish...it is only the trout which are spawning in shallow places, that are speared...fifteen or twenty boats now engaged in this business...at the rate they are at present being taken, the fine delicious trout, which throng its waters will become so scarce...may fish all day and not get a bite."[92]

1864 **(June 19)** A censure appeared in the *Virginia Daily Union* (Virginia City) after previously (see January 31, 1864 entry) expressing that city's appreciation for the bounty of the Truckee River and its fishery: "Like Lake Tahoe, this stream [the Truckee River] is in danger of losing its former reputation...Hitherto it has been the resort of such multitudes of finny beauties, that to take large quantities of them required neither skill nor patience...between the wholesale slaughter in the [Pyramid] lake and at the dam at the lower recrossing [railroad crossing], they are like 'angel's visits'...this course persisted will soon render them a thing of the past, and cannot be too highly censured."[93]

1864 Evidencing concern over the growing threat to fish life, the last Nevada Territorial Legislature (before statehood) enacted a closed season for trout during the spawning months of January to April. To promote compliance, a reward was offered to those

persons reporting out-of-season poaching.[94] Unfortunately, the Pyramid Lake Indians claimed immunity from territorial (and later state) laws and were therefore employed by wholesalers at Wadsworth to fish the Truckee River specifically during these closed seasons for the relatively large and abundant Pyramid Lake cutthroat trout.[95]

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.[96] 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 The first session of the Nevada Legislature re-enacted the 1862 territorial statute prohibiting the dumping of sawdust in state waters.[97]

1865 **(March 25)** From the *Washoe Weekly Times* (Washoe City in Washoe Valley): "The Washoe Indians have been supplying our citizens the past week with fresh trout taken from the Truckee. This stream affords the finest quality of trout to be found anywhere, many of them weighing from fifteen to twenty pounds."[98]

1865 The first major controversy over the waters of Lake Tahoe and the Truckee River began. Alexis Von Schmidt, a San Francisco civil engineer, formed the Lake Tahoe and San Francisco Water Works Company to supply water to San Francisco via an aqueduct from the Lake Tahoe area.[99] Surveys were undertaken to construct a canal from the lake's outlet at Tahoe City to Squaw Valley, where a tunnel was to be excavated through the Sierra Nevada Mountains to the west to take the water to the North Fork of the American River. The project would encounter insurmountable problems in 1870, however, when the California Legislature granted Truckee River improvement rights to the Donner Lumber and Boom Company.[100]

1866 **(March 1)** The Nevada Legislature amended an Act (approved February 20, 1864) relating to wild game and fish such that "it shall be unlawful to catch...fish in any of the ...waters within the state, from and after the first day of April...up and to the first day of July...by means of any drag or drags, or any kind of net, or any fish basket or pot, pond or weir, or by any poison...or by obstructing...the natural transit of fish..."[101] This action represented a reversal of fish protection established by the 1864 Nevada Territorial Legislature, thereby opening the prime spawning months of January through March to unrestricted exploitation of the Truckee River's trout population.[102]

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.[103]

1866 **(April 1)** In what may have seemed like an April Fool's joke or merely journalistic exaggeration, the *Carson Daily Appeal* (Carson City) reported that "A Chinaman came into town yesterday with the largest specimen of a Lake Tahoe trout we have ever seen...a little more than thirty-eight pounds..."[104] [Actually, the present-day record Mackinaw, or lake trout caught in Lake Tahoe in 1975 weighed 37 pounds 6 ounces. However, this species was not introduced into Lake Tahoe until 1887. Therefore, if credible, the trout caught was most probably a spawning Pyramid Lake variety of Lahontan cutthroat trout.]

1866 **(May 17)** Clearly indicating the widespread appreciation of the bounties of the waters of Northern Nevada, an article appeared in the *Carson Daily Appeal* (Carson City) stating "We have never known our fish market to be so well supplied as at present. Lake Tahoe, the Carson and the Truckee [rivers], are made to yield up their piscatorial treasures in great abundance. Our hotels, the restaurants and private tables, serve up trout with painful regularity..."[105]

1866 **(December 21)** Indicating the early commercial use of the Truckee River for logging, the *Territorial Enterprise* (Virginia City) reported that "Eastman & White, whose sawmill is at Truckee Meadows, have let a contract to furnish them with two million feet of saw logs...being cut now in Truckee Canyon some six miles above Crystal Peak and will be flooded down the river with the spring floods."[106] Eventually, Truckee Meadows mills would be replaced by a mill at Verdi, and numerous other lumber mills around Truckee, California.

1867 The Truckee Lumber Company was established near Donner Lake. By 1868, this lumber mill alone had produced some 10,000 railroad ties and two million feet of bridge timber as part of a contract with the Central Pacific Railroad. The lumber mill also produced eight million board feet, a significant portion of the 66 million board feet produced by the dozen or so milling operations located in the immediate vicinity of Truckee.

1867 **(March 29)** As reported in the *Gold Hill News* and the *Territorial Enterprise* (Virginia City): "This morning a wagon with 1,450 pounds of trout, arrived in Virginia [City] from Pyramid Lake. The whole wagon load was caught by the Indians...being the largest day's fishing ever made...we have never seen as many large trout...brought to market...". As a testament to the plentiful nature of the fish, it was noted that "...in the course of an hour an Indian will often take over 200 pounds..."[107]

1867 **(April 5)** As noted in the *Territorial Enterprise* (Virginia City): "The Truckee...is about as full of fish as there is any sort of necessity for...trout of large size and choice quality are caught in any desired quantity." The first reference was also made to the now endangered cui-ui: "...besides which there is a species of fish resembling the smelt, which are found to be excellent eating...lower part of the river in the vicinity of Grand [Pyramid] Lake [supposedly they did not spawn above the "Big Bend" of the Truckee River at Wadsworth]...very peculiar fish is found called, we think, the 'Cuyo', a dark colored, scaly, homely looking fish... spawn...in such immense numbers that at time they almost seem to choke the passage of the waters...whole surface seems fairly alive with heads and fins...such a rushing noise as to stampede horses and cattle along the river."[108]

1868 **(January 10)** In terms of an informal census, it was noted in the *Carson Daily Appeal* (Carson City) that Mr. H.G. Parker, Superintendent of Indian Affairs for Nevada reported that there were about 1,000 Piutes [sic] on the Pyramid Lake Paiute Indian Reservation and

that for every pound of fish sold by the Indians they receive two cents. Mr. Parker reported that "They come in possession of a good many dollars by this means..."[109]

1868 **(January 30)** As reported in the *Territorial Enterprise* (Virginia City): "The Indians of the Reservation at Pyramid Lake, have again commenced spearing trout...there are other fine fish—even more delicious than the trout—in the waters of Pyramid Lake, but it is only at a certain (and very short) season that they venture from the lake into the river where they can be taken. A few of these fish—we have forgotten the name given them by the Paiutes [they were the cui-ui]—were offered in this market last year."[110]

1868 **(March)** Myron C. Lake sold to the Central Pacific Railroad approximately 160 acres of land centrally located in what is now Downtown Reno. Two months later, on May 9th, the Central Pacific began auctioning townsites. The only structures of importance existing at that time included Lake's Hotel (located at the present Riverside Hotel site on the south side of the river) and a grist (grain) mill, located at the northern end of the bridge.[111]

1868 **(Spring)** At the height of the bird breeding season, Robert Ridgway, a young, 17-year old naturalist and mentor of Spencer Fullerton Baird, who was the Director of the United States National Museum, accompanied a biological survey of the U.S. Geological Exploration led by Clarence King. The expedition explored wildlife along the 40th parallel[112] and traveled down the Truckee and Carson rivers. Ridgway identified 91 species of birds during a three-week trip to the lower Truckee River below Wadsworth, Nevada, an area relatively untouched at that time by the effects of modern society. Ridgway's accounting provided an important record of the flora and fauna of the "fertile valley of the river" and its "exceedingly dense willow-jungles...studded with fine large cottonwood trees..." This was lush and hospitable habitat that would be drastically altered through subsequent river channelization projects, draining of wetlands, increased use of adjoining lands for agriculture, and livestock grazing.[113] Despite having only a high school education, Ridgway went on to become one of America's. most distinguished ornithologists[114] as Curator of Birds in the U.S. National Museum. Over one hundred years after Ridgway's visit, over a five-year period of 1972–1976, two University of Nevada, Reno, professors could identify only 65 species of birds in this same area, and of those, 17 were new to this area.[115] Consequently, by the 1970s, 42 of the original bird species identified by Ridgway in 1868 would completely disappear from the lower Truckee River.[116]

1868 The Central Pacific Railroad connected the town of Truckee, California, and the city of Reno, Nevada, via the upper Truckee River canyon route. This represented the first transportation corridor which followed the route of the Truckee River between these two communities. Numerous other railroads prospered around this time throughout the area, thereby promoting the logging industry, paper and pulp mills, and other early forms of commercial enterprise.

1868 **(April)** Judge E. B. Crocker, brother of Charles Crocker, superintendent of construction for the Central Pacific (CP) Railroad, put forth the name of "Argenta" for Lake's Crossing (i.e., Reno), a name which stressed the importance of silver to the area. Two weeks later on May 9, 1868, the name was suddenly changed to Reno, named after a young (39 year-old) Union General, Jesse Lee Reno. Major General Reno was a native of Virginia, graduated from the U.S. Military Academy at West Point, and served in the Mexican War

from 1846 to 1847. He was killed while leading his men in the Union victory of South Mountain, Maryland, on September 14, 1862. It was claimed that one of the CP's owners knew General Reno and insisted on the change. Reno subsequently became the junction for the Virginia & Truckee (V&T) Railroad track to be completed to Virginia City and the Comstock.[117] During its relatively brief history, Reno had been known as Jamison's Station (1852), Fuller's Ferry (1860), Lake's Crossing (1862), End of Track (1868), Argenta (1868), and finally, in May 1868, Reno.[118]

1868 **(May 22)** In an early recognition of the need to establish Anaho Island in Pyramid Lake as a protected wildlife refuge, the *Carson Daily Appeal* (Carson City) wrote that "...returned yesterday from Pyramid lake...brought a great number of gull's and pelicans' eggs...gathered from the island...says that these eggs are to be found...in great abundance."[119]

1868 **(May 31)** As reported in the *Territorial Enterprise* (Virginia City): "Mr. H. Hawes, who resides at the "Big Bend" of the Truckee [Wadsworth], and who brought the fish to this city, gives us some interesting particulars in regard to the fish. It is called by the Indians the "cooynea" [cui-ui], and is found in the waters of both Pyramid and Mud [Winnemucca] lakes,[120] which it only leaves in the spring for the purpose of spawning, when it comes up the Truckee River as far as the Big Bend, never farther, in schools of millions. They weigh from four to eight pounds, and have a head so ugly that all are beheaded before being brought to this market."[121]

1868 Alfalfa seed, also known as "Chile clover," which had been grown in California since the 1850s, reached the Truckee Meadows and became an intensive forage crop to cover the expanding agricultural fields along the river. 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.[122] Ervin Crane, a pioneer Steamboat rancher, proved that alfalfa thrived best on sagebrush bench lands plowed and irrigated. By the mid-1870s, alfalfa was the reigning staple crop of the Truckee Meadows.[123]

1868 The Central Pacific Railroad lines reached Wadsworth on the lower Truckee River and wholesale harvesting of Pyramid Lake cutthroat trout began with shipments both west to San Francisco and east (1869) to Ogden, Utah, via Wells Fargo Express.[124] Although fishing records are questionable and represent only those fish harvested along the lower Truckee River, by 1888 it was reported that some 250,000 pounds (125 tons) of fish were shipped by rail from Wadsworth alone. It was also estimated that this amount constituted only about one-half of the total catch along the entire course of the Truckee River.[125]

1868 **(1868–1904)** The Central Pacific's Truckee Wadsworth division was established at Wadsworth, Nevada (Big Bend). In 1882, work was begin on a new site across the Truckee River (on the south, or eastern side) and a fire on April 15, 1884, fanned by heavy winds, destroyed remaining buildings at the original site. Another fire at the new site in 1902, combined with a persistent lack of an adequate water supply, prompted the relocation of the division, with all buildings and even the workers' homes, to a new location east of Reno, a site which eventually became Sparks, Nevada.[126]

1868 Reno's first sewer lines were built around this time and consisted of pipes connected with

each storefront and then extended down alleys or streets to the Truckee River, where raw sewage poured directly into the river. During the summer, when the stream channel frequently dried up entirely, the area was rank with piles of untreated waste awaiting the fall rains to carry it away downstream. This condition existed well into the 1900s.[127]

1868 Ice harvesting began in the Truckee, California, area, particularly on Donner Lake and on an earlier, and considerably smaller, Boca Reservoir. The Boca site was particularly well suited for this type of enterprise due to its location at the bottom of a depression where cold air would naturally sink, providing temperatures typically 10–20°F colder than at Truckee.[128] Ice was used to cool the Comstock mines and for packing agricultural produce from early farming operations in California, thereby allowing California farmers in the Sacramento and San Joaquin valleys to rail ship agricultural production to eastern markets after 1869 when the transcontinental rail line was completed. At its peak, over 20 ice companies were active in the Truckee area. Ice harvesting operations would continue until approximately 1927 when natural ice was replaced by mechanical refrigeration.

1869 **(March 20)** From the *Territorial Enterprise* (Virginia City): "Immense quantities of trout are being captured daily in the Truckee River. White men and Indians, with hook and line, spear and net, are busy in catching the speckled beauties, for fun and for profit. They weigh from half a pound to 15 pounds, and are cheaper than beef in the market at Reno and Wadsworth."[129]

1869 A Nevada Legislature joint resolution recognized the interstate nature of pollution in the Truckee River and the endangerment of native fish species and called upon the California Legislature to protect upstream waters from the dumping of sawdust.[130]

1869 **(May 10)** The Central Pacific Railroad met the Union Pacific Railroad at Promontory Summit, just south of Promontory, Utah.[131] The nation had now been connected by rail lines and overland migration westward would no longer be the hazardous and daunting task it was.

1870 **(January 4)** In an effort to bring some realism to the Lake Tahoe fish stories (see entry for April 1, 1866), the *Gold Hill News* reported that "...on authority of Captain John McKinney, of Tahoe City, who has made fishing a profession...the largest fish ever taken from those waters...weighed twenty-seven pounds..."[132] [Even so, the modern-day record Mackinaw trout caught in Lake Tahoe weighed in at 37 pounds and 6 ounces, although this species of fish was reportedly not introduced into Lake Tahoe until 1887.]

1870 **(January 15)** As noted in the *Reno Crescent*: "Our markets and restaurants...we notice... most delicious looking speckled trout, taken from the pure transparent waters of our own beautiful Truckee [River]."[133]

1870 **(February 25)** The first indication of concern over the viability of the Truckee River and Pyramid Lake fisheries was raised by the *Territorial Enterprise* (Virginia City) when it reported that: "A correspondent writing from Reno, complains that parties residing in the vicinity of Pyramid Lake have built a weir across the Truckee River which prevents the trout and other fish from coming up the river, as they usually do about this season..."[134]

1870 **(April)** During the 1869–1870 legislative session, the California Legislature authorized the Donner Lumber and Boom Company to improve the channel of the Truckee River from its source at Lake Tahoe to the eastern boundary line of the State of California. It was stipulated, however, that any floodgate at Lake Tahoe's outlet was not to be more than five

feet in height and was to only facilitate floating saw logs downstream to the town of Truckee.[135] Also required under this contract was the construction of adequate fish ladders, yet none were ever constructed.[136] The lumber company would erect a rock-filled timber crib dam at Tahoe City which would remain in operation until its replacement in 1913 by a concrete structure with vertical gates.

1870 Also during the 1869–1870 session of the California Legislature, the name Lake Bigler, which had been first assigned to Lake Tahoe in 1851 during an Indian expedition, was officially legalized in honor of California's third governor, John Bigler.[137] Even so, the U.S. Land Office continued to refer to the lake as Lake Tahoe on its maps, a name which eventually prevailed when the California Legislature officially rescinded the name Lake Bigler in 1945.[138]

1870 **(July 9)** The *Reno Crescent* reported on "Something New" in the Truckee River: "We notice that the boulders in the bed of the Truckee are this season covered with a growth of moss [no doubt a euphemism for algae]—a phenomenon never before observed by the oldest inhabitant..."[139] This should hardly have come as any great surprise as only two years earlier, in 1868, Reno installed sewer pipes which dumped raw sewage directly into the river.

1870 Alexis von Schmidt intensified his efforts to divert waters from Lake Tahoe (see 1865 entry) by offering to provide the City of San Francisco twenty million gallons of water daily in return for $10 million and monopoly control of that city's water works by Schmidt's Lake Tahoe and San Francisco Water Works Company. By the end of 1870, Schmidt had acquired land at the lake's outlet at Tahoe City for $3 per acre and constructed a small dam at the site.[140]

1871 **(January 14)** As prophetically reported in the *Nevada State Journal* (Reno): "We learn that last week some parties were engaged in killing fish by means of exploding giant powder in the river. Though fish are plenty in the Truckee now, if this manner of killing them is not stopped promptly, the day is not far distant when the waters of our beautiful Truckee will have but very few fish in them..."[141]

1871 **(February 25)** As a rebuke to the fishing practices taking place on the Pyramid Lake Indian Reservation, the *Nevada State Journal* (Reno) reported: "...[we] deplore the action of parties in placing obstructions across the Truckee River below Wadsworth, whereby the trout were prevented from ascending the stream...the dam at the [Indian} agency...is arranged with a chute through which the fish might ascend, were they not prevented by Indians employed to spear them as they attempt to pass through. So closely is this chute guarded that not a fish is able to pass above the dam..."[142]

1871 **(March 2)** The Nevada Legislature passed a law 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 within 30 days at mill dams, except that the Carson River (with its numerous dams, weirs, and stamping mills) was exempt from this provision. All other acts relating to fish were repealed.[143]

1871 **(Spring)** Larger, mature female Pyramid Lake cutthroat trout loaded with eggs were first reported unable to reach the Truckee Meadows due to downstream dams and numerous nets, snares, and fish traps impeding their progress to upstream spawning beds.[144]

1871 **(March 18)** In response to the numerous public concerns about the damming of the Truckee River below Wadsworth, George Balcom, Pyramid Lake Indian Agent, wrote a letter to the *Reno Crescent* in which he stated: "I am the newly appointed Indian Agent...[the reservation dam has] not only a chute, but an open sluice about six feet wide, falling gradually over the tiers of brush and stone lapping each other, in such a manner that fish can pass up stream...that all the fish may come up the sportsmen may desire, and the Indians partly support themselves by the sale of what they catch..."[145]

1871 **(March 20)** In a story from the *Reno Crescent* reprinted in the *Reese River Reveille* (Austin) it was noted that "...the Truckee River is being cleaned out of the delicious trout for which that stream is famous. Owing to the obstructions in the river, few if any fish succeed in making their annual trip to the head of navigation...no fish are to be seen in the upper portion of the river, while below the [Indian reservation] dam...they are being caught by the wagon load..."[146]

1871 The first white-Indian violence along the Truckee River since the Pyramid Lake Indian War of 1860 erupted. During the spawning run of October 1870 through April 1871, the Pyramid Lake Indian Reservation's "irrigation" dam blocked much of the upstream run due to an inadequate fish ladder. Truckee Meadows residents felt this represented a deliberate action to allow the Indians to trap the spawning Pyramid Lake cutthroat trout for sale to Wadsworth fish wholesalers. The *Nevada State Journal* reported that "Wadsworth parties" were deliberately damming the river, preventing the fish from passing, while selling the catch along the railroad.[147] The annual run at Reno was reported to be far below normal. After receiving little satisfaction from the Indian Bureau and Nevada's Congressional delegation, some Truckee Meadows residents took matters into their own hands and dynamited the reservation dam.[148] On April 1st the *Reno Crescent* casually noted that "We understand that the Reservation dam...took a start one day this week and left its mooring..." It was also noted in this same edition: "Thursday night, 2,500 pounds of Truckee trout were unloaded at the Reno [railroad] Depot. A ton went west from this place and a ton east from Wadsworth. How long will it be before trout in the Truckee River will be as scarce as hen's teeth if this wholesale slaughter continues?"[149]

1871 **(April 14)** The *Territorial Enterprise* (Virginia City) reported on the success of the demise of the [reservation] dam on the lower Truckee River: "...no new dam has been built across the Truckee in the place of the one lately blown up with giant powder by the Renoites...the river is alive with trout, all pushing up the stream...about 1,000 pounds of trout...were shipped from Wadsworth evening before last." As astutely noted later in the *Reese River Reveille* (Austin) on April 17th with respect to this matter: "...that the fish are prevented from spawning by whites instead of Indians does not improve matters."[150]

1871 **(May 28)** In reporting on logging operations in the Truckee River, the *Territorial Enterprise* (Virginia City) reported that "The lumbermen on the Truckee River find it a difficult matter to float logs down that stream this season...Senator Eastman, who owns a mill (Eastman & White) 2-1/2 miles below Reno...that by building a plank dam nearly across the river he has been enabled to get a considerable lot of logs into his boom. On

the Truckee the sawmill men wish to see the snow go off with a rush, while on the Carson [River] the quartz mill owners desire that it may be all summer about it."[151]

1871 Alexis von Schmidt made a formal proposal to the San Francisco Board of Supervisors: For $10 million Lake Tahoe waters could be diverted from the Truckee River to Squaw Valley, flow five miles through a tunnel to the North Fork of the American River, and then proceed through an aqueduct, a reservoir, and a pipeline to San Francisco. Along the way the system was to provide water to mining, farming, and municipal customers. The project was approved by the city supervisors, but was vetoed by the mayor who feared both the monopoly Schmidt proposed as well as legal suits over Lake Tahoe water rights.[152]

1871 **(July 29)** The *Gold Hill News* provided one account of a popular fishing technique in Lake Tahoe by noting that "...the trout are not very plentiful in the lake, but in the brooks they just swarm...don't use hooks at all, but go for them with a big club..."[153]

1872 The Orr Ditch was completed in the Truckee Meadows, taking water out of the Truckee River on its north side just downstream from the present-day Mayberry Bridge. The ditch would then run in basically an easterly direction, paralleling the river for about two miles to Henry Orr's ranch located on the river's north bank.

1872 **(September 1)** The first through train traversed the 52-mile route recently completed which linked Virginia City with Reno by rail. Chinese laborers had begun grading the roadbed from Reno south to Steamboat Springs in the summer of 1871. On August 24, 1872, Virginia & Truckee Railroad Superintendent Henry M. Yerington drove the last spike in the line a mile west of Carson City. The last train traversed the route on May 31, 1950.[154]

1873 A group of farmers paid Henry Orr for his water rights and began to bring the Orr Ditch northward toward Spanish Spring Valley where the water was sold to ranches north and east of Reno.[155] The return flows eventually came back into the Truckee River via the North Truckee Drain at a point nearly opposite the confluence with the Steamboat Creek and the discharge point of the present-day Truckee Meadows Water Reclamation Facility.

1873 A masonry diversion dam located at the foot of Sierra Street in downtown Reno and used by the Reno Flour Mill effectively blocked upstream spawning runs of Pyramid Lake cutthroat trout.[156] Five years after its construction, and only after a Washoe County Grand Jury ordered the owners prosecuted for violation of state fish protection laws, would the owners submit and add the required fish ladders.[157]

1873 **(March 15)** As noted in the *Nevada State Journal*: "...trout are plenty in the Truckee and it is no more than right that all who live along the borders of the beautiful stream should have an equal show...the dam of the mill company [Reno Flour Mill]...has no aperture through which the fish can get above...they accumulated between the two bridges and are slaughtered unmercilessly..."[158]

1873 **(April 8)** In noting the effectiveness of river impediments to prevent Pyramid Lake cutthroat trout from reaching their upper basin spawning beds, the *Truckee Republican* reported that "Scarcely any trout have made their appearance at Boca or Truckee...and our citizens are complaining...that there are artificial obstructions both at Reno and between Boca and Verdi which prevent their coming."[159]

1873 **(April 17)** The *Territorial Enterprise* (Virginia City) provided an insightful account of the characteristics and habits of the now-endangered Pyramid Lake cui-ui fish species: "This peculiar fish is now to be seen in our principal markets in abundance...name 'Couoa,' is

pronounced 'Kew-yew-way' by the Piutes [sic]...very singular kind of fish...are all decapitated before they are brought to our markets...reason given...the heads weight as much as their bodies, and are so repulsive in appearance that few who saw the head would care to eat the fish...are very round and solid...meat is white, sweet and of very fine grain...never seen for more than five or six days in the Truckee...suddenly disappear... seen no more till their next run...While in Pyramid Lake...never seen...remain altogether in deep water."[160]

1873 **(July 18)** Reporting on the extensive logging operations taking place in the Lake Tahoe Basin, the *Gold Hill News* reported that "Some idea can be formed of the immense amount of lumber turned out by the Glenbrook [Nevada] mills, from the fact that every day or two, rafts of logs containing 250,000 [board] feet of lumber are towed across Lake Tahoe to the mills from Sugar Pine Point [California]..."[161]

1873 **(August 16)** In conflict with the reservation count of 1868 attributed to Mr. H.G. Parker, Superintendent of Indian Affairs for Nevada, in which the *Carson Daily Appeal* reported 1,000 Paiutes on the Pyramid Lake Indian Reservation, an article in the *Nevada State Journal* (Reno) made mention of "...a tribe of about 6,000 Indians, 400 of whom have their lodges along its [Pyramid Lake's] banks and live on the fish and game that throng its waters and shores...prolific with life...beneath the waters swarm the salmon trout, king of game fish...absolutely numberless in these virgin waters..."[162]

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, over 21 miles in length, was 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).[163] The system consisted of a diversion dam below Hobart Creek Reservoir on Franktown Creek, which flows into Washoe Lake from the eastern slopes 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 the east 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 **(April 4)** The *Nevada State Journal* (Reno) reported on excellent, if not excessive, fishing conditions: "Phi Bates, of Long Valley...succeeded in pulling out 73 of the nicest trout ever mortal man set eyes upon...Phi and Ned Reed went out and together managed to corral over 200 pounds. If they keep up their luck there will soon be no trout in the river."[164]

1874 The City of Reno petitioned the California Legislature to prohibit the dumping of sawdust in the upper Truckee River. A "delta" of sawdust from upstream milling had formed in less than ten years at the entrance to Pyramid Lake, effectively closing the mouth of the Truckee River to fish attempting to spawn upstream.[165]

1874 **(August 20)** In an article providing insights into the early topography of the Truckee River through the City of Reno and the Truckee Meadows before extensive flood control measures were taken by the U.S. Army Corps of Engineers in the 1950s and 1960s to remove islands and meanders, and straighten and deepen the river's channel, the *Nevada State Journal* (Reno) related a visit to Poor and Cossitt's islands, located about a mile and a half from Reno. The account noted "there are four islands, formed by the branching of

the Truckee, from one to five acres in extent, thickly covered with willows and cotton wood...wild flowers, gooseberries and currants, grow abundantly...shade made so perfect by the overhanging trees that scarcely a ray of sunshine penetrated..."[166]

1874 **(September 2)** The importance of farming and irrigation to the early Truckee Meadows economy was noted by the *Nevada State Journal* (Reno): "The farmers on the Truckee Meadows have reason to congratulate themselves on their hay crop this season...M.C. [Myron] Lake and Len Savage, two of our largest ranchers, have lately sold to the Virginia & Truckee Railroad 100 tons [of hay] each, receiving...market price."[167]

1874 **(November)** In a letter from the Pyramid Lake Indian Agent to the Commissioner of Indian Affairs, it was reported that the entire Truckee River channel into Pyramid Lake was blocked by logging debris and sawdust, consequently diverting the river's entire flow into Mud [Winnemucca] Lake.[168]

1875 **(January 9)** In the Governor's message to the Nevada Legislature, as reprinted in the *Nevada State Journal* (Reno), he noted "A subject of importance to many citizens of the State...is the preservation of the fisheries of the Truckee River...unless preventive measures are soon adopted and rigidly enforced, their certain destruction is imminent...The mouth of the Truckee [at Pyramid Lake]...is closed by a bar of sawdust at least a mile in length, three hundred yards in breadth and three feet in depth...I saw hundreds of fine trout dead and rotten upon the shores...The air was poisoned with the stench of their decay..."[169]

1875 **(February 16)** In recognizing the importance of the Truckee River fishery to both the Pyramid Lake Indians and the railroad, the *Silver State* (Winnemucca) noted: "The Piutes [sic] are doing a lively business in Truckee trout...permitted to ride free of charge on trains...taking advantage of the free pass or dead-head system, bring fish from [the] Truckee [River] almost every day and sell it in this market."[170]

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 Tribe.[171] The reservation occupied an area of almost 477,000 acres with its dominant feature, the 108,000-acre Pyramid Lake, located at the terminus of the Truckee River.[172] Later, to halt the decline in Pyramid Lake's water level, the Paiute Tribe would attempt to show that since its cultural heritage was clearly one of fishing and not farming, the reserved water rights (federal "reservation doctrine") established for the reservation should have been based on the water necessary to sustain the lake's fishery, rather than a lesser amount of water based on agriculture and the concept of "practicably irrigable acreage."[173]

1875 The "Bonanza Kings" of the Comstock completed their Pacific Lumber and Flume operation from the Lake Tahoe Basin to near the site of Huffaker's in the southern portion of Truckee Meadows, a small community which had been established in the valley in 1859. For fifteen miles "trestled logs were propelled by waters rushing faster than any train." At the terminus of the flume, the Virginia & Truckee Railroad opened a depot and telegraph office and constructed a spur where workers transferred timbers. From there, the timbers were transported to the Comstock via the rail line from Reno to Virginia City which had been completed in 1872.[174]

1875 Work began on the Highland Ditch, which diverted Truckee River waters from a point just east of Verdi to serve the irrigation needs of the Truckee Meadows and Reno's growing

municipal water requirements. This was a joint construction project of the Highland Ditch and Water Company and several large ranchers in the Truckee Meadows.[175]

1875 Recognition of the riparian doctrine of ownership of water rights in Nevada was provided legal support through the early court case of *Barnes v. Sabron*. It would not be until 1885 that the Nevada Supreme Court would reject this concept and formally approve and adopt the prior appropriation doctrine for all the state's water supplies.[176]

1875 A large dam was constructed on the Truckee River for the lumber mill at Verdi. This structure, which essentially diverted the entire flow of the river through a large holding pond for retaining logs flowing downstream, effectively closed the upper Truckee River to Pyramid Lake cutthroat trout spawning runs. Under threat of litigation, an inadequate fish ladder was eventually added to the dam in 1877.[177] This river impediment to spawning fish provided credible justification to upstream California log milling operators who questioned the need to install fish ladders on their dams as virtually no spawning fish ever reached their locations.[178]

1875 Due to rapidly depleted stocks of native fish species in the Truckee River above Verdi, Nevada, the California Fish Commission released the first foreign fish species—brook trout and whitefish—into the Truckee River above Boca (the outlet of the Little Truckee River).[179]

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.[180]

1876 **(January 21)** As concerns over the viability of the Truckee River fishery intensified, it was noted in both the *Nevada State Journal* (Reno) and the *Truckee Republican* that "...[Legislation is needed] that will prevent white men from employing Indians to catch trout...fish business is increasing because more cunning and diabolical contrivances... brought into requisition... fish in the Truckee is decreasing each year, notwithstanding the increased shipments...Unless stopped soon trout-fishing will be a thing of the past...In 1872 the total amount of fish shipped from the Truckee River was 109,812 pounds; in 1873, 150,657 pounds; in 1874, 161,696 pounds; making a total in three years of 422,165 pounds. No trout stream in America could stand such a drain for any considerable length of time...fish ladders are worse than useless...constitute a narrow raceway...in which the Indians...catch every single trout."[181]

1876 **(January 22)** The *Nevada State Journal* (Reno) reported that part of a stock of one half million young salmon were placed in Lake Tahoe and Donner Lake. The batch was procured from the U.S. Fishery on the McCloud River and donated to the State of California.[182]

1876 **(April 1)** The *Reno Evening Gazette* provided a report from a Mr. John Whitehead of Pyramid Lake, who informed the paper that sawdust and sediment had formed a delta at the mouth of the Truckee River such that most of the river's water was being diverted into Mud [Winnemucca] Lake, thereby resulting in a scarcity of fish in the river. It was noted that due to the diversion, Mud Lake had risen 12 feet above its high water mark while

Pyramid Lake had fallen a similar proportion.[183]

1876 **(August 12)** As an indication of the munificence of Pyramid Lake, the *Nevada State Journal* (Reno) noted that "A gentleman from Pyramid Lake says that in places on the lake are to be seen thousands of pelicans, gulls, ducks, geese and other waterfowl...pelicans often so gorge themselves with fish that they will hardly attempt to fly when approached... may be shot by scores within 50 yards of the shore...trouble is...the pelicans...are worth nothing...unless a market could be found for their feathers and skins."[184]

1876 As the water diversions from Franktown Creek and Hobart Creek Reservoir rapidly 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 body of water located in the Carson Range and which drained into Lake Tahoe.[185] This action would directly divert the waters of the 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.

1877 **(January 20)** The *Nevada State Journal* (Reno) provided a report from Mr. A.J. Barnes, U.S. Indian Agent for the Pyramid Lake Paiute Indian Reservation to the effect that "...prosperous fishing season...commenced about the middle of October and will last until April...Indians are taking about 1,200 pounds of trout daily from the river and lake...sell to the trader for ten cents a pound...ships to Wadsworth...supplies outside markets..."[186]

1877 **(February 24)** As noted in the *Truckee Republican*: "We see by the Reno papers that the trout have begun their annual pilgrimages up the [Truckee] river...We suppose they will get up as far as Jack Foulk's dam, at Verdi, and will be slaughtered by the thousands as they were last year...We do not believe that fifty pounds of fish were caught in the river above that point, all last spring."[187]

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 (128 acres) of it. In 1890, the total acreage was reduced to 320 acres. In order to receive a patent, at least 40 acres (12.5 percent) had to be irrigated.[188]

1877 **(March 5)** In a Nevada Legislature Act to provide for the preservation of fish in the waters of Nevada, it was apparent why the railroads [illegally] employed the Indians to catch fish: Section 4 provided that "shall not be lawful for any person...between the first days of January and June of each year, to catch or kill, any...trout...with any seine, gill-net, or any spear, grab-hook, weir, fence, basket, trap, explosive material...or in any manner except by hook and line..." On the other hand, the Indians were afforded somewhat different and more preferential treatment. According to Section 9 of this Act: "Nothing in this Act... construed to prohibit or prevent Indians from taking trout...at any time...by the same means as heretofore usually used and employed by them [including all of the above prohibited means, except, possibly, explosives]; provided that the same are for their own use..."[189] In this case, apparently, "own use" was loosely interpreted to also include the sale of fish by the Indians to the railroads.

1877 **(March 10)** As reported in the *Nevada State Journal* (Reno): "Since the 25th of last

October, when the fish season commenced, there has been shipped from Wadsworth by M. Rahael 110,000 pounds of trout. During the same period other parties have shipped from the same place nearly 20,000 pounds. The season will close in about 40 days more."[190]

1877 The original Donner Lake Dam was constructed.[191]

1877 Another petition of anti-sawdust Joint Resolution of the Nevada Legislature was sent to the California Legislature in Sacramento.[192]

1877 The office of the Nevada Fish Commissioner was created and Nevada fish planting began in the Truckee River.[193] As was noted in the *Nevada State Journal* (Reno) on April 22nd about the appointment of the first fish commissioner: "Fish Commissioner H.G. Parker was in town...looking after the interest and welfare of the fish in the Truckee...do all possible to prevent unlawful destruction of fish...that 35,000 salmon has been placed in the Truckee...taking measures to stock Washoe Lake with cat fish... pay personal attention to those Verdi dams and see that the fish ladders are put in...the mill men hereafter burn their sawdust...keeping it out of the river."[194]

1877 **(August)** Myron Lake's wooden bridge across the Truckee River at the South Virginia Street site was replaced by a modern iron bridge.[195]

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 Nevada 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."[196]

1878 **(October 30)** The *Nevada State Journal* (Reno) provided a valuable account of the existence of Duck Lake near Pyramid Lake: "...situated just west of the Pyramid Lake Indian Reservation [actually on the reservation], and immediately south of Pyramid Lake, the two being divided by a strip of land something over half a mile in width...no connection with each other...no body of water flowing into it...Duck Lake...two miles wide and five in length...The day we saw it was almost entirely covered...must have been twenty thousand of them...majority being mallard [ducks], though there were a few teal, also a large number of mud hen, and around the shores were many snipe...feast for the hunters..."[197]

1878 **(December 5)** The *Nevada State Journal* (Reno) reported that the fishermen around Pyramid Lake wanted a law to prevent the trout from being taken out of the lake during the months of June, July, and August. It was noted that every summer "thousands of pounds" of fish were destroyed on account of the hot weather.[198]

1879 **(January 10)** The *Nevada State Journal* (Reno) made reference that according to their reliable informants, there existed four dams in the Truckee River between Wadsworth and Reno without fish ladders, hence making it impossible for the trout to come upstream.[199]

1879 **(July 2)** After many years of controversy over fishing rights on Pyramid Lake, the *Nevada State Journal* (Reno) reported that on July 1st the [U.S.] Supreme Court "rendered a decision in the Pyramid Lake case...The decision...is to the effect that Pyramid Lake is within a valid Indian reservation...This decision leaves the Indians in peaceful possession of the contested fishing lands."[200]

1879 The original Independence Lake Dam was constructed on Independence Creek, a tributary of the Little Truckee River. The resulting reservoir had a storage capacity of 3,000 acre-

feet and was used primarily for logging operations along that stream's course.[201]

1879 **(February 5)** Quote in the *Reno Evening Gazette*: "Since the high water, the river has been a riley [turbid], whirling, tumbling mass of sawdust . . . A poor lonesome little fish wouldn't know his own mother two feet away and many of the citizens have been measuring their drink by the board [foot] measure."[202] While no doubt an example of journalistic zealousness, it was a fact that extensive upstream logging and milling operations, with direct discharge of sawdust and other milling debris, had severely degraded the quality of the waters of the Truckee River, frequently making it unfit to drink by Reno's residents. Furthermore, the numerous flumes used to float the logs off the steep hillsides and then down the river to the mills were lubricated with tallow, dogfish oil, or rancid butter, much of which also ended up in the river. In the winter of 1879, it was reported that the Truckee River looked like melted butter as it flowed under the Virginia Street Bridge in downtown Reno.

1879 Congress created the U.S. Geological Survey (USGS) as part of the U.S. Department of the Interior with a mission to undertake serious exploration, mapping, and scientific study of the nation's resources, particularly water resources of the West.[203]

1880 **(January 24)** Attesting to the widespread appeal of the bounty of the Pyramid Lake and Truckee River fisheries, from the *Eureka Sentinel* it was noted that "...fully 1,500 pounds of fresh and salt water fish are consumed in Eureka weekly...Nearly all the trout used are brought from Wadsworth."[204]

1880 **(February 2)** As noted in the *Nevada State Journal* (Reno): "The sawdust in the [Truckee] river is keeping the trout from making their annual pilgrimage up to their spawning grounds. But if you speak to a mill man about it, he will swear upon a stack of black cats that no sawdust is thrown into the water. Queer." And later, on March 17th, this same paper reported that "The sawdust is so thick in the river that the mixture has about the consistency of mush, and unless the fish invent "snow plows" they will hardly get up this far." The following day the paper reported that "The fish have reached Clark's [present-day location of Sierra Pacific Power Company's Tracy–Clark Power Plant] down at the canyon and are plowing their way through the sawdust mush, trying to reach the spawning grounds."[205]

1880 **(March 11)** First mention is made of efforts to begin canning Truckee River trout. The *Nevada State Journal* (Reno) reported that Eugene Griswold was trying the experiment of canning Pyramid Lake cutthroat trout by "putting up" 2.000 cans, and if the scheme works well Mr. Griswold would engage in the business on a large scale at Wadsworth.[206]

1880 **(March 21)** The *Nevada State Journal* (Reno) reported on a new fish law before the California Legislature which would make it a misdemeanor for any person to put lime, gas-tar, or any other substance deleterious to fish in the waters of that state, and provides that sawdust shall not be deemed deleterious." It was noted in this article that "The fish laws of California and Nevada are so timed that one goes into effect about the time the other [state's law] goes out..." and that it would be wise for the fishermen to keep this paper away "...from Lake Tahoe trout, for they might study the thing out and keep on the safe side by crossing the [state] line."[207]

1880 **(March 25)** More mention is made of efforts to can Truckee River [Pyramid Lake cutthroat] trout. The *Nevada State Journal* (Reno) reported that the Griswold Trout

Cannery at Wadsworth, Nevada, "...is not likely to prove successful...may not prove objectionable in the start, but be of temporary benefit...experience of other parts of the country...demonstrates that they are not the kind that will benefit regions with limited supplies of fish...Truckee River cannot meet the demand of an extensive cannery for more than two seasons..."[208]

1880 The timber-cribbed dams constructed at the mouth of Gray Creek, a Truckee River tributary located approximately three miles below Hirschdale and two miles above Floriston, were washed out due to severe flooding within the Gray Creek watershed. These dams were used to create ice ponds for supplying ice to Reno and San Francisco. This was the first reported extensive damage created by this hydrologically unstable watershed and tributary to the Truckee River, but it would certainly not be the last.[209]

1880 **(July)** The Truckee & Steamboat Irrigating Canal Company, organized in 1877, completed the 33-mile long Steamboat Ditch along the western side of the Truckee Meadows to provide irrigation water to farmlands as far south as Steamboat and Pleasant Valley, where the ditch emptied into Steamboat Creek.[210]

1880 **(August 30)** In speaking to the issue of the economic mainstay (see 1908 Winters Rights Decision) of the Pyramid Lake Paiute Indian Reservation, at least in the late 1800s, in his annual report to the Secretary of Interior, Indian Agent James E. Spencer noted that "Of much more value...than all the farming-lands on Pyramid Lake Reservation are its fisheries in the Lake and in the Truckee River, provided they could be thoroughly protected from trespassers...lake and river are very prolific in a most valuable fish...commands a high price...brings them annually a large revenue...chief means of support...most available source of income...propose to spare no efforts to give this fishery complete protection...enter my solemn protest, against such a proposed dismemberment of any of the reservations under my charge"[211]

1880 The total disappearance of Pyramid Lake cutthroat trout above the Verdi dam was recorded. The California Fish Commission replaced this species of cutthroat trout in California waters by an imported species of McCloud River (Alaska) trout, Eastern brook trout, and other non-native trout varieties.[212]

1880 At Lake Tahoe, a 4,000 foot-long tramway was built by the Sierra Nevada Wood and Lumber Company up a steep grade near present-day Incline Village, Nevada. A unique steam-powered cable railway carried cordwood and lumber a vertical height of 1,800 feet to the summit, at which point the logs were dumped into a V-flume and sluiced to lumber mills in Washoe Valley. From there they were carried by wagons up to the Comstock.[213] This began a period of extensive deforestation of the Lake Tahoe Basin. By 1896 most suitable trees within the basin (estimated at up to 60 percent of all mature trees) were cut down and the tramway and flume operation was shut down.[214]

1880 The Highland Reservoir, served by an extension of the Highland Ditch (originally constructed in 1875) to Peavine Creek,[215] was constructed to the north of Reno and began providing municipal and industrial water to the City of Reno. As an open, unfiltered water system, taking water directly from the Truckee River by an open canal which was easily fouled by feedlots and decaying carcasses of range stock, it was not surprising when Reno residents often complained that their municipal water "looks thick and nasty, and tastes and smells just as nasty as it looks, having the flavor of rotten wood, dead fish and general

staleness." Making matters even worse, a strainer at the Highland Reservoir outlet frequently came loose, admitting trout and other fish into the municipal water system's distribution pipes. As the pipe diameters through the network narrowed, the water subsequently transformed the contents of the pipes into infamous "Reno chowder" by the time it reached the kitchen sink.[216]

1880 **(September 18)** Dr. Henry De Groot published an article in the *Mining and Scientific Press* on the origin and meaning of the term "Tahoe," a name which early Washoe (Washo) Indians had used for this lake. The original pronunciation—"Tah-hoe-ee," meaning big lake or water—was abbreviated on his suggestion to "Ta-hoe."[217] And so, finally, Lake Tahoe came by its name. Even so, the State of California continued to cling to its Lake Bigler naming until 1945, at which time the California Legislature finally and officially adopted the Lake Tahoe name as well.[218]

1881 **(1881–1896)** Beginning in this year, Sand Harbor at Lake Tahoe near present-day Incline Village, Nevada, played an important role in the operations of the Sierra Nevada Wood and Lumber Company, one of the three large combines harvesting lumber from the Lake Tahoe Basin for use by the Comstock mines. The steamer "Niagara" towed log rafts from company land at the south end of Lake Tahoe to Sand Harbor where they were loaded on narrow-gauge railway cars and transported two miles north to a sawmill at Mill Creek. From that point they were transported over the incline tramway and down a V-flume to Washoe Valley for transport to the Comstock.[219]

1881 With the waning fortunes at the Comstock mines, Nevada's Twenty-Year Depression began.[220] 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.[221] The railroad and (irrigated) agriculture, however, fostered continued development in the Truckee Meadows. Washoe County's population rose from 3,953 persons in 1875 to 9,141 persons by 1890.[222] From 1890 until 1950 Washoe County would remain the most populous county in the state, but by 1951 Clark County would assume, and thereafter retain, that title.

1881 **(August 31)** In another testament relative to the importance of the Pyramid Lake fishery to the Paiute Indian Tribe, the new Indian Agent, Joseph M. McMaster noted in his annual report to the Secretary of Interior that "The most important means of livelihood to the Indians besides working for white people is their fisheries, the trout from Pyramid Lake and Walker Lake being accounted the very finest, and bring as high a price as any known to the writer." With respect to the numerous acts of trespassing on reservation lands, Mr. McMaster wrote: "And now if the department would order a survey of the reservation so that the lines could be positively defined, and authorize a sufficient force of Indian police, trespassers could be kept off or made to suffer, and the Indians get the benefit which is their due from the fisheries in these waters which have been reserved to them."[223]

1882 **(April 17)** As noted in the *Elko Independent*: "The shipment of fresh Truckee River trout from Wadsworth, thus far this season, amounts to 140,500 pounds." Later it was reported in the *Nevada State Journal* (Reno) on January 24, 1883, that for all of 1882, 200,000 pounds of Pyramid Lake cutthroat trout were shipped from Wadsworth.[224]

1882 **(June 28)** In an illuminating, if not imaginative, account of the food chain of Pyramid

Lake, the *Nevada State Journal* (Reno) reported that "a few days ago a man caught a 16-pound trout at Pyramid Lake. Inside the trout was a 4-pound sucker [cui-ui], and in the sucker was a half-pound chub. Singular to say, there was nothing inside the chub but worms."[225]

1882 **(August)** The problem of waste disposal continued to plague the City of Reno and the Truckee Meadows. Raw sewage was dumped directly into the Truckee River in downtown Reno or, even worse, into the dry riverbed during the late summer months. As the *Nevada State Journal* so eloquently put it: "There has been a great deal of talk lately both in print and personally about the fearful stenches that greet the uncultured nose at almost every point in Reno."[226]

1882 **(August 29)** In his annual report to the U.S. Secretary of the Interior, Indian Agent Joseph M. McMaster noted that the "...[Pyramid Lake Indians] have an important fishery, which last season furnished over 70,000 pounds [of trout], for which the price was 8 cents per pound, or $5,600..."[227]

1882 **(August 30)** As agriculture continued to expand in the Truckee Meadows, the scarcity of Truckee River water relative to needs became ever more apparent, particularly by late summer. As noted by the *Nevada State Journal* (Reno) one hot, dry August day: "The scarcity of water in the river bed is very marked, though easily accounted for in the many ditches taking water above the town. It only needs one more ditch to finish the business and convert the raging Truckee into a totally dry creek."[228]

1882 **(August–September)** Israel Cook Russell surveyed Pyramid Lake. Records of this and earlier visits (Frémont, 1844, and King, 1878) indicate 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 would correspond to a lake surface elevation of approximately 3,863 feet above mean sea level (MSL) and a lake volume of approximately 29,600,000 acre-feet.[229] After diversions began at Derby Dam in 1905, Pyramid Lake's surface elevation would begin a more or less steady decline and eventually reach its recorded low point (nadir) in 1967 (February 6 and March 6) at a surface elevation of 3,783.9 feet MSL. This level corresponded to a surface area of 106,800 acres (170 square miles) and a volume of 19,980,000 acre-feet.

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. By the mid-1990s, Pyramid Lake TDS concentrations had risen to approximately 5,100 mg/l,[230] reflecting the combination of effects from high levels of lake-surface evaporation and reduced Truckee River inflows.[231]

1882 **(September 23)** As reported in the *Nevada State Journal* (Reno) and reprinted from the *Truckee Republican*: "...understands that *tons of trout* [italics added] are being caught in Pyramid and Mud [Winnemucca] Lakes daily. At the latter place a number of white men, Italians and Chinese are fishing, while none but Indians are allowed to take trout from Pyramid Lake. The fish sell for eight cents per pound at the lakes. They are mostly shipped to Sacramento and San Francisco. A few find their way to the Comstock."[232]

1883 **(January)** A new Pyramid Lake Indian Reservation irrigation dam (see 1871 entry) built the previous summer became blocked by ice, thereby preventing passage of Pyramid Lake

cutthroat trout from the reservation and allowing the Indians to sell up to one ton of trout per day to shippers at Wadsworth.[233] As was prophetically reported in a Reno newspaper: "To keep the fish out of the river at this time will cause an immense depletion in their number next year, and if followed up for a few years would render them nearly extinct."[234] Unfortunately, this prophesy proved true in less than 60 years. Even so, no drastic measures were precipitated this time as in 1871 when the objectionable dam was dynamited by Truckee Meadows residents.

1883 **(January 26)** The *Elko Free Press* reported that "It is said that 200,000 pounds of trout were shipped from Wadsworth last year."[235]

1883 **(February 1)** The *Reese River Reveille* (Austin) reported that the "Griswold Trout Cannery at Wadsworth is doing good business...The supply of fish in the great lakes of Nevada is practically unlimited...success...depends wholly upon how the market is cultivated."[236]

1883 **(February 5)** Passed by the Nevada Legislature: Assembly Joint Resolution requesting that the State of California quit depositing sawdust in the Truckee River, because of the detrimental impact on fish.[237]

1883 **(March 2)** The *Nevada State Journal* (Reno) noted that the "...trout canning establishment of Griswold & Company (Griswold Trout Cannery), of Wadsworth has been closed down for a few days on account of a scarcity of [Pyramid Lake cutthroat] trout."[238]

1883 **(August 11)** In his annual report to the U.S. Secretary of the Interior, Indian Agent Joseph M. McMaster noted that "...Their [Paiute Indians'] fishing at Pyramid Lake is of great value to them, as it affords them employment for half the year, and last year sales were something over 75,000 [pounds of trout]...the average price, seven cents [per pound], $5,250...actual sales to outside parties..."[239]

1884 **(February 24)** In an informative account of the state of the City of Reno's water treatment process, the *Nevada State Journal* (Reno) reported on the clogging of Reno's water pipes with fish, noting that "The accumulation of fish in the pipes has effectually shut off the water from a number of places in town."[240]

1884 **(August 4)** A cloudburst in the Sierra Nevada Mountains caused flood waters from Gray Creek to wash out the main trestle of the Central Pacific Railroad at Iceland, located between Hirschdale and Floriston in the upper Truckee River canyon.[241] The Gray Creek watershed is characterized by extremely steep terrain, unstable soil conditions, extensive logging, and over-grazing by livestock.

1885 **(March 25)** As reprinted in the *Silver State* (Winnemucca) and based on a story in the *Truckee Republican*: "...trout have never been more plentiful in the Truckee River than during the present season. Over 160,000 pounds of trout have been shipped from Wadsworth... Indians carry away, free of charge, on the various trains, nearly one-fourth as much fish as is shipped..."[242]

1885 **(April)** In the case of *Jones v. Adams* in which the 1870 lower court case of *Van Sickle v. Haines* was affirmed,[243] the Nevada Supreme Court formally approved the "prior appropriation doctrine" for all the state's water supplies, rejecting an earlier (1875) lower court decision which had given recognition to the doctrine of riparian ownership along Nevada's streams.[244]

1885 **(August 20)** In his annual report to the U.S. Secretary of the Interior, the new Indian Agent, W.D.C. Gibson, noted that the "...[Paiute Indians'] catch in the lake amounted to

80,000 pounds, and netted them $5,600..."[245]

1886 The Reno Reduction Works, a modern custom mill for complex metallurgical ore separation, erected a high masonry dam on the Truckee River east of the Central Pacific Railroad yards in Sparks. Lacking any fish ladder as was required under Nevada law, this structure completely blocked upstream transit of fish on spawning runs from Pyramid Lake. Furthermore, the mill discharged its chemical wastes and rock residues directly into the Truckee River, an activity fully legal in Nevada at the time.[246]

1886 **(September)** J.L. Stevenson founded the Reno Electric Light Company using rented space at the Reno Reduction Works, located about a block east of the present Wells Street Overpass and on the north bank of the Truckee River. The company installed a water powered dynamo using the dam recently erected at the site and began selling electrical power to the City of Reno for street lamps and other public buildings.[247]

1886 **(October 25)** Providing an indication of the extensive wetland area that existed prior to the 1960s in the Truckee Meadows from approximately the present-day Truckee River Bridge on East McCarran Avenue all the way to Vista, the *Carson City Free Lance* reported on this area: "Glendale, a place on the borders of the Truckee River a few miles below Reno is the present mecca of sportsmen. In the vicinity are several small lakes and chains of grass-bordered ponds, pools and sloughs, such as are loved and hunted by the mallard duck. Teal and other ducks abound...coming down from the stormy north...to refresh themselves and to be shot."[248] This area was largely drained between 1963 and 1968 when the U.S. Army Corps of Engineers (COE) undertook extensive flood-control work and river channelization through the Truckee Meadows and destroyed the Vista reefs, a natural obstruction at the entrance to the lower Truckee River canyon which allowed the river's waters to seasonally inundate much of the eastern portion of the Truckee Meadows.

1887 **(January 26)** Senate Joint Resolution was passed by the Nevada Legislature requesting action be taken by the State of California to prevent sawdust from being dumped in the Truckee River.[249]

1887 **(February 18)** Assembly Concurrent Resolution was passed by the Nevada Legislature appointing a committee and appropriating necessary funds to meet with California to resolve the sawdust matter in the Truckee River.[250]

1887 Tapping the waters of Marlette Lake in the Lake Tahoe Basin,[251] a third pressure pipe was installed across Washoe Valley in essentially the same location as the first two (see entries under 1873 and 1875).[252] 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 (Franktown Creek, which enters the Truckee River via Washoe Lake and Steamboat Creek), consisted of three reservoirs (Marlette Lake—Lake Tahoe Basin, Hobart Creek Reservoir—Truckee River Basin, and Five-Mile Reservoir—Carson River Basin), over 21 miles of pressure pipes across the Washoe depression (Washoe Valley), approximately 46 miles of covered box flume, and a tunnel through the Carson Range some 3,994 feet in length.[253]

1887 It is generally believed that in this year H.H. Bence, a Nevada land surveyor, first located a possible canal route which would link the lower Truckee River Basin and the lower Carson River Basin when he was surveying government land in the Carson and Humboldt

sinks.[254]

1887 The California Fish Commission conducted an inspection of the lower Truckee River, noting dams without fish ladders and the existence of other man-made impediments to upstream fish passage.[255]

1887 **(May)** Public meetings were held in Reno to address a petition to the Washoe County Commissioners about local health hazards in the Truckee Meadows. In testimony before the commissioners, Colonel George Waring, a San Francisco engineer hired to plan a new Reno municipal waste system, recommended that all the city's wastes be combined and dumped directly into the Truckee River, noting that this would "...not affect the stream to any noticeable extent, [since] nearly all the particles of matter will be devoured by the fishes."[256]

1887 The first recorded introduction of the Mackinaw (lake) trout (*Salvelinus namaycush*) into Lake Tahoe was made. Additional plantings were made at various times in the late 1800s. Small plants in the Truckee River and Walker Lake in 1907–1908 failed due to the lack of suitable water conditions. The Mackinaw trout requires deep, cool waters and rocky bottoms with little or no decaying organic matter to deplete the oxygen content. As a bottom spawning fish, its propagation was relatively immune from the over-fishing taking place in Lake Tahoe's spawning streams which were used by other trout species. The Mackinaw would soon become the dominant sport fish in Lake Tahoe, and there was some speculation that the eventual demise of (Pyramid Lake) Lahontan cutthroat trout in Lake Tahoe was attributed to an epizoötic carried by this trout upon its introduction.[257]

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 the Carson Valley to the east. Rivalries among potential water users in Nevada prevented any effective cooperative efforts on this project.[258]

1888 The Highland Ditch, originally constructed in 1875 in the Truckee Meadows and then extended in 1880 to Peavine Creek and the Highland Reservoir to serve as the primary domestic water service for Reno, was further extended to its full 14-mile length.[259]

1889 A second dam was constructed at Donner Lake by Francis G. Newlands.[260] Later, as a United States Senator from Nevada, Newlands would promote the passage of the Federal Reclamation Act of 1902 and the construction of the Truckee-Carson (Newlands) Irrigation Project in Churchill County, Nevada, which would eventually use a portion of the stored waters in this lake for irrigation purposes.

1889 The U.S. Geological Survey (USGS) began limited measurement of Nevada streams.[261]

1889 **(March 9)** The Nevada Legislature enacted Chapter 113 of the Nevada Revised Statues, 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. 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 Truckee, Carson, Walker, 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.[262] This chapter was subsequently repealed by the 1893 Nevada Legislature.[263]

1889 **(Winter–Spring, 1888–1889)** Over a 6-month period, it was reported that 100 tons of Pyramid Lake cutthroat trout caught by commercial fishermen along the lower Truckee River and in Pyramid Lake were shipped by Wells Fargo express and railroad freight lines to many parts of the United States. It was also noted that many more tons were being removed from the lake and Truckee River by white sportsmen and Indians using "efficient" steel gaff hooks instead of stone spear points.[264]

1889 **(May)** The Washoe County Commissioners finally took action to address City of Reno's sewage problem by announcing Town Order No. 30, which required that all Reno households be connected to sewer pipes which the city had been laying since 1887 by means of convict labor. Another symbol of the frontier lifestyle—the home privy—had been regulated out of existence.[265]

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.[266]

1889 **(August 21)** It was reported in the *Nevada State Journal* that only six weeks after the USGS 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,[267] 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 such a proposed 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 Nevada[268] [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 an irrigation project in the Nevada desert that was beginning to take shape.

1889 The California Legislature passed an anti-sawdust statute, although it would take more than five years to effectively halt discharges of logging debris and construct fish ladders.[269]

1889 **(November)** A group of prominent Reno businessmen formed the Reno Water, Land and

Light Company, which subsequently purchased and consolidated a number of local water and gas companies. One of the principal organizers of this new endeavor was Francis G. Newlands, who later served as a U.S. Senator from Nevada and gained notoriety for his support of the Federal Reclamation Act (1902) and the construction of the Truckee-Carson Irrigation Project (1905).[270] Interestingly, Newlands had previously been the spokesman for the Comstock Union Mill and Mining Company, which had fought against irrigation interests in the Carson Valley.[271]

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."[272]

1890 After this year, annual restocking of fish in the Truckee River became necessary to keep the population numerous enough to meet the demands of sport fishing. Nevada's restocking stressed the McCloud River (Alaska) trout variety and Eastern brook trout and these efforts were supported by the Virginia and Gold Hill Water Company, which annually contributed over 250,000 fry from its Marlette Lake fish hatchery.[273]

1890 Extensive flooding on the Truckee River's tributaries inundated the Truckee Meadows while mud flows emanating from Gray Creek caused the Truckee River to run red through Reno for over a week. It became increasingly apparent that additional upstream flood control was needed on major Truckee River tributaries, particularly the Little Truckee River, Martis Creek, and Prosser Creek.

1890 H.H. Bence, a Nevada land surveyor (see entry under 1887), 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.[274]

1891 The Reno Hydroelectric Power Plant was constructed with a capacity of 250 cubic feet per second (cfs). Later, in 1909, an additional capacity of 46 cfs would be added to this power-generating facility.

1891 In an effort to limit over-fishing of Pyramid Lake cutthroat trout in the Truckee River, the Nevada Legislature passed a statute prohibiting common carriers (railroads) from shipping fish during the closed (spawning) season of late winter and early spring.[275] At first, this effectively controlled commercial fishing on Pyramid Lake and in the lower Truckee River by restricting railroad shipment from Wadsworth.

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.[276]

1891 **(August 17)** Noting a particularly good fishing year for the Pyramid Lake Paiute Indian Tribe, in his annual report to the U.S. Secretary of the Interior, Indian Agent C.C. Warner noted that "...One of the greatest sources of revenue and support of these Indians is derived from the sale of fish caught in the Truckee River and Pyramid Lake, both of which contain an inexhaustible supply of the finest of trout...in a period of five months, they caught and

sold...110,000 pounds of fish, for which they received $8,305.77 in cash..." In addition to the more detailed accounting than his predecessors, this agent also raised an ominous warning pertaining to a recent fish law passed by the Nevada Legislature which the agent estimated would "...lessen their receipts at least 75 percent." [277]

1891 **(September 1)** Pyramid Lake's maximum surface elevation in recent history was recorded at 3,878.2 feet above mean sea level (MSL).[278] According the bathometic tables of the lake,[279] 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 Lake's lowest point (nadir) was recorded to have been reached on February 6, and March 6, 1967, when it attained a surface elevation of 3,783.9 feet MSL, corresponding to a volume of approximately 19,980,000 acre-feet, a surface area of 106,800 acres (167 square miles), and a maximum lake depth of 325 feet. Compared to 1891, this represented a decrease in Pyramid Lake's surface elvation and lake depth of 94 feet, a decreased volume of 11,750,000 acre-feet, and a decrease in surface area of 37,200 acres, or approximately 58 square miles.

1892 In response to the 1891 Nevada statute which was intended to limit commercial fishing on Pyramid Lake and along the lower Truckee River through transport restrictions placed on common carriers (railroads), the reservation agent closed the upstream Indian irrigation dam on the lower Truckee River and effectively held the winter-spring fish run below Wadsworth. To circumvent the new law, suppliers used wagons instead of railroad cars to haul the fish to market.[280]

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 West.[281]

1894 **(April 6)** As reported in the *Genoa Weekly Courier* pertaining to Indian fishing at Lake Tahoe: "...Indians...up this week and went back loaded with fish which they got in Taylor Creek [at the south end of Lake Tahoe], where the fish are now on their annual spawning expedition...carry away about three tons of fish every spring, besides destroying millions of spawn. If there is a law to protect trout while they are spawning, it should be enforced...no reason why the Indians should be exempt."[282]

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.[283]

1895 **(March 16)** Recognizing the growing risk to the viability of the Truckee River fishery, the Nevada Legislature passed a law stating "It shall not be lawful for any person or persons between the first day of October of each year and the first day of June each year to catch or kill any...trout..."[284]

1895 **(May 4)** In a defeat for the fish, the *Wadsworth Dispatch* reported that a "...portion of the fish law was declared unconstitutional, in the [Nevada] Supreme Court recently. A section

of the remaining portion of the law is that it is not a misdemeanor to carry fish; so any person sharp enough to catch them without detection, can ship them without fear. Express and railroad companies can transport them and not be subject to prosecution."[285]

1895 Many water customers of the Reno Water, Land and Light Company, which had been organized in 1889, began to suspect that the frequent summer "fevers" and other seemingly inexplicable illnesses suffered by the local population were due to Reno's untreated drinking water, much of which came directly from the Highland Reservoir which was fed by the Highland Ditch. Water samples sent to California for testing proved to be alive with harmful organisms and water company officials, confronted with such overwhelming evidence, subsequently advised customers to boil their water before drinking it.[286]

1895 **(November 23)** It was reported in the *Wadsworth Dispatch* that the California authorities have stopped the sale of Nevada trout in their markets and that Wells Fargo & Company railroad express agents and the Sierra Pacific Railway Company would not accept shipments for California points.[287]

1896 **(February 15)** As noted in the *Wadsworth Dispatch*: "...California Fish Commissioners... decided to discontinue stocking the Truckee River in California...all the fish...go down the river...On account of the wretched condition of the fish-ladders at the dams in Nevada they are unable to return to the headwaters..."[288]

1896 **(September 28)** The Indian Agent for Nevada, I.J. Wooten, noted that "...Pyramid Lake abounds in salmon trout, which can be caught almost the year round...The Indians at one time received a large income from the sale of fish caught in Pyramid lake, but this industry has, by enactment of unjust State legislation (see 1891 and November 1895 entries), been totally destroyed and the Indians have seriously felt the loss of revenue from their fish."[289]

1897 **(March 9)** Backpedaling on the preservation of the Truckee River fishery, the Nevada Legislature passed a law reducing the "no-take" period from October 1st–June 1st to October 1st–April 1st.[290]

1898 **(March 25)** The *Genoa Weekly Courier* made note that the California Fish Commission had warned the Indians that no spearing or taking of spawn trout about Lake Tahoe would be tolerated this year and threatened to arrest every Indian "detected" in violation of the law.[291] [Also see April 6, 1894 entry for background information on this matter.]

1898 The California Fish Commission published the findings from its study of the lower Truckee River, stating that the Pyramid Lake Indian Reservation's irrigation dam represented the single most critical impediment to Pyramid Lake cutthroat trout migration on the Truckee River.[292]

1898 **(June 10)** The *Genoa Weekly Courier* reported that "Between three and four thousand Mackinaw (lake) trout from the Sisson hatchery were planted in Lake Tahoe last week."[293] From is first recorded introduction to Lake Tahoe in 1887, this species would eventually become the most important sport fish in the lake, and, according to speculation, bring about the ultimate demise of Lake Tahoe's cutthroat trout population (1922–1928) through the introduction of an epizoötic carried by the Mackinaw trout species.[294]

1898 **(September 6)** As pointed out in the *Tuscarora Times-Review*: "The Truckee River, once the grandest trout stream on the coast, is now declared to be almost depopulated of all but catfish."[295]

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 the Truckee River Basin. These studies became crucial in the approval and subsequent development of the Truckee-Carson (Newlands) Irrigation Project in 1902, to be located in Churchill County, Nevada.

1899 Reno's electric utility company—Reno Water, Land and Light Company—constructed a hydropower plant and associated diversion dam two miles upstream from downtown Reno, further impeding upstream passage of spawning fish from Pyramid Lake.[296]

1899 The Farad hydroelectric power plant, located about 18 miles upstream from Reno, was constructed with a capacity of 325 cubic feet per second. The construction of this facility was based on an electrical power contract with the Comstock Pumping Association of Virginia City. Water was diverted from the Truckee River into a flume at Floriston about a mile upstream from Farad. In 1906, an additional 75 cfs would be added to the flume's capacity. Total electrical capacity of this facility was rated at 2.5 megawatts.[297]

1899 **(July 25)** In assessing the business potential of the Pyramid Lake fishery, Indian Agent Fred B. Spriggs declared that "...another industry of importance to these [Pyramid Lake] Indians which should be given more attention is fishing...profitable income from this source if properly attended...Pyramid Lake...filled with a splendid species of marketable trout." In a spark of surprising entrepreneurship (and possible self interest), Indian Agent Spriggs suggested that "...the Government [should] build the Indians a large boathouse and wharf on the lake, provide all the fishermen with boats of their own, and instruct the agent to personally superintend the disposal of their catch.[298]

1899 The Floriston Pulp and Paper Company (FP&PC), located at the present-day site of the community of Floriston, California, commenced operations with the daily discharge of up to 150,000 gallons of acidic waste directly into the Truckee River.[299] By 1903, the Truckee River's water quality had deteriorated to the point where the *Reno Evening Gazette* reported that the river's water at the Virginia Street bridge in downtown Reno consisted of a "blend between black and brown with soapy bubbles covering the surface."[300] Despite court-ordered injunctions and the threat of a Nevada suit filed with the U.S. Supreme Court, direct and indirect (hillside spraying and evaporation ponds) discharges would continue up until late 1930 when the plant would cease operation and be dismantled. This facility would constitute the major source of pollutants in the Truckee River and severely degrade Reno's municipal water quality for a period of some 30 years. Of possible significance in the persistence of its operations was the fact that the FP&PC was owned by the Fleishhacker banking and investment firm of San Francisco, an entity which also controlled the Reno Water, Land and Light Company.[301]

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2. Houghton, *op. cit.*, page 52.

3. Hyne, N.J., et al., *Quaternary History of Lake Tahoe, California-Nevada: Geological Society America Bulletin*, Volume 83, 1972, page 1435.

4. 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, Samuel G., *A Trace of Desert Waters: The Great Basin Story*, University of Nevada Press, Reno, Nevada, 1994, page 63.

5. Houghton, *op. cit.*, page 73.

6. *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.

7. 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.

8. Houghton, *op. cit.*, page 63.

9. 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 11.

10. Houghton, *op. cit.*, pages 26-27 and 78-79.

11. Gorley, Chad, "Historic Overview of Modifications to the Truckee River Ecosystem," *The Truckee River Times*, Volume 6, Number 2, May 1996, pages 3-4.

12. Land, Barbara and Myrick, *A Short History of Reno*, University of Nevada Press, Reno, Nevada, 1995, page 8.

13. 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 21.

14. Houghton, *op. cit.*, page 104.

15. Hulse, James W., *The Nevada Adventure*, Sixth Edition, University of Nevada Press, Reno, Nevada, 1990, pages 34-36.

16. *Ibid.*, pages 34-35.

17. *Ibid.*, page 47.

18. Townley, John M., *Tough Little Town on the Truckee*, History of Reno Series, Volume One, Great Basin Studies Center, Reno, Nevada, 1983, page 24.

19. Hulse, *op. cit.*, pages 36-37.

20. *Ibid.*, page 37.

21. Murphy, *op. cit.*, page 22.

22. Houghton, *op. cit.*, page 29.

23. Hulse, *op. cit.*, pages 49-52.

24. Houghton, *op. cit.*, page 105.

25. Hulse, *op. cit.*, page 40.

26. When first viewed by Frémont, Pyramid Lake was estimated to be some 50 miles long and 12 miles wide (as compared to some 30 miles long and about 8 miles wide today), although this is probably a gross exaggeration. In his journal he reported that the lake "broke upon our eyes like the ocean" and was "set like a gem in the mountains." [See 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.]

27. Houghton, *op. cit.*, page 63.

28. *Ibid.*, page 81.

29. 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.

30. 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.

31. *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 reportedly 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.]

32. Murphy, Shane, *op. cit.*, page 22.

33. 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 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 1840s, 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. [Information provided from "Sutter's Fort State Historic Park" (Pamphlet), State of California, The Resources Agency, Department of Parks and Recreation, April 1989, pages 3–7.]

34. 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.

35. Houghton, *op. cit.*, page 23.

36. 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*), polyctenium (*Polyctenium 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.]

37. Matthew Harbin, a member of this party, had been acquainted with a French Canadian trapper known as "Truckee" when they were both with the Bonneville–Walker expedition in the 1830s. Harbin called their Paiute Indian guide after this trapper and the party, presumably regarding the stream as this Indian's home, named the river after him. [See Hulse, *op. cit.*, page 63.]

38. Carlson, Helen, S., *Nevada Place Names: A Geographical Dictionary*, University of Nevada Press, Reno, Nevada, 1974, page 235.

39. Hulse, *op. cit.*, page 54.

40. Houghton, *op. cit.*, page 54.

41. 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.]

42. Houghton, *op. cit.*, page 105.

43. Historians sometime refer to this group of 87 persons as the Donner-Reed Party, but the term "Donner Party" appears more commonly, perhaps because George Donner was elected captain of the group on June 20, 1846. Of this party, the families of George and Jacob Donner comprised 16 members while the family of James Reed made up 6 members. There were also larger families than the Reeds: The Breen family comprised 9 members; the Graves 12 members (including 2 Fosters); and the Murphy family also had 6 members. Of the 40 members who died, 8 were Donners, 4 were Graves, and 3 were Murphys. All the Reeds and Breens survived the ordeal. [For an extensive analysis of the Donner Party's tragedy, see Grayson, *op. cit.*, pages 277–296.]

44. Hulse, *op. cit.*, pages 55–56.

45. Townley, *Tough Little Town on the Truckee, op. cit.*, page 28.

46. "Sutter's Fort State Historic Park" (Pamphlet), State of California, The Resources Agency, Department of Parks and Recreation, April 1989, page 4.

47. Grayson, *op. cit.*, page 284.

48. Hulse, *op. cit.*, page 59.

49. *Ibid.*

50. *Ibid.*

51. *Multimedia Encyclopedia*, (Electronic Encyclopedia), The Software Toolworks.

52. Sometime between 1963 and 1968, the U.S. Army Corps of Engineers (COE) would remove this rock dike, commonly referred to as the Vista reef, as part of a comprehensive Truckee River "rehabilitation" program to better channelize the river's course and remove potential flood impediments which had, in the past, caused its waters to all to often stray far afield. Interestingly, the result of this action would cause considerable loss of wetlands in the eastern portion of the Truckee Meadows. It also lowered the level of the Truckee River along this reach below the level of Steamboat Creek, causing that stream to begin to erode back up its reach, creating considerable turbidity along the lower Truckee River for some time. [Personal communication with Rick Moser, Water Resources Engineer, Glendale Water Treatment Plant, Sierra Pacific Power Company, Reno, Nevada, 1995.]

53. Townley, *Tough Little Town on the Truckee, op. cit.*, page 36.

54. Hulse, *op. cit.*, page 68.

55. The doctrine of riparian water rights 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.]

56. Carlson, *op. cit.*, page 228.

57. Houghton, *op. cit.*, page 64.

58. *Ibid.*, page 56.

59. Land, *op. cit.*, pages 21–22.

60. Nevada Historical Marker 114, "Franktown."

61. Land, *op. cit.*, pages 22–23.

62. Nevada Historical Marker 238, "Huffaker's."

63. *Ibid.*, page 25.

64. *Ibid.*

65. Murphy, *op. cit.*, pages 22–24.

66. Horton, *Nevada: A Historical Perspective of the State's Socioeconomic, Resource, Environmental, and Casino Gaming Development, op. cit.*, pages 9-10.

67. Townley, *Tough Little Town on the Truckee, op. cit.*, page 34.

68. *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.

69. Nevada Historical Marker 198, "Steamboat Springs."

70. Nevada Historical Marker 191, "Verdi."

71. Hulse, *op. cit.*, pages 89–91.

72. Townley, *Tough Little Town on the Truckee, op. cit.*, page 54.

73. Nevada Historical Marker 212, "Galena."

74. *Ibid.*, pages 52–53.

75. Horton, *Nevada: A Historical Perspective of the State's Socioeconomic, Resource, Environmental, and Casino Gaming Development*, *op. cit.*, pages 8-9.

76. 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.]

77. Houghton, *op. cit.*, page 67.

78. Other irrigation ditches would later be added to this network creating an "arterial system" of ditches covering the Truckee Meadows and dispersing life-sustaining waters to the arid agricultural lands. On the south side of the Truckee River some of the major diversion ditches would include, in order of their upstream diversion, the Steamboat Ditch, the Last Chance Ditch, Lake Ditch, Cochrane Ditch, Abbee Ditch, Scott Ditch (later abandoned when Scott Island, located at the Kirman Avenue-Sutro Street Bridge, became part of the Truckee River's south bank upon channelization of that part of the river in the 1970s), Pioneer Ditch, and Eastman Ditch. On the north side of the river the major diversion ditches included the Highland Ditch, the Orr Ditch, English Mill Ditch, Peoples Ditch, and Glendale Ditch. [This information was obtained from an irrigation ditch map provided courtesy of Sierra Pacific Power Company, Reno, Nevada, 1995.]

79. Nevada Historical Marker 219, "Glenbrook."

80. *Annual Report of the Superintendent of Indian Affairs to the Secretary of Interior for the Year 1861*, Report No. 40, James W. Nye, Governor, Acting Superintendent, Carson City, Nevada Territory, Government Printing Office, Washington, D.C., July 19, 1861.

81. McQuivey, Robert, "Habitat and Fisheries Historical Fact File," Habitat Bureau, Nevada Division of Wildlife (NDOW), Department of Conservation and Natural Resources, Reno, Nevada, 1996.

82. 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.]

83. 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, State of Nevada, Carson City, Nevada, 1991. page 90.

84. *WALKER RIVER ATLAS*, *op. cit.*, pages 52-54.

85. Carlson, *op. cit.*, page 228.

86. Townley, *Tough Little Town on the Truckee*, *op. cit.*, pages 52-53.

87. McQuivey, *op. cit.*

88. Houghton, *op. cit.*, page 64.

89. *Water Treatment Master Plan*, Gas/Water Engineering & Planning Department, Sierra Pacific Power Company, March 1987, page A-3.

90. McQuivey, *op. cit.*

91. Nevada Historical Marker 94, "The Winter's Ranch (Rancho Del Sierra)."

92. McQuivey, *op. cit.*

93. *Ibid.*

94. *Nevada Laws of the Territory of Nevada, Passed at the Third Regular Session of the Territorial Assembly* (Virginia City: John Church & Co., Territorial Printers, 1864), page 146. [Also see Townley, *The Truckee Basin Fishery*, *op. cit.*, page 4.]

95. Townley, *The Truckee Basin Fishery*, *op. cit.*, page 4.

96. The prior appropriation doctrine of water rights, 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 (i.e., without riparian water rights). 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 doctrine states. [See Shamberger, *op. cit.*, pages 4–5.]

97. *Nevada Statutes of the State of Nevada, Passed at the First Session of the Legislature*, 1864-5, Begun December 12th, 1864, and Ended March 11th, 1865 (Carson City: John Church, State Printer, n.d.), page 348. [Also see Townley, *The Truckee Basin Fishery*, *op. cit.*, page 4.]

98. McQuivey, *op. cit.*

99. Strong, Douglas H., *Tahoe: An Environmental History*, University of Nebraska Press, Lincoln, Nebraska, 1984, page 95.

100. *TRUCKEE RIVER ATLAS*, Department of Water Resources, The Resources Agency, State of California, June 1991, page 43.

101. McQuivey, *op. cit.*

102. Townley, *The Truckee Basin Fishery*, *op. cit.*, page 4.

103. Shamberger, *op. cit.*, page 5.

104. McQuivey, *op. cit.*

105. *Ibid.*

106. *Ibid.*

107. *Ibid.*

108. *Ibid.*

109. *Ibid.*

110. *Ibid.*

111. Townley, *Tough Little Town on the Truckee*, *op. cit.*, pages 67–70.

112. The 40th parallel, i.e., 40 degrees north latitude, runs east and west and cuts through the approximate middle of Pyramid Lake.

113. Ammon, Elizabeth, "Historical Changes in Biodiversity Along the Lower Truckee," *The Truckee River Times*, Volume 6, Number 2, May 1996, page 2.

114. Ornithology: The branch of zoology dealing with birds.

115. *Reno Gazette-Journal*, June 3, 1996, pages 1A and 4A, and "Letter to the Editor," June 10, 1996.

116. The 42 bird species that were abundant (A), common (C), or rare (R) in 1868 along the lower Truckee River and which were reported to have completely disappeared by 1976 included (listed alphabetically): American Avocet (C); American Bittern (C); American Goldfinch (R); American Widgeon (A); Ash-throated Flycatcher (R); Bank Swallow (A); Black-chinned Hummingbird (A); Black-crowned Night Heron (R); Black-headed Grosbeak (C); Black-necked Stilt (C); Black-throated Sparrow (C); Cliff Swallow (A); Dunlin (R); Gadwall (A); Golden Eagle (R); Hooded Merganser (R); Least Bittern (R); Loggerhead Shrike (C); Long-billed Curlew (C); Long-billed Marsh Wren (A); Long-eared Owl (C); Marsh Hawk (A); Osprey (R); Peregrine Falcon (One Pair); Purple Martin (R); Rufous-sided Towhee (C); Sandhill Crane (R); Savannah Sparrow (C); Shoveler (C); Solitary Sandpiper (R); Song Sparrow (A); Sora (C); Turkey Vulture (A); Vaux's Swift (C); Virginia Rail (R); Western Tanager (C); White-throated Swift (R); Willet (C); Willow Flycatcher (A); Yellow-billed Cuckoo (R); Yellow-breasted Chat (C); Yellowthroat (C). [See *Reno Gazette-Journal*, June 3, 1996, page 4A.]

117. Townley, *Tough Little Town on the Truckee*, *op. cit.*, pages 66–67.

118. Houghton, *op. cit.*, page 64.

119. McQuivey, *op. cit.*

120. Mud Lake was also the name given by La Rivers, perhaps erroneously, in a picture caption to a natural depression to the west and slightly south of Marble Bluff, located to the south of Pyramid Lake, which was more commonly referred to as Duck Lake. In this newspaper article, however, it is reasonably certain that the writer was referring to Winnemucca Lake, which was generally referred to as Mud Lake at that time. [See La Rivers, Ira, Ph.D., F.A.Z., F.O.M.S., *Fishes and Fisheries of Nevada*, Nevada State Fish and Game Commission, State Printing Office, Carson City, Nevada, 1962., page 140.]

121. McQuivey, *op. cit.*
122. Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, page 95.
123. Townley, *Tough Little Town on the Truckee*, *op. cit.*, pages 116–120.
124. Townley, *The Truckee Basin Fishery*, *op. cit.*, pages 14–15.
125. *Ibid.*, page 39.
126. Nevada Historical Marker 68, "Wadsworth."
127. Townley, *Tough Little Town on the Truckee*, *op. cit.*, page 81.
128. In fact, the U.S. Weather Service station at the Boca Reservoir site recorded the record lowest temperature in California: -45°F (-42.8°C) in 1937. [See *TRUCKEE RIVER ATLAS*, *op. cit.*, page 34.]
129. McQuivey, *op. cit.*
130. Townley, *The Truckee Basin Fishery*, *op. cit.*, page 4.
131. 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.
132. McQuivey, *op. cit.*
133. *Ibid.*
134. *Ibid.*
135. *TRUCKEE RIVER ATLAS*, *op. cit.*, page 4.
136. Townley, *The Truckee Basin Fishery*, *op. cit.*, page 11.
137. Carlson, *op. cit.*, page 228.
138. Houghton, *op. cit.*, page 56.
139. McQuivey, *op. cit.*
140. Strong, *op. cit.*, pages 96–97.
141. McQuivey, *op. cit.*
142. *Ibid.*
143. *Ibid.*
144. Townley, *The Truckee Basin Fishery*, *op. cit.*, page 14.
145. McQuivey, *op. cit.*
146. *Ibid.*
147. *Nevada State Journal*, February 11, 1871, page 2.
148. Townley, *The Truckee Basin Fishery*, *op. cit.*, pages 33–34.
149. McQuivey, *op. cit.*
150. *Ibid.*
151. *Ibid.*
152. Strong, *op. cit.*, page 97.
153. McQuivey, *op. cit.*
154. Nevada Historical Marker 248, "Virginia & Truckee Railroad Right of Way."
155. Townley, *Tough Little Town on the Truckee*, *op. cit.*, page 138.
156. Townley, *The Truckee Basin Fishery*, *op. cit.*, page 11.
157. *Nevada State Journal*, January 10, 1874, page 3.
158. McQuivey, *op. cit.*
159. *Ibid.*
160. *Ibid.*
161. *Ibid.*

162. *Ibid.*

163. *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.

164. McQuivey, *op. cit.*

165. Townley, *The Truckee Basin Fishery*, *op. cit.*, page 5.

166. McQuivey, *op. cit.*

167. *Ibid.*

168. *Nevada State Journal*, November 11, 1874, page 2.

169. McQuivey, *op. cit.*

170. *Ibid.*

171. 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.

172. Briefing Document, Public Law 101-618, Bureau of Indian Affairs, U.S. Department of the Interior, Carson City Office, Carson City, Nevada, February 1994.

173. Practicably irrigable acreage would be based on the 1908 Winters Rights Decision and provided a means to quantify a reservation's water rights based on irrigable acreage to which it may be applied. Under the Winters Doctrine, practicably irrigable acres must meet two criteria: (1) the land must be able to reasonably sustain crops; and (2) the cost of supplying water to the crops must not be unreasonable. [See *Indian Water Rights: Negotiating the Future*, Water Resources Research Center, University of Arizona, College of Agriculture, Tucson, Arizona, June 1993, page 8, and *A Brief Outline of Water Resources on the Walker River Paiute Reservation*, Public Resource Associates, Reno, Nevada, September 1994, page 4.]

174. Nevada Historical Marker 238, "Huffaker's."

175. Townley, *Tough Little Town on the Truckee*, *op. cit.*, pages 137-138.

176. Shamberger, *op. cit.*, page 5.

177. Townley, *The Truckee Basin Fishery*, *op. cit.*, page 12.

178. *Ibid.*, page 13.

179. *Ibid.*, page 22.

180. *The Marlette Lake Water System*, *op. cit.*, page 16.

181. McQuivey, *op. cit.*

182. *Ibid.*

183. *Ibid.*

184. *Ibid.*

185. *The Marlette Lake Water System*, *op. cit.*, page 16.

186. McQuivey, *op. cit.*

187. *Ibid.*

188. Shamberger, *op. cit.*, page 90.

189. McQuivey, *op. cit.*

190. *Ibid.*

191. *TRUCKEE RIVER ATLAS*, *op. cit.*, page 18.

192. Townley, *The Truckee Basin Fishery*, *op. cit.*, page 8.

193. *Ibid.*, page 21.

194. McQuivey, *op. cit.*

195. Townley, *Tough Little Town on the Truckee*, *op. cit.*, page 85.

196. McQuivey, *op. cit.*

197. *Ibid.*

198. *Ibid.*

199. *Ibid.*

200. *Ibid.*

201. *TRUCKEE RIVER ATLAS, op. cit.*, page 19.

202. *Reno Evening Gazette*, February 5, 1879, page 2.

203. Houghton, *op. cit.*, page 119.

204. McQuivey, *op. cit.*

205. *Ibid.*

206. *Ibid.*

207. *Ibid.*

208. *Ibid.*

209. Joplin, Maureen (Geologist), and Hal Fiore (Hydrologist), *Gray Creek Watershed Monitoring Project*, United States Department of Agriculture, Forest Service, April 4, 1995, page 5.

210. Townley, *Tough Little Town on the Truckee, op. cit.*, page 138.

211. *Annual Report of the Commissioner of Indian Affairs to the Secretary of Interior for the Year 1880*, James E. Spencer, Agent, Nevada Agency, Nevada, Pyramid Lake Reservation, Government Printing Office, Washington, D.C., August 30, 1880. As a historical note, on July 20, 1906, after considerable pressure from state and federal government officials, and particularly mining interests, the Walker Lake (now the Walker River) Paiute Indian Tribe ceded 268,000 acres of reservation land (out of 318,809 acres set aside in 1859), including all of Walker Lake and lands surrounding it, back to the federal government. [See *Walker River Chronology*, Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada, and *Water Resources in the Walker River Basin: A Search for Water to Save Walker Lake*, Public Resource Associates, Reno, Nevada, November 1994, page 15.]

212. Townley, *The Truckee Basin Fishery, op. cit.*, page 8.

213. Nevada Historical Marker 246, "The Great Incline of the Sierra Nevada."

214. Houghton, *op. cit.*, page 55.

215. *Water Treatment Master Plan, op. cit.*, page A-1.

216. Townley, *Tough Little Town on the Truckee, op. cit.*, pages 156-157.

217. Carlson, *op. cit.*, page 228.

218. Houghton, *op. cit.*, page 56.

219. Nevada Historical Marker 221, "Sand Harbor (1881-1896)."

220. Hulse, *op. cit.*, page 153.

221. *Population of Nevada Counties and Communities, 1860-1980*, compiled by Waller H. Reed, RSVP Volunteer, Nevada Historical Society, Reno, Nevada, Winter 1983-1984.

222. *Ibid.*

223. *Annual Report of the Commissioner of Indian Affairs to the Secretary of Interior for the Year 1881*, Joseph M. McMaster, Agent, Nevada Agency, Nevada, Pyramid Lake Reservation, Government Printing Office, Washington, D.C., August 31, 1881.

224. McQuivey, *op. cit.*

225. *Ibid.*

226. *Nevada State Journal*, August 11, 1882, page 3.

227. *Annual Report of the Commissioner of Indian Affairs to the Secretary of Interior for the Year 1882*, Joseph M. McMaster, Agent, Nevada Agency, Nevada, Pyramid Lake Reservation, Government Printing Office, Washington, D.C., August 29, 1882.

228. McQuivey, *op. cit.*

229. 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.

230. *TRUCKEE RIVER ATLAS, op. cit.*, page 27.

231. This calculation assumes approximately 55,000 acre-feet of lake surface precipitation and essentially no local surface or groundwater inflows. [See *Pyramid Lake Task Force Final Report*, December 1971, page vi.]

232. McQuivey, *op. cit.*

233. Townley, *The Truckee Basin Fishery*, *op. cit.*, page 41.

234. *Reno Evening Gazette*, January 19, 1883, page 3.

235. McQuivey, *op. cit.*

236. *Ibid.*

237. *Ibid.*

238. *Ibid.*

239. *Annual Report of the Commissioner of Indian Affairs to the Secretary of Interior for the Year 1883*, Joseph M. McMaster, Agent, Nevada Agency, Nevada, Pyramid Lake Reservation, Government Printing Office, Washington, D.C., August 11, 1883.

240. *Ibid.*

241. Joplin, *op. cit.*, page 5.

242. McQuivey, *op. cit.*

243. Dangberg, Grace, *Conflict on the Carson*, Carson Valley Historical Society, Minden, Nevada, November 1975, pages 16-17.

244. Shamberger, *op. cit.*, page 5.

245. *Annual Report of the Commissioner of Indian Affairs to the Secretary of Interior for the Year 1885*, W.D.C. Gibson, Agent, Nevada Agency, Nevada, Pyramid Lake Reservation, Government Printing Office, Washington, D.C., August 20, 1885.

246. Townley, *The Truckee Basin Fishery*, *op. cit.*, pages 13-14.

247. Townley, *Tough Little Town on the Truckee*, *op. cit.*, page 159.

248. McQuivey, *op. cit.*

249. *Ibid.*

250. *Ibid.*

251. In order to move the waters of Marlette Lake, located at an elevation of 7,823 feet above mean sea level (MSL) on the west slope of the Carson Range and 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 two existing diversions (at approximately 0.8 and 1.0 mile downstream from Hobart Creek Reservoir, which is located at an elevation of 7,440 feet MSL).

252. *The Marlette Lake Water System*, *op. cit.*, page 19.

253. 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.]

254. 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.

255. Townley, *The Truckee Basin Fishery*, *op. cit.*, page 8.

256. *Reno Evening Gazette*, May 20, 1887, page 3.

257. La Rivers, Ira, Ph.D., F.A.Z., F.O.M.S., *Fishes and Fisheries of Nevada*, Nevada State Fish and Game Commission, State Printing Office, Carson City, Nevada, 1962, pages 257-264.

258. Strong, *op. cit.*, page 97.

259. *Water Treatment Master Plan*, *op. cit.*, page A-1.

260. *TRUCKEE RIVER ATLAS*, *op. cit.*, page 18.

261. Shamberger, *op. cit.*, page 92.

262. *Ibid.*, page 13.

263. *Ibid.*, page 7.

264. Wheeler, Sessions S., *The Desert Lake—The Story of Nevada's Pyramid Lake*, The Caxton Printers Ltd., Caldwell, Idaho, 1967, pages 92–93.

265. Townley, *Tough Little Town on the Truckee*, *op. cit.*, page 159.

266. Townley, *The Orr Ditch Case*, *op. cit.*, page 16.

267. *Ibid.*

268. *Ibid.*, page 17.

269. Townley, *The Truckee Basin Fishery*, *op. cit.*, page 24.

270. Townley, *Tough Little Town on the Truckee*, *op. cit.*, page 158.

271. For an extensive chronology of Newlands activities before his "conversion" to reclamation projects, see Horton, Gary A., *Carson River Chronology—A Chronological History of the Carson River and Related Water Issues*, Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada.

272. Strong, *op. cit.*, page 97.

273. Townley, *The Truckee Basin Fishery*, *op. cit.*, page 22.

274. Townley, *The Orr Ditch Case*, *op. cit.*, page 16.

275. Townley, *The Truckee Basin Fishery*, *op. cit.*, page 8.

276. 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.

277. *Annual Report of the Commissioner of Indian Affairs to the Secretary of Interior for the Year 1891*, C.C. Warner, Agent, Nevada Agency, Nevada, Pyramid Lake Reservation, Government Printing Office, Washington, D.C., August 17, 1891.

278. Per gaging station records obtained from U.S. Geological Survey, Water Resources Division, Carson City, Nevada. A maximum surface level of 3,877.9 feet MSL may be found in *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.

279. Harris, *op. cit.*

280. Townley, *The Truckee Basin Fishery*, *op. cit.*, page 8.

281. Rowley, *op. cit.*, page 39.

282. McQuivey, *op. cit.*

283. Shamberger, *op. cit.*, page 85.

284. McQuivey, *op. cit.*

285. *Ibid.*

286. Townley, *Tough Little Town on the Truckee*, *op. cit.*, page 158.

287. McQuivey, *op. cit.*

288. *Ibid.*

289. *Annual Report of the Commissioner of Indian Affairs to the Secretary of Interior for the Year 1896*, I.J. Wooten, Agent, Nevada Agency, Wadsworth, Pyramid Lake Reservation, Government Printing Office, Washington, D.C., September 28, 1896.

290. McQuivey, *op. cit.*

291. *Ibid.*

292. Townley, *The Truckee Basin Fishery*, *op. cit.*, page 8.

293. McQuivey, *op. cit.*

294. La Rivers, *op. cit.*, page 263.

295. *Ibid.*

296. Townley, *The Truckee Basin Fishery*, *op. cit.*, page 14.

297. *TRUCKEE RIVER ATLAS*, *op. cit.*, page 81.

298. *Annual Report of the Commissioner of Indian Affairs to the Secretary of Interior for the Year 1899*, Fred B. Spriggs, Agent, Nevada Agency, Wadsworth, Pyramid Lake Reservation, Government Printing Office, Washington, D.C., July 25, 1899.

299. Townley, *The Truckee Basin Fishery, op. cit.*, page 51.

300. *Reno Evening Gazette*, October 14, 1903, page 4.

301. Townley, *The Truckee Basin Fishery, op. cit.*, page 50. Of particular interest with respect to this matter is that Mr. Mortimer Fleishhacker also served as the President of the Truckee River General Electric Company in the early 1900s. [See *Pipe & Wire: A Historical Profile of Sierra Pacific Power Company*, Sierra Pacific Power Company, Reno, Nevada, 1977, page 16.]

Truckee 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. Newlands[1] of Nevada gave a speech which symbolized his entry into national prominence within the reclamation movement.[2]

1900 **(July 21)** As printed in the *Lyon County Times* (Dayton, Nevada): "It is said that the refuse that goes into the Truckee River from the Floriston paper mill is killing thousands of trout in that stream." Expressing similar concerns, from the *Tuscarora Times-Review*: "The poisonous refuse from the Floriston paper mill [Floriston Pulp and Paper Company (FP&PC)] above Reno is said to be killing fish in the Truckee. The attention of the California Fish Commissioners will be brought to the matter."[3]

1900 As a result of renewed California interest in a Lake Tahoe water supply, an inspection party from the City of San Francisco visited Lake Tahoe. Based on strong opposition from Nevadans and the formidable engineering requirements of such a project, the party concluded that a more accessible water supply could be obtained from the western slope of the Sierra Nevada Mountains.[4]

1901 Dr. James Edward Church, Professor of Classics at the University of Nevada, Reno, and an enthusiastic outdoors man, first 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 indicating 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.[5]

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.[6] 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 **(June 17)** Congress passed the National Reclamation Act, which created the U.S. Reclamation Service (USRS), which was 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 U.S. Bureau of Reclamation, 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 **(June)** Immediately following the passage of the National Reclamation Act, the U.S. Reclamation Service opened negotiations for the purchase of the Lake Tahoe Dam at Tahoe City, California, from the Donner Boom and Logging Company. Unknown to the government, the downstream power companies had also entered into negotiations for the purchase of this structure.[11]

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."[12]

1902 **(September)** In a complicated series of real estate transactions, for a purchase price of $40,000, the Truckee River General Electric Company (predecessor of the present-day Sierra Pacific Power Company of Reno, Nevada) obtained title to the Lake Tahoe Dam at Tahoe City, California, and a surrounding 54 acres of land.[13] This acquisition would allow the power company to effectively control the flow of the Truckee River.

1902 The Washoe Power Dam was constructed on the Truckee River immediately upstream of the diversion point for the Highland Ditch (constructed in 1875) to divert water into the Washoe Power Canal on the south side of the river. Later, in 1954, this dam would be used to divert waters to the Highland Ditch by means of a 54-inch steel siphon.[14]

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."[15]

1903 **(February 16)** The Nevada Legislature passed the Irrigation Law of 1903 which, among other things, created the Office of the 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.[16] 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.[17] 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 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.[18]

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.[19]

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.[20] 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 Francis G. Newlands that, had he known of the difficulties in turning Lake Tahoe into a reservoir, this project never would have been authorized.[21]

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.[22] Based on this precedent, Anaho Island, located in Pyramid Lake and wholly within the Pyramid Lake Indian Reservation, would set apart as a preserve and breeding ground for White Pelicans and other colony-nesting water birds in September 1913.[23]

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 is part of the Newlands Project in the Lahontan Valley and was intended to divert Truckee River waters for irrigation uses. 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.[24]

1904 **(April)** The town of Harriman, renamed Sparks in 1905 by the State Legislature in honor of John Sparks, rancher and Governor of the State of Nevada, came into existence. The area was initially developed in 1903 as a new division point on the Southern Pacific Railroad. Engaged in straightening and realigning the old Central Pacific tracks across Nevada, the Southern Pacific Company moved its shops, headquarters, and even the homes of its employees from Wadsworth, Nevada, to this location. During the era of steam locomotives, Sparks boasted one of the largest roundhouses in the world and served as the western Nevada base for a vast stable of steam locomotives, particularly the famous cab-in-front articulated type (Mallets), huge steamers which hauled both freight and passengers over the steep grades of the Sierra Nevada Mountains between Roseville, California, and Sparks, Nevada.[25]

1904 The Fleish hydroelectric power plant, located approximately one mile downstream from the California–Nevada border, was constructed along the Truckee River with a capacity of 327 cubic feet per second and an electrical capacity of 2.5 megawatts.[26]

1904 **(July)** Unable to come to an agreement on the purchase of the Lake Tahoe Dam at Tahoe City, the U.S. Reclamation Service optioned sixty-three acres immediately below the existing dam site and planned to construct their own works that would effectively control the river.[27]

1904 The Reno Power, Light and Water Company purchased the facilities of the Hunter Creek Water Company. Subsequently, the Hunter Creek Ditch, originally constructed in 1863, was enlarged and the Hunter Creek Reservoir was constructed. Hunter Creek enters the Truckee River in the Truckee Meadows above the old Mayberry Drive bridge location.

The Hunter Creek water treatment facility would later be supplemented with Truckee River water via the Steamboat Canal (Ditch). Eventually, this facility attained a water treatment capacity of 15 million gallons per day (mgd).[28]

1905 **(February 2)** As part of the Truckee-Carson Irrigation Project (Newlands Project), construction of the Truckee Canal (begun in 1903), which linked the Truckee and Carson rivers, was completed in this year,[29] 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 Law of 1903 to require that any person desiring to appropriate water file an application with the State Engineer for a permit. 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.[30]

1905 Washoe Power and Development Company (incorporated in 1902 with the construction of the Washoe Power Dam) constructed the Washoe hydroelectric power plant at Mogul[31] with a capacity of 396 cubic feet per second. Electrical capacity of this facility was rated at 2.5 megawatts.[32]

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.[33] 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 Reclamation Act of 1902.[34]

1905 **(June 29)** Dr. James Edward Church of the University of Nevada, Reno, established one of America's first high-altitude meteorological observatories on the 10,778-foot summit of Mount Rose, located nearly 14 miles south-southeast of Reno, Nevada. At this location, Dr. Church carried out his famed snow studies from fundamental mathematical relationships first developed in 1901. In his honor, the north summit of Mt. Rose has been named "Church Peak" (approximately 10,600 feet MSL).[35]

1905 **(July)** Based on their newly acquired (July 1904) optioned acreage below the existing Lake Tahoe Dam and their refusal to pay the asking price of $100,000 for the existing dam, the USRS began construction of a government dam at that site. The power companies along the Truckee River immediately filed an injunction and stopped the work.[36]

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.[37]

1905 **(October 29)** Charles T. Short, Al North, and John N. Evans opened and initially operated Moana Springs, a spa fed by hot springs and located in south Reno, Nevada, at the present-day site of Moana Park. The original facility consisted of a large bath house with a pool fed by hot springs, a stately hotel, a clubhouse, baseball diamond, and picnic grounds. Eventually served by a trolley line from Reno, Moana hosted dances, rodeos, boxing matches, trapshoots, circuses and aviation exhibitions. The remaining buildings were demolished in 1957 after the City of Reno purchased Moana for development of a new recreational complex.[38]

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.[39] 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 USRS'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.

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.[40]

1907 **(March 18)** Major flooding occurred along the Truckee River and within the City of Reno. River flow rates were recorded at 14,600 cubic feet per second through downtown Reno. This flood event was primarily a rain-on-snow event, although snow surveys had not yet been developed. The storm built in intensity over the period of March 16–19, 1907, with peak rains generally occurring on March 18. At Donner Summit, recorded rainfall between March 16–19 was 0.30 inches, 1.42 inches, 2.42 inches, and 2.32 inches, respectively. At Truckee, rainfall was recorded at 1.20 inches, 3.10 inches, 3.60 inches, and 0.96 inches over this same period. From available *Nevada State Journal* articles, it appeared that a very warm winds on March 16 and 17 preceded the heavy rainfall and the precipitation recorded in the mountains during this flood event was primarily in the form and rain, which significantly melted the existing snowpack at lower elevations.[41] (By comparison, today a flood stage would be recorded in Downtown Reno at approximately 10,000–14,000 cfs.)

1907 **(July 14, 15, 17, and 18)** Lake Tahoe attained its highest recorded lake surface level over its entire period of record (April 1990–present): 6,231.26 feet above mean sea level (MSL). This corresponded to a lake level 8.26 feet above its natural rim (6,223 feet MSL) and 11.00 feet above its lowest lake surface level of 6,220.26 feet MSL recorded on November 30, 1992.[42]

1907 The first full year of irrigation for the Truckee–Carson Irrigation Project 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.[43]

1908 An Eastern (U.S.) power syndicate, Stone–Webster and Company, acquired an option to purchase the assets of the Truckee River General Electric Company and continued its negotiations with the USRS relative to assuring a constant flow of water for the power company's hydroelectric power's along the Truckee River and for the federal government's water deliveries to the Truckee–Carson Irrigation Project in Churchill County, Nevada.[44] The sale price for the Lake Tahoe Dam had been reduced from $100,000 to $50,000, a figure that the U.S. Reclamation Service still considered as excessive.[45]

1908 The U.S. Supreme Court issued 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.[46] 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).[47]

1908 The "Floriston rates" were first established in an agreement among the Truckee River General Electric Company, the Floriston Land and Power Company, and the Floriston Pulp and Paper Company.[48] The Floriston rates required that there be a mean flow of water in the Truckee River near Floriston, California, of 500 cfs during the period from March 1 to September 30, inclusive, and 400 cfs between October 1 and the last day of February. The agreement required that if there existed insufficient flow from the remaining portion of the Truckee River System to meet these rates, then water would be released, if possible, from Lake Tahoe to maintain the specified rates of flow.

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 the waters of these rivers, leaving uncertain supplies for the Lahontan Valley farmers downstream.[49]

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.[50]

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 establish a dedicated water supply for Lahontan Valley farmers.[51]

1909 **(February 24)** The U.S. Reclamation Service began condemnation action to acquire ownership of the Lake Tahoe Dam at Tahoe City through *United States v. Floriston Pulp and Paper Company, et al.*[52] 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. However, a final agreement would not be reached until June 4, 1915.[53]

1909 The Verdi hydroelectric power plant was constructed with a capacity of 399 cfs and a generating capacity rated at 2.5 megawatts.[54] The diversion point for the canal and flume taking water from the Truckee River would be located approximately one-half mile downstream from the Fleish power plant.

1909 Another tunnel scheme was developed for the Lake Tahoe Basin (see entries under 1860s 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.[55] The plan eventually was abandoned due to severe opposition by lakeshore property owners and the State of California.

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.[56]

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.[57]

1911 Dr. James Edward Church of the University of Nevada, Reno developed the present-day technique of determining the water content of snow. His methodology was first applied to the Lake Tahoe Basin and thereby made possible the accurate prediction and eventual control of the seasonal adjustment in lake, reservoir, and river levels.[58]

1911 **(July 1)** Pyramid Lake's surface water level was recorded at 3,870.0 feet above mean sea level (MSL). This measurement was taken approximately six years after diversions began on the lower Truckee River at Derby Dam. By February 6, and March 6, 1967, Pyramid Lake's surface elevation would reach its nadir (lowest point) at 3,783.9 feet MSL, a decline of 86.1 feet over a period of 56 years.[59]

1912 As late as this year, it was reported that Fred M. Crosby, a commercial fisherman operating at Sutcliffe, located near Pyramid Lake, was shipping 10–15 tons of Pyramid Lake cutthroat trout each week. The trout were caught by Crosby's 40–50 Indian fishermen and sold in Tonopah, Goldfield, Manhattan, Rhyolite, and other mining towns and cities of Nevada.[60]

1912 **(April)** During the driest year of the new century, with snowpack 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.[61]

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.[62]

1912 The Southern Pacific Railroad began construction of a branch line from Fernley, Nevada, to Westwood, California, along the west side of Pyramid Lake. Completed in 1914 with the primary intention of carrying lumber, the railroad line, known as the Fernley and Lassen Railway, ceased operations in 1970 when the mills ran out of timber. Eventually, all rails and ties were removed by the railroad, although at first the Pyramid Lake Paiute Indian Tribe attempted to claim them as fixtures of tribal property. Today, only the barren roadbed remains.[63]

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.[64]

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.[65]

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.[66] 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,[67] and later in 1970–1971 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.[68]

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."[69]

1913 **(March 30)** Litigation between the U.S. Reclamation Service and virtually all Nevada upstream water users on the Truckee River began (*United States v. Orr Ditch Water Company, et al.*).[70] 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;[71] 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 Claiming that the fish ladder at Derby Dam on the lower Truckee River was inadequate and that the spawning Pyramid Lake cutthroat trout would merely die crowded below the dam, the Pyramid Lake Paiute Indians undertook to harvest the entire winter and spring fish run on the reservation, stretching nets across the river near the reservation headquarters and thereby trapping the fish.[72]

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 concrete slab and buttress structure with 17 vertical gates. The new Lake Tahoe Dam was actually located 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 (established at between 6,223.0 MSL to 6,229.1 MSL), thereby creating a storage capacity of approximately 744,600 acre-feet.[73]

1913 **(September 4)** By Executive Order of President Woodrow Wilson, Anaho Island, located in Pyramid Lake and wholly within the Pyramid Lake Indian Reservation, was set apart as a preserve and breeding ground for White Pelicans and other colony-nesting water birds.[74] The continued lowering of lake levels has threatened to bridge the island to the mainland, destroying its isolation. This area, now known as the Anaho Island National Wildlife Refuge (NWR), presently covers approximately 750 acres.[75]

1913 The Idlewild municipal water plant was first utilized for emergency domestic water needs of Reno, Nevada. During such conditions, water was pumped from a forebay serving the old Reno Hydroelectric Power Plant to the intake of the Idlewild water treatment plant. The facility eventually attained a treatment capacity of 17 million gallons per day.[76]

1915 Lahontan Dam and Reservoir on the lower Carson River was completed creating a maximum storage capacity of approximately 294,000 acre-feet (317,000 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.[77] This gave the USRS 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).[78]

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 Lake Tahoe Dam. 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, while all water rights not appropriated by the power company were allocated to the federal government. This Truckee River General Electric Decree effectively granted the USRS an easement to operate the Lake Tahoe Dam at Tahoe City, 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.[79] [See Part I, "Truckee River Operating Requirements and Procedures," for a complete listing of these rates.]

1915 The road between Wadsworth, Nevada, and Donner Summit in California above Donner Lake, became a part of the Lincoln Highway in conjunction with the San Francisco Exposition. This early route followed the Truckee River for much of its course from Wadsworth to Verdi, where it then veered off through Dog Valley, returning to the Truckee River corridor at Boca.[80] This placed much of the Truckee River corridor, as well as the town of Truckee, California, and the city of Reno, Nevada, on the nation's first coast-to-coast highway and dramatically reduced transportation time, allowing road transport to begin to effectively compete with rail transport. Later, much of this route would be followed by U.S. Highway 40 and eventually by the Interstate 80 highway system.

1916 It was reported that Fred M. Crosby, a commercial fisherman operating at Sutcliffe, located near Pyramid Lake, that an Indian fisherman caught a Pyramid Lake cutthroat trout weighing in at 62 pounds. This was the largest *reported* catch of such a fish in the Truckee River system. The largest *recorded* catch, at 41.5 pounds, was made by a Paiute Indian, Johnny Skimmerhorn, in 1925.[81]

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.

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 The Nevada Legislature passed a law banning water meters in Nevada cities having a population of more than 10,000 persons.[82]

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.[83]

1919 **(August)** Judge Edward Silsby Farrington of the U.S. 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.[84]

1920 In this year, the road through the lower Truckee River canyon between Wadsworth and Reno, Nevada, and the upper Truckee River canyon between Reno, Nevada, and Truckee, California, which had been known as the Lincoln Highway became part of the Victory Highway. In 1925, when federal highway names were replaced by a numerical system, the Victory Highway became U.S. Highway 40. Then in 1958, after reconstruction, this route became the initial section of Interstate 80 stretching across eastern California and western Nevada.[85]

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.[86]

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 other water users in the Truckee Meadows and was organized specifically to protect their interests from the downstream Newlands Project water claimants.[87] 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.

1922 **(1922–1928)** The wholesale and ultimate demise of the cutthroat trout in Lake Tahoe took place over this period. While it was believed that the introduction of the Mackinaw (lake) trout species in 1885 contributed to the decline of this species, realistically, the Mackinaw is a deep lake feeder and the two species were probably not in close contact. More to the point, others believe that had the cutthroat trout's spawning streams at Lake Tahoe been

better managed (the Mackinaw is a bottom spawner), this species would have "held its own." There was also some speculation that the cutthroat trout's ultimate demise was caused by an epizoötic carried by the Mackinaw (lake) trout species.[88]

1923 The U.S. Reclamation Service (USRS) was officially renamed the U.S. Bureau of Reclamation (USBR).

1924 **(July)** The Special Master appointed in 1919 by the U.S. District Court of Nevada in the 1913 suit *U.S. v. Orr Ditch Water Company, et al.*, issued a report and proposed decree. The report awarded the Pyramid Lake Paiute Indian Reservation an 1859 priority date on the Truckee River for a flow of 58.7 cfs and 12,412 acre-feet annually to irrigate 3,130 acres of reservation lands. The Newlands Project was awarded a 1902 priority date for a 1,500 cfs flow to irrigate, to the extent the amount would allow,[89] 232,800 acres of land within the project.[90]

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.[91]

1925 The largest recorded Pyramid Lake cutthroat trout, weighing in at forty-one and one-half (41.5) pounds, was caught in Pyramid Lake by Johnny Skimmerhorn, a Paiute Indian.[92] This strain (sub-species) of Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) developed to a maximum length of about four feet and a maximum weight of well over 40 pounds. It is believed that much larger ones were taken from the lake and lower reaches of the Truckee River in preceding years (see 1916 entry) before anyone made particular note of such matters.[93]

1926 **(February)** The U.S. District Court in Reno issued 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.[94] 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.[95]

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 laterals, canals, and 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-feet[96] for

the irrigation of, and not to exceed, 74,500 acres of land.[97]

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.[98] 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,[99] 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 Watermaster. 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.[100]

1928 The Truckee River Basin 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 the Reno–Sparks metropolitan area and would not be exceeded in drought severity until the most recent drought period which began in 1987 and lasted through 1994.[101] Interestingly, both of these severe drought periods had essentially the same duration.

1929 The present-day dam at Donner Lake was completed. Total storage capacity of this lake was established at 9,500 acre-feet, between 5,924 feet MSL and 5,935.8 feet MSL.[102]

1929 Lake Tahoe fell below its natural rim and by prior agreement approximately 33,960 acre-feet were pumped from the lake in this year.[103]

1929 This period marked the beginning of a period of intense study of the Truckee River and the Truckee River Basin and several reports were issued on river storage and operations. These studies comprised an important part of the Truckee River's operating criteria which were later incorporated into the 1935 Truckee River Agreement.

1929 **(June)** The Washoe County Water Conservation District (WCWCD) was formed to seek ways of developing a supplemental irrigation water supply for the Truckee Meadows.[104] The District originally covered 29,000 acres of farmland in the Truckee Meadows, with small acreage near Lagomarsino Canyon and in Spanish Springs Valley to the north.

1929 The federal Migratory Bird Conservation Act was passed which provided the authority for purchasing land and establishing federal refuges for migratory birds.[105]

1930 Lake Tahoe fell below its natural rim again (see 1929 entry) and approximately 25,080 acre-feet were pumped from the lake during this year.[106]

1930 Due to the intensifying drought conditions in the Truckee River 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, Truckee-Carson Irrigation District, and others to halt the digging, and the trench was subsequently backfilled.[107]

1930 Sierra Pacific Power Company (SPPCo), formerly the Truckee River General Electric Company and subsequently incorporated in Maine in 1928 and in Nevada in 1965, began to install 400 test water meters in Reno and Sparks, Nevada, in anticipation of applying for permission from the Nevada Public Service Commission to retrofit all homes in their service area with water meters. The City of Reno ordered SPPCo to stop its installation program and to remove those meters which had been installed. SPPCo filed suit against the city's order in federal court.[108]

1930 **(August 23)**[109] Truckee-Carson Irrigation District filed application permit number 9322 with the State Engineer 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.[110]

1930 **(September 9)**[111] Truckee-Carson Irrigation District filed application permit number 9330 with the State Engineer 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 U.S. Department of the Interior 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.[112]

1931 **(March 19)** Gaming became legal (for the last time) in Nevada and a new growth industry was born, one which would have significant effects on how and where water would be used in the State of Nevada. Some 5,000 California tourists arrived in Reno, Nevada, during the first week of legalized gambling.[113]

1931 The Truckee River's lowest annual discharge (flow volume) was recorded at 133,200 acre-feet, equivalent to an annual average rate of flow of 184 cubic feet per second, well below required Floriston rates of 400-500 cfs. [By contrast, the Truckee River's highest annual discharge was attained in 1983 at 1,769,000 acre-feet, equivalent to an annual average rate of flow of 2,443 cfs.][114]

1931 The Nevada Legislature amended its 1919 law to include the City of Sparks in the ban on water meters. New legislation also amended the law to make it clear that the water meter

ban only applied to Sierra Pacific Power Company by exempting water companies owned by Nevada cities or counties.[115]

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, however, generally not enough water enters this area to maintain it as a viable wetlands. The area is currently managed by the U.S. Fish and Wildlife Service (USFWS) along with the Stillwater NWR (established in 1991) and is included as part of the Stillwater Wildlife Management Area (established in 1948).[116]

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.[117]

1934 Lake Tahoe fell below its natural rim again (see 1929 and 1930 entries) and approximately 24,610 acre-feet were pumped from lake in this year.[118]

1935 **(July 1)** After the United States increased the Pyramid Lake Indian Tribe's water rights to allow for the irrigation of an additional 2,745 acres of reservation land (in additional to the previous 3,130 acres), the defendants in the 1913 suit *U.S. v. Orr Ditch Water Company, et al.*, finally signed the agreement, which was formally adopted on September 8, 1944 as the Orr Ditch Decree.[119]

1935 An unpublished field report by United States Bureau of Fisheries biologist M.J. Madsen pointed out the uncertainties of keeping a viable fishery in Pyramid Lake without sufficient water inflows. This was a pessimism which others had long been expressing.[120]

1935 The United States, Truckee–Carson Irrigation District, Sierra Pacific Power Company, and the Washoe County Water Conservation District entered into the Truckee River Agreement for the conservation and control of flood waters and other uses of the river and Lake Tahoe. The Truckee River Agreement also recognized Lake Tahoe's natural rim at 6,223.0 feet MSL and allowed 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.[121] [See Part I, "Truckee River Operating Requirements and Procedures" for details of these Lake Tahoe pumping restrictions.]

1936 Recognizing its importance as a feeding and nesting area for migrating waterfowl, Winnemucca Lake, a body of shallow, marshy water nearly as long as Pyramid Lake, but only one-half as wide, and located just to the east of Pyramid Lake, was declared a National Wildlife Refuge (NWR).[122] This body of water, even before the commencement of Truckee River diversions at Derby Dam, had undergone significant fluctuations

throughout its recorded history, and was frequently little more than a marsh and mud flat.[123] Even so, this wetland area, along with the Lahontan Valley wetlands to the south in Churchill County, served as crucial feeding and nesting areas on the eastern edge of the Pacific Flyway. Later this designation as a NWR would be withdrawn when it became apparent that Lake Winnemucca could not remain filled with water.[124]

1937 **(December 10–12)** Major flooding occurred in the Truckee Meadows with Truckee River peak rate of flow recorded at 15,500 cubic feet per second through downtown Reno at 4:00 p.m. on December 11. This storm system, while of relatively short duration, was very heavy and widespread on a great many stream systems of western Nevada. The system typically produced heavy rains up to 8,000 feet MSL with snow accumulating above that level. At Soda Springs, located just on the western side of Donner Summit, accumulated precipitation in the form of rain totaled 12.83 inches, with 10.80 inches falling on just December 10 and 11. In downtown Reno, the Chestnut Street bridge over the south channel at Wingfield Park (now Arlington Avenue) was badly damaged and had to be rebuilt the following summer. Other bridges to the east (downstream), however, remained open to traffic.[125]

1937 Sierra Pacific Power Company acquired ownership of Independence Lake and Dam from the Hobart Estate Company and enlarged the lake's storage capacity to 17,500 acre-feet.[126] Of this storage amount, 3,000 acre-feet consisted of a senior storage priority and represented the capacity of the earlier reservoir.

1938 Lake Winnemucca, part of which was located within the borders of the Pyramid Lake Indian Reservation and which was located parallel to and just east of Pyramid Lake, completely dried up due to insufficient Truckee River flows.[127] Only two years earlier, in 1936, this area had been designated as a National Wildlife Refuge, but the refuge status was abandoned in 1938 when it was realized that Lake Winnemucca would never refill.[128] Realistically, however, in a period spanning from the mid-1880's to the end of the nineteenth century, even without Truckee River water diversions at Derby Dam, this lake's condition had varied from almost dry, to a mud flat, to a marshy area, to a shallow lake. Even earlier geological evidence has suggested that the lake underwent extreme fluctuations in water levels and periodically completely dried up. In fact, some early writers of this area referred to the lake as Mud Slough and Mud Lake rather than Winnemucca Lake.[129] Even so, with periodic Truckee River water inflows during high water years, this area abounded as a natural wetland with diverse plant and animal life and represented a crucial environmental resource for the feeding and nesting of migratory waterfowl, and particularly the nesting White Pelicans from Pyramid Lake's Anaho Island, located within the Pyramid Lake Indian Reservation. Due to the construction of a roadbed, there exists no chance of high river flows entering this area, and the former Lake Winnemucca will continue to exist as a dry, barren, unproductive lakebed. Today, at the lake's southern end where Truckee River waters once entered, isolated tufa monuments mark where this lake's waters use to be.

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 groundwater laws in the western United States.[130] This act provided the mechanism for designating ground-water basins that the State Engineer determines are in

need of additional administration. Such a designation usually occurs when groundwater 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 groundwater basin.[131] At the present time, approximately 116 of Nevada's 232 groundwater basins are so designated.[132]

1939 Boca Dam and Reservoir were completed on the Little Truckee River as part of the Truckee Storage Project to maintain Floriston rates and serve the Truckee Meadows and all Orr Ditch water users (including the Newlands Project). The Washoe County Water Conservation District (WCWCD), which had been formed in 1929, was tasked to contract with the federal government to repay the construction costs of Boca Dam and Reservoir. Total storage capacity of Boca Reservoir was 40,800 acre-feet.[133]

1940 In U.S. District Court in Reno, Nevada, Judge Frank Norcross upheld the constitutionality of the state ban and sided with the City of Reno and dismissed a suit filed in 1930 by Sierra Pacific Power Company to permit the installation of water meters. The City of Reno argued on aesthetic grounds that water meters would prevent residents from using sufficient water for trees, shrubbery and lawns and "result in extensive withering and death of the city's flora."[134]

1940 U.S. Highway 40 was completed between the town of Truckee, California, and the city of Reno, Nevada, and followed the Truckee River's entire channel between these communities (unlike the previous Lincoln Highway which left the Truckee River at Verdi and proceeded up through Dog Valley, returning to the Truckee River at Boca). This highway system greatly facilitated automobile traffic to the Truckee–Donner area and on to the Truckee Meadows from northern California, and marked the route that the Interstate Highway 80 would later follow.

1940's Sometime between 1938 and 1944 the Pyramid Lake cutthroat trout (*Oncorhynchus clarki henshawi*), a sub-species of the Lahontan cutthroat trout, became extinct.[135] In 1844 John Frémont had written about these incredibly large trout (40–60 pounds in weight and up to four feet in length were not uncommon) as being the best tasting he had ever eaten.[136] This magnificent strain of fish had abounded in the isolated waters of Pyramid Lake and the Truckee River for thousands of years since the last decline of Lake Lahontan just over 10,000 years ago. From the time of the white man's first arrival, however, it took less than one hundred years to completely decimate this once plentiful species, which had fed the native peoples of this region since their first arrival. Extinction came relatively quickly through a combination of physical impediments to upstream spawning runs, river pollution, sawdust choking the river's waters and covering the trout's spawning beds, and over-fishing during critical spawning periods by whites and Indians alike. Future generations would now be denied the inspiring sight of the passage of these magnificent creatures through downtown Reno on their way to their Lake Tahoe and Donner Lake spawning beds.

1941 **(1941–1945)** The U.S. Army Corps of Engineers began construction of the New Truckee River Channel, extending from Marble Bluff to Pyramid Lake, a distance of approximately 2.5 miles. A diversion dam, believed to be completed in 1945, was also constructed at the head of this channel. The purpose of the new channel was to provide water deep for the

trout to spawn. It operated until the flooding of November 1950, when the diversion dam gave way and the river returned to its original course.[137] By this time the project's intent had out-lived its usefulness as the Pyramid Lake cutthroat trout was already extinct.

1943 Donner Lake Dam was acquired from the Donner Lake Company by Sierra Pacific Power Company of Reno, Nevada, and 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 11.8 feet of the lake (between 5,924.0 feet MSL and 5,935.8 MSL) 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.[138]

1944 **(September 8)** Based on a "friendly suit" filed on March 30, 1913 to quantify Truckee River water rights in Nevada (*U.S. v. Orr Ditch Water Company, et al.*), the Orr Ditch (Final) Decree was entered in U.S. District Court in Reno by Judge Frank H. Norcross adjudicating Truckee River water rights and incorporating the provisions of 1935 Truckee River Agreement (along with the Floriston rates), which provided the framework for operating the river to meet those rights. The concept of the "decree" was to establish individual water rights along the Truckee River, while the concept of the "agreement" provided a framework for "operating" the Truckee River in order to satisfy those decreed water rights. The Orr Ditch Decree 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. The Tribe's total diversion amount was set at 30,000 acre-feet per year for irrigation purposes on 3,130 acres of bottom land and 2,745 acres of bench land,[139] but no waters were allocated for Pyramid Lake's preservation or restoration.[140] Only second to these reservation water rights, Sierra Pacific Power Company was granted the consolidated right to 40 cubic feet per second (approximately 29,000 acre-feet per year) of Truckee River flow for municipal, industrial, and domestic purposes in the Reno–Sparks metropolitan area.[141] The United States, received a water right (Claim 3) with a priority date of July 2, 1902 for Truckee River diversions through the Truckee Canal not to exceed 1,500 cfs for the irrigation of 232,800 acres on Newlands Reclamation Project farmlands; modified by 1926 contract to 74,500 acres; storage in Lahontan Reservoir (capacity of approximately 294,000 acre-feet); and other multiple purposes. The project irrigation water was not to exceed (after transportation losses) 3.5 acre-feet per acre per year for bottom lands and 4.5 acre-feet per acre per year for bench lands.[142]

1945 While the name Lake Tahoe had generally become prevalent on maps and official documents, the California Legislature finally cleared up their intransigence on this issue by rescinding their act of 1870 which had applied the name "Lake Bigler" to this lake.[143] Now, by universal consensus, the lake was now "officially" Lake Tahoe.

1947 A bill was introduced in the Nevada Legislature to repeal the ban on water meters. It passed the Senate but died in Assembly committee.[144]

1948 The Stillwater Wildlife Management Area (WMA) was established in Churchill County, Nevada, under a tri-party agreement among 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 lower Carson River Basin. In 1960, the management 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, Stillwater WMA consists of some 146,500 acres (229 square miles) of land.[145] To a considerable extent, this area relies on drain waters from the Newlands Project which, in turn, relies on waters diverted from the Truckee River Basin.

1948 Raw sewage was discovered to be running into Lake Tahoe from land owned by George Whitell. Whitell argued, with some justification, that the sewage resulted from crowds of illegal campers and picnickers who had ignored "no trespassing" signs.[146]

1949 The Nevada Legislature passed a law prohibiting the discharge of wastes directly into Lake Tahoe or within a hundred feet of any tributary stream or creek within the Nevada portion of the Lake Tahoe Basin. The law also required a written permit from the Nevada Department of Health for any construction in the Nevada portion of the Lake Tahoe Basin that required domestic water or sewage disposal in areas draining into the lake.[147]

1949 The California Legislature passed the Water Pollution Control Act of 1949 (the Dickey Act) which transferred the primary responsibility for pollution control from the California Department of Public Health to several regional boards under the State Water Pollution Control Board (currently the California State Water Resources Control Board, or SWRCB). The Lahontan Regional Water Quality Control Board acquired responsibility for the California portion of the Lake Tahoe Basin. This board forbade the discharge of sewage into water sources in the California portion of the basin that failed to meet federal standards for drinking water.[148]

1950s Lahontan cutthroat trout, a strain related to the now extinct strain of Pyramid Lake cutthroat trout, were introduced into Pyramid Lake to replace the Pyramid Lake cutthroat trout variety which became extinct in the early 1940s.

1950 **(November 21)** Major flooding and property damage occurred in Reno and the Truckee Meadows with the Truckee River reaching a flow rate of 19,900 cubic feet per second at the Virginia Street Bridge in downtown Reno. Nine days of rain occurred in the Sierra Nevada Mountains beginning on November 13 and lasting through November 21 with rain falling on each day. The Truckee River's flow peaked through downtown Reno at 1:00 a.m. on November 21, 1950. The storm system began slowly. Between November 13–15, rains were relatively light with 1.58 inches recorded at Soda Springs, 0.91 inches at Truckee, and 0.60 inches at Lake Tahoe. Between November 16–21, however, rainfall increased dramatically with 18.85 inches recorded at Soda Springs, 9.97 inches at Truckee, and 12.78 inches at Lake Tahoe. This flood event caused far more damage to the City of Reno than any pervious flood event.[149] [Since the completion of Prosser Dam and Prosser Creek Reservoir (1962), Stampede Dam and Reservoir (1970), and Martis Creek Reservoir (1971), floods have never again approached this level.]

1950 **(November)** During the November flooding of the Truckee River, inflows into Pyramid Lake attained a maximum rate of flow of 19,000 cubic feet per second. The muddy waters of the Truckee River could be traced up the eastern, deeper side of Pyramid Lake all the way to its northern end. The lack of mixing was marked by a sharp line down the entire length of the lake, separating the green lake waters on the west from the brown, silt-laden

river waters on the east.[150]

1950 **(December 3 and 4)** After ten days of respite from the November 1950 flood event, the worst flood on record on the Truckee River up to that time, rains returned to the Truckee River Basin and surrounding areas. A strong two-day storm dumped 6.38 inches of rainfall at Soda Springs, 3.82 inches at Truckee, and 4.25 inches at Lake Tahoe. The Truckee River through Reno rose to a rate of flow of 11,000 cubic feet per second, but quickly receded by midnight of December 4, 1950.[151]

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 Truckee and Carson rivers to serve (primarily) Nevada agricultural interests and provide for the development of hydropower. Flood control needs were also incorporated into the USBR's study.[152] The Washoe Project contained proposals for both the Truckee River Basin and the Carson River Basin, including:[153]

[1] ***Truckee River Basin***—Prosser Creek Dam and Reservoir (to be located on Prosser Creek), Stampede Dam and Reservoir (to be located on the Little Truckee River upstream from Boca Reservoir), Marble Bluff Dam and Pyramid Lake Fishway (to be located on the Pyramid Lake Paiute Indian Reservation and just upstream from Pyramid Lake);

[2] ***Carson River Basin***—Watasheamu[154] Dam and Reservoir (including the Watasheamu Power plant), Dressler Diversion Dam and Afterbay, Carson Canal, Paiute Dam and Reservoir, and the enlargement of Stillwater Point Reservoir.

All the projects proposed for the Truckee River Basin were completed; however, none of those water projects proposed by the USBR for the Carson River Basin were ever funded or constructed.

1954 Interim channel improvements on the Truckee River and its tributaries in California and Nevada for flood control purposes were authorized by the Flood Control Act of 1954.[155] Initial funding called for the U.S. Army Corps of Engineers to undertake a number of flood protection measures along specific reaches of the Truckee River:[156]

[1] Enlargement of the Truckee River from the Lake Tahoe Dam downstream for a distance of about 3,200 feet to include fish spawning gravels and a fish pool a short distance downstream from the dam;

[2] Enlargement of the channel through the Truckee Meadows that would extend for a distance of approximately 7.5 miles downstream from Reno;

[3] Removal of the Vista reef bedrock control [obstruction] at the Truckee River's entrance into the lower Truckee River canyon;

[4] Intermittent channel improvements downstream from about Vista to Nixon (approximately 47 miles) to compensate for increased flows from the channelization work done in the Truckee Meadows; and

[5] Intermittent channel improvements downstream from Tahoe City, California, to Reno, Nevada (approximately 45 miles).

Construction of these projects was begun by the COE in 1959 and the majority of the work was completed in 1963, with the exception of the work on the McCarran and Parker ranches, which was completed in 1968.[157]

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.[158] Interestingly, sixteen years later, after both states has passed legislation resolving just such water distribution issues by means of the California-Nevada Interstate Compact, Congress refused to ratify it.[159]

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 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.[160] This body worked together until 1968 when a Draft Interstate Compact was produced for consideration by each state's legislature.

1955 During the 1995 session of the Nevada Legislature, as well as in subsequent sessions of 1961, 1969, and 1979, the population limits on banning water meters was increased to allow for growth in the Truckee Meadows.[161]

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 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 TCID, Washoe County Water Conservation District, Sierra Pacific Power Company, and a representative from the subconservancy district in Carson Valley.

1955 **(December)** Reno and the Truckee Meadows were subjected to its worst recorded flooding in history with extensive property damage throughout the Truckee Meadows. The Virginia Street Bridge gage in downtown Reno recorded a flow of 20,800 cubic feet per second.[162] Public concerns intensified over the inability to control the Truckee River's destructive potential.

1956 Congress authorized the Washoe Project,[163] a USBR program intended to build additional upstream reservoir sites on both the Truckee and Carson rivers to serve (primarily) Nevada agricultural interests and provide for the development of 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 or constructed.

1956 The federal Fish and Wildlife Act was passed giving additional impetus to the federal wildlife refuge program by authorizing the U.S. Fish and Wildlife Service (USFWS) to acquire land for refuge purposes for all kinds of wildlife.[164]

1958 **(October 24)** The Sierra Valley Decree (precipitated from *U.S. v. Sierra Valley Water Company, et al.*)[165] was issued allowing the Sierra Valley Water Company to divert a portion of the Little Truckee River in California into the Feather River Basin for use as supplemental irrigation in the Sierra Valley.[166] The maximum allowable diversion was 60 cubic feet per second between March 15th and September 30th of each year, averaging approximately 5,700 acre-feet per year (although as a supplemental water source, diversions typically vary between 1,500 acre-feet to 10,000 acre-feet). The priority date of this water right was set at 1870.[167]

1959 Based on the Flood Control Act of 1954, the U.S. Army Corps of Engineers began major flood control work on the Truckee River with most of the work completed by 1963. Within the Truckee Meadows, these actions resulted in the removal of the Vista reefs and the subsequent draining of considerable wetland areas in the eastern portion of the valley. The lower water levels led to the upstream eroding of Steamboat Creek as its level was now above that of the Truckee River at its confluence. This severely clouded the lower Truckee River for many miles downstream.[168] The Truckee River underwent extensive channelization (straightening and deepening) through much of downtown Reno, greatly affecting riparian areas. These actions also resulted in the removal of a number of small and scenic islands in the Truckee River, including Scott Island, a relatively large island in the middle of the Truckee River near the present location of the Reno Gazette-Journal office building and just downstream from the Kirman Avenue–Sutro Street Bridge. [See August 20, 1874 entry relating to the existence of these unique wildlife habitats located in the Truckee River near Reno.]

1959 **(June)** In anticipation of the completion of Prosser Dam and Prosser Creek Reservoir as part of the U.S. Bureau of Reclamation's Washoe Project, the Tahoe–Prosser Exchange Agreement ("Agreement for Water Exchange Operations of Lake Tahoe and Prosser Creek Reservoir") was finalized whereby certain waters in Prosser Reservoir would be identified as "Tahoe Exchange Water." By this agreement, when waters were to be released from Lake Tahoe for a minimum instream flow (50 cfs winter; 70 cfs summer) and when such releases from Lake Tahoe were not necessary to satisfy the Floriston rates due to normal flows elsewhere in the river, then an equal amount of water (exchange water) could be stored in Prosser Reservoir and used for releases at other times.[169] [This agreement was later approved by the U.S. Supreme Court in *U.S. v. Truckee River General Electric Company*, May 18, 1961.][170]

1959 An engineering study completed for the South Tahoe Public Utility District (STPUD) reviewed four possible methods for sewage disposal in the Lake Tahoe Basin:

[1] Spraying treated effluent onto land sites within the basin;
[2] Direct discharge into the lake;
[3] Injection of effluent into deep wells in the basin; and
[4] Export of effluent from the basin.

Discharge and injection methods were dismissed because of the possibility of increased eutrophication within the lake.[171] The exportation of effluent from the basin was set aside for the time being due to the problems associated with finding suitable disposal sites outside the Lake Tahoe Basin. The study therefore recommended the expansion of spraying the effluent on land within the basin until a better solution could be found. Nevertheless, this report marked an important break with the past by providing insights into the ultimate solution of the removal of treated sewage entirely from the Lake Tahoe Basin.[172]

1960 The Lake Tahoe Basin 's growth was given considerable impetus and its infrastructure and facilities were heavily taxed when the VIII Winter Olympic Games were held at Squaw Valley and at other sites around the area. The eight-mile stretch of Highway 89 which ran alongside the Truckee River between the town of Truckee and the Squaw Valley turnoff was extensively graded and widened to accommodate the influx of visitors.

1961 A suit was filed (*U.S. v. Truckee River General Electric Company* [Decree]) to modify and incorporate the 1959 Prosser Creek Reservoir agreement between the United States, Sierra Pacific Power Company, TCID, and the Washoe County Water Conservation District.[173]

1962 Scientists using an 8-inch secchi disc and a hydrophotometer found that the disc was discernible in Lake Tahoe at a depth of 136 feet and light was detectable at 500 feet. Seven years later, in 1969, in a repeat test, the secchi disc was visible at only 100 feet, equating to an annual four percent reduction in the clarity of the lake's waters.[174] By the 1980s this visibility test recorded the depth at only 75 feet.[175]

1962 Prosser Dam and Prosser Creek Reservoir were constructed with a total reservoir capacity of 29,800 acre-feet.[176] The dam and stored waters are operated and owned by the U.S. Bureau of Reclamation and are used for:

[1] U.S. Army Corps of Engineers flood control requirements;
[2] Exchange for Lake Tahoe releases based on the Tahoe-Prosser Exchange Agreement; and
[3] Spawning needs of the endangered fish species cui-ui in Pyramid Lake.

1962 **(August)** As part of the work undertaken by the U.S. Army Corps of Engineers on reducing the potential flood damage along the Truckee River based on the Flood Control Act of 1954 and begun in 1959, the COE completed its deepening and straightening of the lower Truckee River below Wadsworth.[177] Within six months, however, these river "enhancements" would have an unexpected and disastrous effect on the riparian zone of the lower Truckee River.

1963 **(February 1)** Major flooding occurred along the Truckee River with the USGS gaging station at Vista, Nevada, recording a flow of 18,900 cubic feet per second.[178] The channelization work recently completed by the U.S. Army Corps of Engineers in August 1962 on the lower Truckee River's reach below Wadsworth had not had time to adjust to the modifications and the resultant scouring and erosion were, by all accounts, "catastrophic."[179] In downtown Reno flow rates reached 18,400 cfs at the Virginia Street Bridge. Since about 1900, when streamflow recordings were first initiated, significant floods had occurred in 1907, 1909, 1928, 1937, 1950, 1955, and 1963. While some flood damage mitigation had been afforded with upstream flood storage in 1962 (Prosser Creek Reservoir) and Truckee River channel modifications in the 1950s,[180] the of COE felt that additional flood control measures were still necessary. It had been determined that through the Truckee Meadows the Truckee River had a flood-flow capacity of between 6,000 and 7,000 cfs without major flooding and through Reno itself the river's flood capacity was about 14,000 cfs.[181]

1964 Construction began on a new sewage treatment plant for the Truckee Meadows. The new Reno-Sparks Sewage Treatment Plant, as it was named, would replace two separate primary treatment trickling filter plants in operation by both Reno and Sparks. The new plant, consisting of a secondary treatment activated sludge process, would eventually come on line in 1966 with a capacity to treat 20 million gallons per day.[182]

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 of 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.[183]

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:[184]

[1] Article 35 of the original 1926 compact between the USBR and TCID should be satisfied (406,000 acre-feet of water deliveries from both rivers for a maximum of 74,500 acres of Newlands Project farmlands);

[2] The Secretary of the Interior should promulgate regulations (the OCAP) defining amounts and conditions of water releases for the Newlands Project;

[3] The Secretary of the Interior, in consultation with TCID, will issue regulations on return flows for the Stillwater Wildlife Management Area (WMA);

[4] The drainage and supply system relating to the Stillwater WMA shall be improved;

[5] Public lands will be withdrawn in the Stillwater WMA; and

[6] Policies will be implemented to clearly support the greatest possible flows of water into Pyramid Lake in support of the Pyramid Lake Indians.

1964 **(November)** The U.S. Army Corps of Engineers held a public meeting in Reno to determine local desires and interests pertaining to additional flood control along the Truckee River. Out of this meeting came the COE's proposal for the Verdi Dam and Reservoir, the construction of which would entail flooding much of the Verdi area as well as necessitating rerouting both U.S. Highway 40 and the railroad tracks through this area. Further study on this project was eventually suspended in 1970 due to continued lack of public support.[185]

1965 In a spirit of cooperation, the state legislatures of both California and Nevada created a Joint Study Committee to investigate worsening environmental problems in the Lake Tahoe Basin. The committee would undertake a scientific study and issue a technically sound and highly convincing report detailing the dangers to the lake's environment, the balance of nature, and the worsening quality of the lake.[186]

1965 A government inventory of bird life on Anaho Island in Pyramid Lake listed 7,500 White Pelicans, 1,500 Double-Breasted Cormorants, 4,500 California Gulls, 150 Caspian Terns, and 200 Great Blue Herons.[187]

1965 **(August 16)** A particularly severe thunderstorm caused extensive flooding in the Gray Creek watershed and washed out a railroad bridge along the Truckee River, covering the tracks with rock, mud, and tree debris. Grey Creek enters the Truckee River some three miles below the community of Hirschdale, California, and just over two miles upstream from Floriston, California. As a result of the heavy sediment load of this stream, the Reno-Sparks water treatment plants were forced to shut down due to the resultant turbidity in the river. A series of almost daily thunderstorms had been blanketing the Sierra Nevada Mountains and western Nevada for nearly a month beginning around July 26th.[188]

1966 The Reno-Sparks Sewage Treatment Plant was completed with a capacity of 20 million

gallons per day. In addition to settling tanks (primary process), the new plant consisted of a secondary treatment activated sludge process. In this process, waste is treated by microorganisms in a well-aerated tank to degrade the organic material. A sedimentation tank is then used to remove the resultant sludge.

1966 The Endangered Species Preservation Act was passed. This act constituted the precursor of the Endangered Species Act (ESA) of 1973. Major provisions of this act included:[189]

[1] Identification of native vertebrates in danger of extinction;

[2] Directed federal agencies to preserve habitat when "practicable and consistent;"

[3] Authorized establishment of National Wildlife Refuges (NWRs) to protect habitat; and

[4] Provided no protection except on wildlife refuges.

1967 **(February 6 and March 6)** Pyramid Lake reached its lowest surface level in recent history (3,783.9 feet MSL),[190] 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.[191] The Pyramid Lake fish species cui-ui 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,[192] although other estimates indicate that a lesser amount of approximately 385,000 acre-feet would suffice.[193] 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, thereby resulting in an average annual *deficit* of between 28,080 and 83,080 acre-feet based on these minimum flow requirements. These annual discharges have been as low as 17,450 acre-feet (1992) and as high as 1,888,840 acre-feet (1983).[194]

1967 The Pyramid Lake cui-ui fish species (*Chasmistes cujus*) was identified as in danger of extinction under the federal Endangered Species Preservation Act of 1966.

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 and use as much water from the Carson River as possible and minimize diversions from the Truckee River and improve project efficiency. By this action, total irrigated acreage was set at 74,500 acres and an annual water allocation at 406,000 acre-feet using both the Carson and Truckee rivers. These amounts were originally established in the contract between USBR and TCID in 1926.[195] Project OCAPs would be reinstituted annually through 1972.[196]

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.[197] Since their construction in the early 1900s, 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.[198] 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.[199]

1968 The Pyramid Lake Paiute Indian Tribe filed the first in a series of lawsuits based on the 1967 OCAP (*Pyramid Lake 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.[200]

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) to oversee land-use planning and environmental issues within the Lake Tahoe Basin. However, the compact was never ratified by Congress which would have made it law.[201] Even so, both states chose to implement its terms under individual state legislation. With respect to the Lake Tahoe Basin, the compact provided for a maximum annual gross diversion from all sources of 34,000 acre-feet, of which California was allocated 23,000 acre-feet per year and Nevada 11,000 acre-feet per year.[202]

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 1967, Pyramid Lake's surface elevation had reached its lowest level (nadir) in recorded history (3,783.9 feet MSL) and had declined by some 86 feet over 56 years. Out of this meeting, the Pyramid Lake Task Force was created and subsequently published their findings and recommendations on December 31, 1971.[203]

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. Major provisions of this act included:[204]

[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.

1969 The National Environmental Protection Act (NEPA) was passed establishing the U.S. Environmental Protection Agency (EPA) and requiring that Environmental Assessments (EAs) and Environmental Impact Statements (EISs) be undertaken for major construction projects.

1970 Stampede Dam and Stampede Reservoir were constructed on the Little Truckee River about five miles upstream from Boca Reservoir and eight miles upstream from the confluence of the Little Truckee River and the Truckee River. Total storage capacity is approximately 226,500 acre-feet.[205] The USBR operates the dam and owns the stored

waters. Due to its relatively junior water rights, the reservoir is infrequently filled as several conditions must be met before water can be stored:[206]

[1] Floriston rates must be met;
[2] Truckee River water diversion (Orr Ditch Decree) rights must satisfied;
[3] Boca Reservoir (below Stampede Reservoir) is full; and
[4] Independence Lake (above Stampede Reservoir on Independence Creek) is full.

1970 Due to lack of community support, the U.S. Army Corps of Engineers formally suspended further investigation of flood improvement proposals for the Truckee River that it had submitted for local review in 1964–1965. These proposed flood-control projects included the Verdi Dam and Reservoir and alternative reservoirs at the Lawton, Hirschdale, Truckee, and Gateway sites, storage and interceptor facilities on the Steamboat Creek tributary, and channel improvement in the Truckee Meadows.[207]

1970 **(March)** Based on mounting evidence of degradation to the environment in the Lake Tahoe Basin, and the passage of the California–Nevada Interstate Compact, the first meeting of the Lake Tahoe Regional Planning Agency was held. While initially the body appeared assertive and decisive concerning water quality and environmental matters within the Lake Tahoe Basin, later it would become hamstrung through lack of funds and legal entanglements.[208]

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 Paiute Indian Tribe, including the full rights to use and receive waters of the Truckee River for maintaining Pyramid Lake's fishery.[209]

1970 **(September 19)** The California Legislature adopted the California–Nevada Interstate Compact.[210].

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.[211]

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.[212] 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 A study by the California State Water Resources Control Board (SWRCB) showed that when California's 23,000 acre-feet of annual water rights in the Lake Tahoe Basin were added to then pending applications for water rights within the California portion of the basin, the resultant total of 59,800 acre-feet per year exceeded the provisions of the California–Nevada Interstate Compact by 36,800 acre-feet.

1971 Martis Creek Reservoir was constructed by the U.S. Army Corps of Engineers with a storage capacity of 20,400 acre-feet solely for flood control storage. Today, however, due to a leaking dam, only temporary storage is permitted and inflows typically equal

outflows.[213]

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.[214] 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].[215]

1971 **(December)** The Pyramid Lake Task Force, a group formed in July 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.[216] 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.[217] It was also noted in this report that greater efficiencies in the Newlands Project could save as much as 85,650 acre-feet.[218] It was also 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.[219]

1972 The Clean Water Act (CWA) was passed and was based on the 1965 Water Quality Act. The new act dramatically increased the goals of zero toxic discharges providing for "fishable" and "swimmable" surface waters. Major enforceable provisions of the CWA included:[220]

[1] Technology-based effluent standards for point sources (PS) of pollution;
[2] State-run control program for nonpoint sources (NPS) of pollution;
[3] A construction grants program to build and/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 on wetland provisions has become a crucial factor in the future preservation efforts of wetlands throughout the United States. It also created considerable controversy over the definition and value placed on such areas.

1972 **(1972–1976)** Beginning in this year and continuing over the next five years, University of Nevada, Reno, professors Don Klebenow and Robert Oakleaf performed a follow-up study of the bird species of the lower Truckee River below Wadsworth. In 1868, Robert Ridgway had identified 91 species of birds during a three-week trip to the area at the height of the spring breeding season. Over this more recent five-year period, only 65 species could be identified and of those, 17 were new. Consequently, 42 of the original species identified by Ridgway had completely disappeared.[221] Together, these losses represented a 56 percent reduction in bird species diversity within only about 100 years

along the lower Truckee River.[222]

1972 **(July 11)** Based on an extensive aerial reconnaissance, it was determined that the Newlands Project had 64,388.4 acres of improved irrigated lands. This 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, 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.[223]

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.[224] 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:[225]

[1] Reduce Lahontan Reservoir's storage capacity from a maximum of 319,000 acre-feet [actually 317,300 acre-feet with flashboards installed] 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 authorized] 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 these 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 USBR, and specifically, the 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 (after U.S. District Court Judge Gerhard Gesell), contained new operating criteria for the Newlands Project calling for a stepwise reduction in allowed water diversions 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 Operating Criteria and Procedures would be put into effect during 1985, 1986, and 1987, and the final OCAP would be put into effect in 1988.[226] 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 per year. The court's determination 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 acre per year) and bottom lands (water duty of 3.5 acre-feet per acre per year); (2) project irrigation inefficiencies;[227] and (3) the alleged lack of compliance by TCID with various interim OCAPs.[228]

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 (USFWS) 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. The act also required the re-authorization by Congress every five years.[229] Major provisions of this act included:[230]

[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 the "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 (NWRs) to protect critical habitat;
[12] Establishing a state grant program; and
[13] Appropriating funding for programs through 1978 (5-year cycle).

1973 The Pyramid Lake modern trout weight record was established at 19 pounds, 8 ounces for the strain of Lahontan cutthroat trout transplanted from Walker Lake in the 1950s. These trophy fish attained a length of 30 inches and were up to 18 inches in girth.[231] While impressive, this is still well below the record set in 1925 at 41.5 pounds and nearly four feet in length for the Pyramid Lake variety of Lahontan cutthroat trout, a sub-species that became extinct in the early 1940s.

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. Over a 15-year period (1973–1988) this amount of Truckee River diverted water considered in excess of valid project water rights would grow to over one million acre-feet.[232]

1973 **(August)** The delay by TCID 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 the cancellation of its 1926 operating agreement. Despite USBR directives and a 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 potential danger of refusal to meet the new criteria. The meetings failed to reach an agreement.[233]

1973 **(September 17)** Amid growing frustrations and acrimonious relationships, the USDI gave TCID a one-year required notice of its intention to cancel TCID's contract to operate the Newlands Project, effective October 31, 1974.[234]

1973 Based on growing controversies surrounding the Newlands Project and associated water rights issues, the U.S. District Court in Washington, D.C. (which had issued the Gesell Opinion), ordered the implementation of a new OCAP for the project.[235]

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 (30,000 acre-feet per year) based on the irrigation of farmlands and the concept of "practicably irrigable acreage." In order to attempt to effect this change, the United States, on behalf of the Pyramid Lake Paiute Tribe, filed a lawsuit (originally *U.S. v. TCID*, but later renamed *Nevada v. United States*) against the Nevada parties[236] 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.[237] 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.[238] 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.[239]

1974 **(March)** TCID 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 U.S. 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 take possession and control of the Newlands Project.[240]

1974 **(May)** Washoe County formally requested that the U.S. Army Corps of Engineers consider the economic feasibility of an alternative to their 1964–1965 proposal for additional upstream flood storage on the Truckee River (i.e., the Verdi Dam and Reservoir, as well as alternative proposed reservoir sites).[241]

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 USDI'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.[242]

1975 During this year and into 1976, the U.S. Environmental Protection Agency (EPA) sponsored a plant-scale test by the licensing company of the modified "PhoStrip" version of a phosphorus removal process at the Reno–Sparks Sewage Treatment Plant.[243] Subsequently, a major expansion of the plant was designed and constructed in 1982 employing this process, termed "phosphorus stripping,"[244] and the Reno–Sparks Sewage Treatment Plant became the first wastewater treatment plant in the United States for which this proprietary treatment process was planned and then later used as a designed-in process for phosphorus removal.[245]

1975 Marble Bluff Dam and the Pyramid Lake Fishway, located within the Pyramid Lake Indian Reservation, were completed in an effort to reduce further erosion in the lower Truckee River and to promote the spawning runs of the Pyramid Lake cui-ui endangered fish species.[246]

1975 A record Lake Tahoe Mackinaw (lake) trout weighing 37 pounds and 6 ounces was caught in Lake Tahoe by Robert Aronsen. Also known as lake trout, mackinaw more typically weigh in at three to five pounds. Lake Tahoe also features rainbow trout, brown trout, and kokanee salmon.[247]

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.[248]

1976 **(June)** In response to a letter from the U.S. Department of Justice insisting that the U.S. District Court Federal Water Master in Reno, Nevada, strictly enforce the terms of the 1944 Orr Ditch Decree with respect to the diversion of water from the Truckee River, the Water Master responded by filing a petition (*Petition of the Water Master in United States v. Orr Water 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.[249] Adherence to such practices would, in effect, allow excess Truckee River waters, i.e., unappropriated flood waters, to be diverted at Derby Dam for use in the Newlands Project and within the wetlands beyond, as opposed to allowing them to remain within the Truckee River and flow into Pyramid Lake.

1976 The Safe Drinking Water Act (SDWA) was passed establishing uniform drinking water standards for the nation.[250]

1976 A civil suit was filed by the State of Nevada (*Nevada v. United States*) in U.S. District Court in Reno, Nevada, claiming ownership of Pyramid Lake's lakebed. By its claim, the State of Nevada sought to exert jurisdiction over the Pyramid Lake fishery. In October 1977, the U.S. District Court dismissed the case on grounds of sovereign immunity and the state appealed to the Ninth Circuit Court of Appeals. The Ninth Circuit Court affirmed the dismissal and the U.S. Supreme Court refused to hear the case.[251]

1976 **(October 1)** A suit was filed by the Carson–Truckee Water Conservancy District, Sierra Pacific Power Company, and the State of Nevada (*Carson–Truckee Water Conservancy District (CTWCD) v. U.S. Department of the Interior* [Secretary of the Interior]) seeking mandamus and injunctive and declaratory relief with respect to two issues: (1) Whether the provisions of the Washoe Project Act required a cost reimbursement contract with the Carson–Truckee Water Conservancy District; and (2) If so, whether the provisions of the Endangered Species Act (ESA) of 1973 somehow altered that obligation. This suit dealt with the issue of the use of the waters of Stampede Reservoir, which the Pyramid Indian

Tribe was attempting to have allocated solely for Pyramid Lake and fishery restoration and preservation purposes.[252]

1977 The ban on water meters that applied to Sierra Pacific Power Company was amended by the Nevada Legislature to allow SPPCo to install water meters on all businesses and to initiate a voluntary test program for residential housing units. Federal officials (USBR) informed SPPCo that they could Stampede Reservoir for drought storage if water meters were installed.[253]

1978 **(February)** Sierra Pacific Power Company's Glendale water treatment plant was constructed on the north bank of the Truckee River in Sparks just downstream from the Glendale Avenue Bridge. This facility differed from previous treatment facilities located in the Truckee Meadows (i.e., Highland, Hunter Creek, and Idlewild) in that it used filtration (as opposed to merely sedimentation) as a major component of the treatment process.[254] The treatment facility, however, was limited by its inability to divert water from the Truckee River during low-water flows. Water diversions are made via a rock, concrete rubble, and gravel dam which was originally constructed to divert water for the Sessions Ditch. During normal river flows the dam can divert up to 25 million gallons per day (mgd); however, plant backwashing limitations of the filter element restrict the plant's effective capacity to 22.5 mgd.[255]

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 water rights permitting process since its inception (as the U.S. Reclamation Service) with the National Reclamation Act of 1902.[256]

1978 Amendments were made to the Endangered Species Act (of 1973) to include:[257]

[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.

1978 **(April 10)** The Lagomarsino Wildlife Management Area (WMA) was established along the Truckee River in Storey County near Lockwood and consisted of 120 acres of land donated by the federal government to the State of Nevada for such purposes.[258] This location represents the approximate maximum extension up the lower Truckee River canyon of Ice Age Lake Lahontan at its highstand of 4,380 feet MSL some 65,000 years ago.

1978 **(November 24)** TCID 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.[259] 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.

1979 **(April 3)** The Unites States, on behalf of the Pyramid Lake Paiute Tribe, petitioned the court (*U.S. v. Orr Water Ditch Company, et al.*) for a change in place and purposes of use of water rights decreed to the Tribe under the 1944 Orr Ditch Decree. Responses to the petition were filed by: Sierra Pacific Power Company (June 21, 1979); Albert Alcam & Group 19 Defendants (June 27, 1979); TCID (June 28, 1979; Washoe County (June 29, 1979); Steamboat Canal & Irrigation Company and Last Chance Ditch Company (July 6, 1979); and the State of Nevada (June 21, 1979). The State of Nevada filed a motion to dismiss the suit contending that this matter should be brought before the Nevada State Engineer.[260]

1979 The (Dr.) David L. Koch Cui-Ui Hatchery, Pyramid Lake Fisheries of the Pyramid Lake Paiute Tribe, was completed.[261]

1980 **(October 28)** Based on litigation initiated by the USBR in 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)[262] to resolve water rights disputes between the states of California and Nevada for waters of the Carson River. With respect to waters diverted from the Truckee River, as applied to lands within the Newlands Irrigation 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.*[263] While the Alpine Decree established water duties for bench and bottom lands, it made no identification of those lands. The water duties would apply to all irrigated lands within the Newlands Project and therefore affect allowable diversions from the Truckee River as well. Judge Thompson also granted property owners in the Newlands Project the right of ownership of their water rights ("...Each such landowner is the owner of an appurtenant water right for the patented land...") as opposed to ownership by the federal government (USBR).[264] This action would have important implications with respect to the federal government's ability to cancel, restrict, or re-acquire these water rights from individual owners.

1980 **(December 19)** The Tahoe Regional Planning Compact was amended requiring, among other things, that the Tahoe Regional Planning Agency adopt "Environmental Threshold Carrying Capacities" for the Lake Tahoe Region. The compact further required that withing one year after the adoption of these carrying capacities, the TRPA shall amend its regional plan so that, at a minimum, the plan and all of its elements, as implemented through TRPA ordinances, rules, and regulations, will achieve and maintain the adopted Environmental Threshold Carrying Capacities. These environmental standards would be adopted by the TRPA Governing Body on August 26, 1982.[265]

1981 **(March 18)** The U.S. Department of the Interior filed a Memorandum and Order *(U.S. v. TCID)* to take possession of a 64-acre tract of land surrounding the headwaters of the Truckee River near the point where the river drains out of Lake Tahoe. This tract was originally ceded to the U.S. Reclamation Service by the Truckee River General Electric Company in 1915 by a consent decree for a purchase price of $139,500. The Department of the Interior wished to convey the tract to the U.S. Department of Agriculture (Forest Service) for the purpose of developing a public recreational facility.[266]

1981 **(June 23)** The Pyramid Lake Indian Tribe filed suit (*Pyramid Lake Paiute Tribe of Indians v. State of California, et al.*) against Truckee River water rights holders in California in

order to claim reserved water rights for Pyramid Lake and the Pyramid Lake fishery.[267] This suit is currently pending based on the Negotiated Settlement process (Public Law 101-618).[268]

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 Lake Tahoe and Truckee River basins, would last through 1986. During this 1982-1986 (water year) period,[269] the Lake Tahoe Basin recorded an average annual snow water content 136 percent of normal, ranging from a low of 90 percent of normal (1985) to a high of 202 percent of normal (1983). Similarly, the Truckee River Basin (excluding the Lake Tahoe Basin) recorded an average annual snow water content 136 percent of normal, ranging from a low of 90 percent of normal (1985) to a high of 205 percent of normal (1983).[270]

1981 **(December 4)** The Pyramid Lake Indian Tribe filed a suit (*Pyramid Lake Paiute Tribe of Indians v. U.S. EPA*) seeking a declaratory judgement declaring void EPA's approval of portions of the Nevada Water Pollution Control Regulations. A central issue in this suit was the water temperature standard for the Truckee River's waters.[271]

1982 **(January)** Modifications were made to the Reno-Sparks Joint Water Pollution Control Plant (formerly the Reno-Sparks Joint Sewage Treatment Plant) increasing its total treatment capacity from 20 million gallons per day to 30 million gallons per day. The performance of the phosphorus-removal process "PhoStrip," which was initially installed and tested in 1975-1976, suffered from a number of startup problems including equipment malfunctions and failures, initial unreliable performance of the control system, the inadvertent recycling of phosphorus-rich digested sludge from a storage lagoon external to the plant site, serious infestations of Nocardia in the activated sludge, and periodic upstream discharges of toxic substances. It would not be until early 1985 that these problems would be effectively eliminated and the PhoStrip process began meeting discharge requirements on a continuous basis.[272]

1982 Amendments were made to the Endangered Species Act (of 1973) to include:[273]

[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.

1982 **(July 20)** 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 lower 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.[274]

1982 **(August 26)** By unanimous vote, the Governing Body of the Tahoe Regional Planning Agency adopted a resolution which established numerical goals for nine (9) environmental indicators for Lake Tahoe and the Lake Tahoe Basin. These included: (1) water quality; (2) soil conservation; (3) air quality; (4) vegetation preservation; (5) wildlife; (6) fisheries; (7) noise; (8) recreation; and (9) scenic resources. These "Environmental Threshold Carrying Capacities" for the Lake Tahoe Region were based on a December 19, 1980 amendment to the Tahoe Regional Planning Compact.[275]

1982 **(December 22)**[276] The Pyramid Lake Indian Tribe won an important suit originally filed on October 1, 1976 (*Carson-Truckee Water Conservation District v. Secretary of the Interior*) that obtained dedicated water rights for Pyramid Lake's endangered cui-ui fish species and threatened Lahontan cutthroat trout.[277] The ruling in the 1944 Orr Ditch Decree held that the 1908 Winter's Decision applied to reserved water rights for irrigation only on the reservation; water rights for lake restoration and the fishery operations would have to be adjudicated (determined by court action). This new action provided just such a dedicated upstream source of water for the Tribe's fishery by ruling that the waters of Stampede Reservoir, located upstream from Boca Reservoir on the Little Truckee River, were to be used solely for the benefit of the Pyramid Lake fishery.

1983 **(May 30)** After a winter of relatively high precipitation and snowpack buildup, an estimated 120,000 cubic feet of wet soil slid into Upper Price Lake on Ophir Creek below Slide Mountain. The surge sent 1.8 million gallons of water into Lower Price Lake and then sent a wall of water, rocks, and debris through the foothills, across Old Highway 395 and out into Washoe Valley. Upper Price Lake was largely filled, reducing it from approximately four acres and 30 feet deep to only half its surface area and two feet deep. Lower Price Lake was completely obliterated. The mud and debris covered Old Highway 395 to a depth of nine feet. One person was killed by the rampaging waters, six others were injured, four homes were destroyed and several others were severely damaged, nine cars destroyed including a motor home, a school bus, and a truck.[278] The geology of the Ophir Creek drainage, which begins in the alpine meadows between Slide Mountain and Mount Rose, is highly unstable and an analysis of the extensive alluvial fan formation stretching well out into Washoe Valley indicates that this creek has flooded a number of times previously.[279]

1983 **(June 24)** Based on a lawsuit (*Nevada v. United States*, originally *U.S. v. TCID*)[280] filed by the federal government on behalf of the Pyramid Lake Indian Tribe in 1973 to open the Orr Ditch Decree based on the "federal 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).[281]

1983 **(August 8)** Based on the suit (*TCID v. Secretary of the Interior*) filed by TCID 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 U.S. Secretary of the Interior had the authority to issue OCAP 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 U.S. Ninth Circuit Court of Appeals.[282]

1983 **(September 30)** End of the wettest year ever recorded in the Truckee River Basin. This year became the standard "High Water Year" for virtually all creeks, streams, and rivers within the Lake Tahoe and Truckee River basins. The Truckee River's recorded annual average discharge (volume) recorded at the California-Nevada border (Farad gaging station) for this year was 1,769,00 acre-feet, equivalent to an annual average continuous rate of flow of 2,443 cubic feet per second. This discharge was over three times the average annual discharge up to this time (574,101 acre-feet per year for the period of record 1900-1982). [By contrast, the Truckee River's lowest recorded annual average discharge was attained in 1931 at 133,200 acre-feet, equivalent to an annual average rate of flow of only 184 cfs.][283]

1983 The first major application of the "Public Trust Doctrine" to water rights decisions was given an important precedent by the California State Supreme Court in *National Audubon Society v. Superior Court* when it ruled in favor of a balancing of public trust uses of water (e.g., minimum instream flows, habitat restoration and protection, wetland preservation) against typical consumptive uses of water during the water rights application process. Further, the California Court ruled that the state, and specifically the grantor of water rights, i.e., the California State Water Resources Control Board (SWRCB),[284] may reconsider the effects of past allocations based on this concept.[285]

1984 Based upon the August 1983 resolution of the suit filed by TCID in March 1974 against the Secretary of the Interior over contract cancellation (*TCID v. Secretary of the Interior*) which was decided in favor of the federal government, an interim contract was signed with TCID. It was stipulated that the contract could be terminated by either party with 90 days written notice. The issue of recoupment of excess waters diverted between 1973 and 1983 remained unresolved, however.

1984 The Tahoe Sierra Preservation Council, an organization representing the interests of hundreds of Lake Tahoe Basin property owners, filed a lawsuit in Nevada and California federal courts against the bi-state (Nevada and California) Tahoe Regional Planning Agency over its land-use powers. The landowners claimed damage in the amount of $26.7 million from different TRPA regulations and because the properties have received various restrictions on their use, thereby resulting in diminished property values and denying owners full use of their property without fair compensation. Specifically, the case challenged TRPA's 1984 regional plan, a 1981 land-classification ordinance, and a 1983 building moratorium. The filing was based on the classic "taking" of property barred by the U.S. Constitution without just compensation.[286]

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

Environmental Impact Statement (EIS).[287]

1985 The USBR's Environmental Assessment found that within the Newlands Project 63,100 acres were actually 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 irrigated which did not have documented water rights or for which water right transfer applications were not complete.[288]

1985 The Nevada Legislature amended Sierra Pacific Power Company's ban on water meters to allow any resident who volunteered for a water meter to have one. Legislation also required that all new homes built after July 1, 1988 have water meters installed.[289]

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 located in Churchill (Carson Division) and Lyon (Truckee Division) counties, Nevada. This total amount consisted of 68,396.48 acres of TCID acreage, 22.10 acres of additional acreage concluded to be part of the TCID acreage, and 5,440.30 acres of Fallon Indian Reservation water-righted acreage.[290]

1986 **(February)** Extreme precipitation dramatically increased the Truckee River's rate of flow to 10,000 cubic feet per second through downtown Reno, approximately equal to designed flood stage. Upstream storage and flood control measures completed since 1970 (Stampede Reservoir and channelization through Reno) were primarily responsible for preventing a repeat of the 20,800 cfs Truckee River flows and extensive flooding and consequent property damage recorded during the river's record stage of 1955. 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 the Truckee River Basin (1987–1994).

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.[291] 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.[292] Winnemucca Lake dried up for the last time in 1938.

1986 A major increase in the White Pelican colonies was recorded by the U.S. Fish and Wildlife Service at the Anaho Island National Wildlife Refuge in Pyramid Lake. Based upon the high water flow years of 1983–1986 for both the Truckee and Carson rivers (which thereby reduced diversions from the lower Truckee River at Derby Dam) and the consequent beneficial effects on downstream terminus locations, e.g., Pyramid Lake and the Lahontan Valley wetlands, it became apparent that fish and waterfowl conditions were inextricably tied to the viability of these river system terminus areas.[293]

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 (U.S. District Court) Gesell Opinion (OCAP) to 406,000 acre-feet, which was the upper water diversion limit established in the 1967 OCAP.[294]

1986 **(Summer)** A large blue-green algae "bloom" covered one-third of Pyramid Lake's surface area. Phosphates, primarily entering the lake as windblown sediments, were at extremely high levels and while the size of the lake has enabled it to handle the high levels of phosphates, the lake continued to show a deficit in nitrogen. Differences in water densities between river inflows and lake waters (moderately saline—over 4.1 parts per thousand, and highly alkaline—9.1–9.3 pH) allowed surface entrapment of nutrient-rich freshwater inflows, hence leading to this condition and the potential for future algal "blooms" in Pyramid Lake as well.[295]

1986 Thirteen million gallons of partially treated sewage spilled into Lake Tahoe from the wastewater treatment facilities of the South Tahoe Public Utility District (STPUD). As a result of this spill, the California Attorney General and the League to Save Lake Tahoe filed suit against the utility, requiring movement of the utilities' transfer pipeline away from environmentally sensitive wetlands and portions of the Upper Truckee River. STPUD uses a 27-mile pipeline from the Lake Tahoe Basin, over Luther Pass, to Harvey Place Reservoir in Alpine County in the Carson River Basin where the treated effluent is used for irrigation. In a 1989 settlement, STPUD agreed to move the pipeline by 1994.[296]

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 1973 Endangered Species Act, and public trust doctrine issues, all combined to derail Congressional approval.[297]

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.[298]

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 Lake Tahoe Basin recorded an average annual snowpack water content 65 percent of normal, ranging from a low of 29 percent of normal (1988) to a high of 149 percent of normal (1993). The Truckee River Basin (excluding the Lake Tahoe Basin) recorded an average annual snowpack water content 69 percent of normal, ranging from a low of 32 percent of normal (1988) to a high of 158 percent of normal (1993).[299]

1987 A Lake Tahoe Dam suit was initiated by the Pyramid Lake Paiute Indian Tribe (*Pyramid*

Lake Paiute Tribe of Indians v. Secretary of the Interior Hodel). Based on the intent of the USBR to repair the Lake Tahoe Dam at Tahoe City in order to improve its seismic resistance, the Paiute Tribe used this occasion to file a suit against the federal government over the operation of the dam and its impact on Pyramid Lake's endangered cui-ui fish species. This suit has since been put on hold pending the outcome of the negotiations being conducted under the Negotiated Settlement (Public Law 101-618) and the implementation of a new Truckee River Operating Agreement (TROA).[300]

1987 **(April 1)** The snow water content of both the Lake Tahoe and Truckee River basins was recorded at only 56 percent of normal for this time of year,[301] and signaled the commencement of a record drought period, 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. In terms of average annual flows measured at the California-Nevada border (Farad USGS gaging station), the 1987-1994 drought period was worse than the 1928-1935 drought period. Over the 1928-1935 period, average annual flows (discharges) measured at Farad were 303,240 acre-feet per year, whereas during the 1987-1994 period they were 286,350 acre-feet per year, a 5.6 percent reduction.

1987 U.S. Senator Harry Reid (Nevada) began formal discussions with Truckee River water users—Pyramid Lake Paiute Indian Tribe, Sierra Pacific Power Company, and TCID—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.[302]

1987 **(August)** Soil contamination was first discovered by Sante Fe Pacific Pipeline, Inc., at their petroleum storage tank facility in Sparks, Nevada, a location less than one mile from the Truckee River. By November, further studies had shown that the contamination had affected the groundwater at the site. It was later estimated that approximately two million gallons of primarily gasoline, diesel fuel, and jet fuel, had seeped into the ground and created a plume of contaminated soil extending towards the Helm's gravel pit. The Nevada Division of Environmental Protection (NDEP) issued an Administrative Order to Sante Fe Pacific Pipeline to investigate and remediate the contamination.[303]

1987 **(November)** The U.S. Fish and Wildlife Service issued its *Biological Opinion* pursuant to the USBR'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," which called for 320,000 acre-feet per year, or less, of total allowable Newlands Project water diversions (including both Truckee River 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.[304]

1987 **(December)** *Final Environmental Impact Statement for the Newlands Project Proposed*

Operating Criteria and Procedures was issued by the U.S. Bureau of Reclamation, Mid-Pacific Regional Office, Sacramento, California. 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.[305]

1988 Amendments were made to the Endangered Species Act (of 1973) to include:[306]

[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.

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.[307]

1988 **(April 15)** The U.S. Secretary of the Interior adopted a new OCAP ("Final OCAP") for the Newlands Project with respect to allowable water diversions. From this date through at least December 31, 1997,[308] 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).[309]

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,[310] 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 **(June–July)** Local governments in the Truckee Meadows adopted a four-stage drought water conservation plan. The first stage, already in effect, called for voluntary twice-weekly watering of lawns. The Nevada Legislature also passed a law that required all new

homes to have water meters.[311]

1988 **(October)** Lake Tahoe dropped below its natural rim of 6,223.0 feet MSL and the upper reach of the Truckee River below the dam stopped flowing.[312]

1988 **(November)** Fuel contamination from the Sante Fe Pacific Pipeline facility in Sparks, Nevada, (see August 1987 entry) was first discovered at the Helm's gravel pit located approximately one mile east of the storage tank site. The pit was being pumped at the rate of some seven million gallons per day, and it was estimated that the level of pumping was affecting the area's hydrologic gradient, causing the plume of pollutants from the tank farm to be drawn due east to the pit and parallel to the river, instead of assuming a natural direction of flow east southeast towards the Truckee River. It was therefore apparent that pumping at the Helm's pit site would need to be continued if this plume of fuels was to kept away from the Truckee River.[313]

1988 **(December)** Modifications were made to the Reno–Sparks Joint Wastewater Treatment Facility (formerly the Reno–Sparks Joint Water Pollution Control Plant and before that the Reno–Sparks Joint Sewage Treatment Plant) increasing its total treatment capacity from 30 million gallons per day to 40 million gallons per day. In addition to increased capacity, two major improvements were made to the treatment process during this year to include the installation of multimedia filters consisting of pea gravel, sand, and anthracite (charcoal) in March 1988, and the addition of nitrification/denitrification towers in May 1988.[314] In response to the increased plant treatment capacity and threat of greater effluent discharges, the Pyramid Lake Paiute Indian Tribe filed a lawsuit precluding discharges beyond the prior capacity of 30 million gallons per day. This suit would not be resolved until October 1996 with the signing of the Truckee River Water Quality Agreement.

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.[315]

1989 **(May)** A Preliminary Settlement Agreement (PSA) was negotiated between the Pyramid Lake Indian Tribe and Sierra Pacific Power Company which provided SPPCo the ability to store up to 39,500 acre-feet of water covered by a portion of its water rights in federally operated reservoirs along the Truckee River in California at times when it was not needed for municipal and industrial (M&I) water supply in the Reno–Sparks metropolitan area. In exchange, excess water in storage was to be used for fishery purposes. Also, SPPCo would forego its right to single-use hydroelectric flows in the Truckee River under the Orr Ditch Decree, thereby enabling the United States and the Tribe to store water for fishery benefit at certain times of the year. The Reno–Sparks metropolitan area would be required to implement conservation measures reducing water use by about ten percent.[316] The PSA was later to be incorporated into Public Law 101–618 by reference. [See November 1, 1995 entry for continuing information on this matter.]

1989 The Nevada Legislature lifted Sierra Pacific Power Company's ban on the use and installation of residential water meters in the Truckee Meadows provided that:

[1] Truckee River Negotiated Settlement goes into effect;

[2] Residents do not pay for hookups; and

[3] Residents are not forced to have meters installed until 90 percent of SPPCo's customers are on meters.

The Legislature also insisted that the water saved by the installation of meters must be stored for drought protection [and not used for future growth accommodation].[317]

1990 **(June)** Based on the effects of the continuing drought, mandatory twice-a-week watering restrictions went into effect in the cities of Reno and Sparks.[318]

1990 **(September)** After it had risen slightly above its natural rim in March 1989, Lake Tahoe again dropped below its rim and would remain below its rim until May 1993.[319]

1990 The Truckee Meadows Coalition for Citizens' Right to Vote held a petition drive to force a public vote on water meters. The cities of Reno and Sparks refused to put the issue on the ballot, forcing the Coalition to file suit.[320]

1990 **(November 16)** Public Law 101-618, also referred to as the Truckee-Carson-Pyramid Lake Water Settlement Act, was enacted into law in two titles:[321]

[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 to include:

[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] Fallon Paiute-Shoshone water issues settlement;

[6] Pyramid Lake Paiute Tribe water issues settlement; and

[7] California-Nevada interstate water apportionment settlement.

The act would give 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) of this act 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."[322]

1991 **(January)** A suit was filed by the Nevada Division of Environmental Protection against all parties associated with the groundwater contamination at the Sante Fe Pacific Pipeline storage tank facility in Sparks, Nevada. The fuel contamination had been first discovered in August 1987 and the contaminated groundwater plume first recorded as having reached the Helm's gravel pit in November 1988.[323]

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.[324] 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.[325]

1991 **(July)** Due to drought-induced extremely low flows in the Truckee River, the Federal Water Master shut off the irrigation ditches in the Truckee Meadows.[326]

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 water logging (establishment of an artificially high water table).[327] 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).[328]

1992 **(April)** The De Bruyn report, *Potential Water Conservation Measures—Newlands Project*, 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 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 $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:[329]

[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 **(June 8)** Again due to an intensification of the drought conditions and extremely low Truckee River flows (see July 1991 entry), the Federal Water Master in Reno, Nevada, was forced to shut down the irrigation ditches in the Truckee Meadows. This represented the earliest they had ever been closed.[330]

1992 **(July 14)** A sudden localized rainstorm in the Sierra Nevada Mountains in the Gray Creek watershed sent extensive quantities of mud into the Truckee River just upstream from Floriston, California.[331] Sierra Pacific Power Company was forced to shut down its Reno–Sparks water treatment plants for three days and by July 16th Reno's fresh water supplies were down to 25 percent of capacity. An outdoor water ban was placed into effect from Wednesday, July 15th through Sunday, July 19th.[332]

1992 **(August)** The Truckee River completely dried up between Sierra Pacific Power Company's Glendale Water Treatment Plant and the Reno–Sparks Sewage Treatment plant, a distance of nearly four miles.[333]

1992 In a suit filed against the cities of Reno and Sparks in 1990 by the Coalition for Citizens' Right to Vote, Washoe County District Court Judge Jerry Whitehead ruled in favor of the Coalition and ordered the cities to put the issue of water meters on the November ballot. In November voters were asked if they wished to vote in the future on making water meters mandatory, and they answered no.[334]

1992 **(November 30)** Lake Tahoe attained its lowest recorded lake surface elevation over its entire period of record (April 1900 to the present): 6,220.26 feet MSL. This represented a lake level 2.72 feet below its natural rim (6,223 feet MSL), and 11 feet below its highest lake surface level of 6,231.26 feet MSL recorded on July 14, 15, 17, and 18, 1907.[335]

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 project's extensive 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.[336]

1993 **(May)** Based upon an above average water year in the Lake Tahoe Basin (149 percent of normal snow water content measured on April 1st), Lake Tahoe rose above its natural rim of 6,223 feet MSL, the first time it had done so since September 1990.[337]

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.[338] Until this time, that representation had been left up to individual farmers themselves.[339] 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 Senator Bill Bradley (New Jersey), both Democrats, held hearings in Reno to take testimony on whether Congress should re-authorize the Newlands Irrigation Project.[340]

1994 **(February)** Pouch snails, a one-quarter inch long common snail variety found in home aquariums, were first discovered in the Truckee Meadows Water Reclamation Facility. The snails affected the plant's four nitrification towers by eating the bacteria film that removes the nitrogen, thereby increasing the possibility that the plant would exceed its allowable nitrogen discharge limit of 500 pounds per day (based on a 30–day average).[341]

1994 **(March 28)** Sierra Pacific Power Company 's Chalk Bluff Phase I water treatment plant, located on a bluff above the Truckee River just upstream from the West McCarran Avenue Bridge, began service with a capacity of 20 million gallons per day (mgd).[342] Because several of SPPCo's other water treatment plants, namely Idlewild, Hunter Creek, and Highland, did not meet the Surface Water Treatment Rule (SWTR)[343] due to lack of filtration as required under the federal Safe Drinking Water Act (SDWA), it was deemed most cost effective to remove these plants from service and replace their capacity with that of the Chalk Bluff water treatment plant. At the time of its opening, construction was also begun on a 30 mgd nominal expansion (Phase II) which was scheduled to be in service by June 1996. When completed, the design capacity of this plant would be 50 mgd with a peaking capacity of 69 mgd. Water was to be supplied via the Highland Ditch and the Orr Ditch pump station with a maximum raw water supply of 80 mgd.[344]

1994 **(April)** 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 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 and that in accordance with the 1990 Negotiated Settlement Act (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.[345]

1994 **(April)** In anticipation of the opening of the Chalk Bluff water treatment plant, Sierra Pacific Power Company's Idlewild water treatment plant was removed from service, but would remain available for emergency production until June 1996. SPPCo's other non-filtered plants—Highland and Hunter Creek water treatment plants—will be removed from service by June 1996.[346] Later it was decided to use the covered storage facilities at both Highland Reservoir and Hunter Creek Reservoir to store the treated water from the Chalk Bluff water treatment plant.

1994 **(April)** Pyramid Lake's biggest fish have typically been found to be landed by hook and line during the fall and spring. This proved the case when wading fly fisherman Eldon Hanneman caught a 21 pound 8 ounce Lahontan cutthroat trout in the lake. It should be noted that the ability of Pyramid Lake to growth large trout quickly is primarily based on a unique prey-predator relationship between the lake's cutthroat trout and the abundant rough fish called tui chub (*Gila bicolor*). Without sufficient stocks of tui, the trout must eat microscopic animals called zooplankton, limiting growth rates dramatically. It appears that over the last two years the lake's tui chub population has made a remarkable

comeback. Large schools of juvenile chubs were seen in the shallows around Pyramid Lake early last fall (1993).[347] Not unexpectedly, it appears evident that the health of the lake's cutthroat trout population and its primary food source are crucially dependent on lake inflows. During the water year ended September 1993, inflows into Pyramid Lake measured at the USGS Nixon gaging station measured 241,080 acre-feet. In the current 1994 water year inflows were a lesser 141,392 acre-feet. Even so, during the prior five water years (1988 through 1992), inflows into Pyramid Lake totaled only 154,196 acre-feet, averaged 30,839 acre-feet per year, and fell to as little as 17,496 acre-feet in the water year ended September 1992.

1994 **(May 18)** Based on scheduled hearings on the Truckee-Carson Irrigation District's request for 100,000 acre-feet per year of additional (unappropriated) Truckee River water (see September 9, 1930 entry for application permit number 9330), Elizabeth Ann Rieke, Assistant Secretary of Water and Science of the U.S. Department of the Interior, wrote a letter[348] to the Nevada State Engineer, R. Michael Turnipseed, stating that even if TCID's request was approved, 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 (Public Law 101-618).[349]

1994 **(May 31)** Based on the "threshold issue" of USDI's refusal to allow federal facilities to be used for the conveyance, storage, or delivery of any Truckee River water appropriated pursuant to TCID's application permit number 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.[350]

1994 **(June 13)** Due to a resumption of drought conditions in the Truckee River Basin after a relatively wet year in 1993 (snow water content in the Lake Tahoe Basin at 149 percent of normal and 158 percent in the Truckee River Basin), the federal watermaster cut off water to the irrigation ditches in the Truckee Meadows.[351]

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 that meeting, the hearing was not held until January 31, 1996.[352]

1994 **(July)** U.S. Senator Harry Reid (Nevada) agreed to let a professional mediator from Resolve (Center for Environmental Dispute Resolution) of Washington, D.C.,[353] conduct negotiations to mediate and arbitrate outstanding water issues pertaining to Pyramid Lake and the Truckee and Carson rivers.

1994 **(August)** As it had done in August of 1992, the Truckee River dried up again between Sierra Pacific Power Company's Glendale Water Treatment Plant and the Reno-Sparks Sewage Treatment plant, a distance of nearly four miles.[354]

1994 **(September)** Negotiator Gail Bingham from Resolve 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 farmers and TCID (represented through the Lahontan Valley Environmental Alliance—LVEA); 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.[355]

1994 **(October)** Due to an infestation of bacteria-eating pouch snails, an exotic aquatic species of snail first discovered in the Reno-Sparks sewage treatment plant's nitrification towers in February 1994, the plant discharged an average of 804 pounds of nitrogen per day (based on a 30-day average) into the Truckee River during this month. This was the first time that the sewage treatment plant had exceeded its permitted limit of 500 pounds per day.[356]

1995 **(February)** Sierra Pacific Power Company began collecting a fee of $1,350 per acre-foot[357] of water demand from developers to pay for the Truckee Meadows water meter retrofit program. The first phase installation was intended to target some 5,000 homes in SPPCo's service area that were built between 1980 and 1988 which already had meter boxes installed.[358] The water meter retrofit program constitutes an integral part of the Negotiated Settlement process among the cities of Reno and Sparks, Washoe County, the Pyramid Lake Paiute Indian Tribe, SPPCo, and the U.S. Department of the Interior. According to these negotiations, mandatory twice-a-week watering will end in 12 years, or when 90 percent of all SPPCo's customers are on water meters.[359]

1995 **(March 1)** The Steamboat Creek Restoration Project was funded and placed under the administration of the Washoe-Storey Conservation District, Washoe County Comprehensive Planning, and the Nevada Division of Environmental Protection. Steamboat Creek, which enters the Truckee River at the Truckee Meadows Water Reclamation Facility near Vista, represents the major contributor of non-point source pollution to the river, contributing sediment, nitrogen, phosphorus and trace metals, as well as geothermal waters laden with boron and arsenic. The purpose of the project was to develop a master plan to include: (1) history of the creek and its tributaries; (2) listing of stream types and their behavior; (3) land use and project inventories for current and future development; (4) an overview of best management practices (BMP's); (5) policy and implementation guidelines; (6) permitting requirements; (7) funding opportunities; and (8) reach by reach recommendations for restoration.[360]

1995 **(March)** Portions of the South Tahoe Public Utility District's 27-mile pipeline failed near Luther Pass. The pipeline conveys treated effluent out of the Lake Tahoe Basin, over Luther Pass, to Harvey Place Reservoir in Alpine County in the Carson River Basin.

Based on a 1986 spill from the pipeline in which approximately 13 million gallons of partially treated effluent was released into Lake Tahoe, the utility was sued and forced to move the pipeline away from environmentally sensitive wetlands and portions of the Upper Truckee River. In a 1989 settlement, the utility agreed to move the pipeline by 1994; however, when this was not possible, an extension was granted until 1997.[361]

1995 **(March)** Per prior arranged schedule, the Truckee River Settlement Negotiations 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)[362] and water quality flows on the Truckee River (greater dilution of discharges from 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.[363] Even so, major issues pertaining to the restoration of Pyramid Lake and the Lahontan Valley wetlands remained unresolved.[364]

1995 **(April 1)** A very good year, hydrologically, for the Lake Tahoe and Truckee River basins. The Lake Tahoe Basin's snow water content was recorded at 168 percent of normal for this time of year, after only 44 percent of normal recorded in 1994. The Truckee River Basin's snow water content (excluding the Lake Tahoe Basin) was measured at 184 percent of normal after only 50 percent of normal in 1994.[365]

1995 **(Summer)** The Tahoe Regional Planning Agency's *1995 Water Quality Report* noted that the most recent algal's primary productivity index stood at 164 grams of carbon per square meter per year, over 3.5 times as great as the 46.5 index level recorded in 1968. Lake Tahoe's algae growth levels are measured by the Tahoe Research Group (TRG), a group of scientists who measure growth rates every 10 to 14 days at several lake depths.[366] The primary productivity index is a measure of the mass of carbon used annually by algae per unit measure of lake surface and provides an index of the eutrophic state of a body of water.[367]

1995 **(July 18)** A sudden localized rainstorm in the Sierra Nevada Mountains in the Gray Creek watershed sent extensive quantities of mud into the Truckee River just upstream from Floriston, California. By the following day (Wednesday) all Sierra Pacific Power Company's Reno, Nevada, water treatment plants were taken off line. By Thursday evening, SPPCo had enacted an outdoor watering ban which would last until Saturday, July 22nd.[368] An investigation of the Gray Creek watershed by the U.S. Forest Service showed that little could be done to effectively alleviate this periodic flood-related problem due to topographical, hydrological, and biological conditions. [Also see related entries under 1880, 1884 (August 4), 1890, 1965 (August 16), and 1992 (July 14)].[369]

1995 **(July)** The U.S. Fish and Wildlife Service, released its Draft Environmental Impact Statement *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.[370]

1995 **(July)** The 1995 Nevada Legislature passed Nevada Revised Statute (NRS) Chapter 540A requiring water planning commissions for each county. As the chapter specifically applied to counties whose population was 100,000 or more, but less than 400,000, only Washoe County (in the Truckee River Basin) was affected by the act [see NRS 540A.020]. As specified, the [Washoe County] Regional Water Planning Commission must consist of nine (9) voting members[371] who are residents of Nevada and are appointed as follows:[372] (1) one member appointed by the governing body of the largest city in the county [i.e., Reno City Council]; (2) one member appointed by the governing body of the next largest city in the county [i.e., Sparks City Council]; (3) one member appointed by the board of county commissioners [i.e., Washoe County]; (4) one member appointed by the [Washoe County] board of county commissioners to represent owners of domestic wells; (5) one member appointed by the governing body of a general improvement district (GID)[373] having the greatest number of customers for water and sewage in the region; (6) one member appointed by the largest public utility water purveyor in region;[374] (7) one member appointed by the governing body of the largest (in area) Indian reservation in the county[375] (or, if none, or none is appointed, then the board of county commissioners will appointed a member to represent the public at large); (8) one member appointed by the governing bodies of the two largest cities [Reno and Sparks] by mutual agreement to represent environmental, biological, conservation or public concerns; and (9) one member appointed by the governing body of the irrigation district which has the largest number of members in the region[376]. The purpose of the regional water planning commission was to develop a comprehensive regional water plan which addressed specific elements.[377] All statutory authority for the commission was mandated to expire on July 30, 1997; however, requirements related to the remediation of water quality[378] and transfer of water supply facilities and certain other matters[379] were not provided expiration dates.

1995 **(July 24)** Four wells used by Sierra Pacific Power Company to supply drinking water to central Reno during the previous week's water emergency, which was caused by sediment-laden waters flowing out of Gray Creek, showed traces of water contamination by tetrachloroethylene (also known as perchloroethylene, or PCE), a solvent often used for degreasing and in dry cleaning. Three of the subject wells which exceeded the EPA safe drinking-water standard included Kietzke Lane, Mill Street, and High Street, and one well, Corbett Street, was only slightly below the EPA standard of 0.005 parts per million.[380] [Studies have shown that high concentrations of this chemical, also called perclene, can cause liver and kidney damage, including cancer, in animals, although in humans not enough information is available to say it is a definite carcinogen.][381]

1995 **(July)** A near-record water year of precipitation in the Lake Tahoe 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.[382] 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.[383] Lahontan Reservoir on the lower Carson River also filled, peaking at 316,300 acre-feet on July 25, 1995.[384] This allowed the diversions at Derby Dam on the lower Truckee River to be virtually cut off by the end of March 1995.[385] 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 **(August 8)** Churchill County filed a formal request with the USBR 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 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.[386] 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.[387] The Negotiated Settlement specifies that the Secretary of the Interior is authorized to "...operate and maintain the project for the purpose of...municipal and industrial water supply in Lyon and Churchill counties, Nevada."[388]

1995 **(August 29)** A $10 million settlement was reached with the Nevada Division of Environmental Protection based on fuel contamination at the Sante Fe Pacific Pipeline tank farm in Sparks, Nevada. In addition to the fine, the companies that had been party to the suit filed by the NDEP in January 1991 agreed to be liable for continued mitigation of the fuel spill and to insure that the plume of contaminated groundwater would not reach the Truckee River. Other potential litigation still remained on this issue with the City of Sparks and private parties.[389] The City of Sparks would later settle its claims for the sum of $12 million.

1995 **(September)** TCID requested that the USBR 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 year[390] 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.[391]

1995 **(October)** The $26.7 million lawsuit filed in 1984 by the Tahoe Sierra Preservation Council against the Tahoe Regional Planning Agency in 1984 over its land-use powers and based on the classic "taking" of property barred by the U.S. Constitution without just compensation was ordered by the federal court into mediation sessions. Thus far, the case has survived more than a decade of court actions, including two separate dismissals and repeated appeals.[392]

1995 **(November 1)** By means of an agreement between Sierra Pacific Power Company and the Pyramid Lake Paiute Tribe, the Federal Water Master dropped the Truckee River's minimum allowable rate of flow at the Farad gaging station from 350 cfs (Orr Ditch Decree rights, i.e., Floriston rates) to 300 cfs. The difference in flow will allow an estimated 20,000–30,000 acre-feet to be stored in Stampeded Reservoir and used during the next spring's spawning run for Pyramid Lake's endangered cui-ui sucker fish. This permanent agreement will also increase SPPCo's storage capacity in Stampede Reservoir to 39,000 acre-feet.[393]

1995 **(December 1)** Churchill County filed a lawsuit in U.S. District 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" to be completed to assess the cumulative impacts of a number of federal government actions taking place simultaneously.[394] 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 Settlement Act (Public Law 101–618), the county claimed that water rights transfers would dry up local aquifers and adversely affect homes and businesses.[395]

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 Secretary of the Interior, filed a suit in Reno federal district court against TCID demanding full return of approximately 1,057,000 acre-feet[396] of waters diverted from the Truckee River between 1973 and 1987 (15 years) in violation of existing OCAPs.[397] In addition to the recoupment amount, the suit also sought "in-kind interest." According to the complaint, the recoupment figure was derived from:[398]

[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.

1995 **(December)** The Tahoe Regional Planning Agency created the Shorezone Partnership Committee of 20 organizations and entities to lessen the problems among those interested in the future development of the lake. Those represented include: California and Nevada state lands; California and Nevada state parks, California Department of Fish and Game, California Tahoe Conservancy, Lahontan Regional Water Quality Control Board; League to Save Lake Tahoe; Nevada Division of Wildlife; Tahoe Lakefront Owners Association; TRPA; Tahoe Research Group; Tahoe-Sierra Preservation Council; U.S. Army Corps of Engineers; U.S. Forest Service; commercial property owners; Lake Tahoe marinas; Lake Tahoe tour-boat operators; other private property owners; and Lake Tahoe Basin recreation concessionaires.[399]

1995 **(December)** A resolution sponsored by U.S. Senator Harry Reid (Nevada) pertaining to Lake Tahoe was approved by the Senate Environment and Public Works Committee. The resolution would: (1) resurrect previously established authority for the U.S. Army Corps of Engineers to study the Truckee River Basin and extend that authority to the Lake Tahoe Basin, and (2) instruct the COE to examine all studies on water quality and wetlands at Lake Tahoe and report to Congress with a plan for environmental restoration. This action represented the first step in ultimately obtaining up to $25 million in federal aid to address growing water clarity problems at Lake Tahoe. Four key watersheds within the basin have been identified for restoration projects: the Upper Truckee River and Edgewood Creek on the lake's south shore, and Incline Creek and Third Creek on the north shore.[400]

1995 **(December)** Due to the infestation of pouch snails in the Truckee Meadows Water Reclamation Facility discovered in February 1994, discharges of nitrogen into the Truckee River averaged 2,084 pounds per day during this month, over four times the permitted maximum level of 500 pounds per day. In fact, daily nitrogen discharges from the plant have exceeded the permitted maximum level since October 1994.[401] In order to avoid future fines contemplated by the Nevada Department of Environmental Protection, plant operators have proposed a $1.8 million project to alter the plant's plumbing so as to be able to isolate the four nitrification towers so that they may be treated independently to kill both the snails and their eggs without the risk that the chemicals would get into the Truckee River.

1996 **(January 23)** An agreement was signed by South Lake Tahoe casinos, a major Lake Tahoe property owner, and government agencies to proceed with a multi-million dollar drainage project. Harvey's Resort, Harrah's Tahoe, Caesars Tahoe, the Lake Tahoe Horizon, Park Cattle Company, Douglas County, and the Nevada Department of Transportation (NDOT) formed the Stateline Stormwater Association. Stormwater treatment facilities will include underground vaults, filters and pipelines, and above-ground ponds and holding basins to capture and clean sediment-laden polluted water before it enters Lake Tahoe.[402] Such runoff has been a major source of the lake's recent loss of clarity, increased algae growth, and lake euthrophication.

1996 **(February 21)** In an event all too typical and highly reflective of the variable hydrology of the Truckee River Basin, as of February 19th the SNOTEL[403] precipitation update reported that Truckee River Basin snow water content was at 79 percent of normal and that of Lake Tahoe Basin at 96 percent of normal for this time of year. After one extensive

storm system moved through the area, however, on February 21st the SNOTEL update showed the Truckee River Basin snow water content at 106 percent of normal and Lake Tahoe Basin at 107 percent of normal.[404]

1996 **(March)** The Nevada Weed Management Association (NvWMA), located at the University of Nevada, Reno, was formed to address the concerns of noxious weed control within the State of Nevada and particularly to address weed problems along the Truckee River and its tributaries. The organization's research has shown that weeds are increasing at a rate of 14 percent per year and within five years their acreage will effectively double. Activities of the association's inter-disciplinary advisory board will emphasize: (1) plant identification; (2) research and recommendations; (3) remediation and weed control; and (4) information dissemination.[405]

1996 **(March)** Sierra Pacific Power Company installed a higher capacity solids removable system at their Chalk Bluff water treatment plant. This modification allowed the Truckee Meadows' primary water treatment facility to increase its treatment capability from waters having a turbidity of approximately 350 nephelometric turbidity units (NTU's)[406] to waters having turbidity up to 3,000 NTU's.[407] In July 1995, SPPCo was forced to shut down this primary water treatment plant when a localized thunderstorm in the Gray Creek watershed, located just above Floriston, California, sent extensive quantities of mud into the Truckee River, forcing an outdoor watering ban in the Truckee Meadows. This improvement to the treatment capabilities of the Chalk Bluff plant will now allow SPPCo to handle the level of turbidity which forced the plant to close for a brief period of time in 1995.

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: TCID 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.[408] After meeting twelve times, the negotiations would be terminated in July when the parties failed to agree on which topics could be discussed.[409]

1996 **(March 28)** In response to the proposed merger of the Union Pacific [Railroad] Corporation and Southern Pacific [Railroad] Corporation,[410] the Reno City Council voted to oppose the largest railroad merger in U.S. history by filing a resolution of opposition and numerous other documents with the federal Surface Transportation Board (Department of Transportation), which will decide on the merger in August 1996.[411] In an earlier assessment of this merger and its potential impact on the Truckee River Basin, three Indian tribes—Pyramid Lake Paiute Indian Tribe, Reno-Sparks Indian Colony, and the Battle Mountain Band Temoak Tribe of Western Shoshone—noted that the railroad runs along the entire length of the Truckee River from Wadsworth, Nevada, to Truckee, California (as well as along the Humboldt River through the Nevada counties of Lyon, Churchill, Pershing, Humboldt, Lander, Eureka, and Elko). The planned merger would increase the daily train traffic along this environmentally-sensitive route from the current 14 trains to 32 trains (Union Pacific estimate), or 38 trains (City of Reno estimate), and potentially pose a significant risk to drinking water supplies in the Truckee Meadows, the Pyramid Lake fishery, as well as the water flowing to the Newlands Project, should a major spill

occur along its route.[412] The railroad tracks run adjacent to the Truckee River through both the upper Truckee River canyon (between Truckee, California, and Reno, Nevada) and the lower Truckee River canyon (between Sparks and Wadsworth, Nevada).

1996 **(April 1)** Another satisfying hydrologic year for the Truckee River Basin. As of this date, snow water content within the Lake Tahoe Basin was measured at 116 percent of normal for this time of year, which, following 1995's 168 percent or normal recording, dramatically rejuvenated the basin's water resources. The Truckee River Basin (excluding the Lake Tahoe Basin) recorded a snow water content of 121 percent of normal.[413] According to the Nevada State Climatologist, John James, these water conditions proved sufficient to officially end the 1987–1994 severe drought period.

1996 **(April 29)** The South Tahoe Public Utility District announced an accelerated schedule for re-routing its 27-mile pipeline which transports treated effluent out of the Lake Tahoe Basin over Luther Pass to Harvey Place Reservoir in Alpine County in the Carson River Basin. The move was triggered by several sewage spills from the pipeline in recent years, the latest occurring in March 1995 near Luther Pass. Since its initial construction nearly 30 years ago, the pipeline has generally run parallel to the environmentally-sensitive Upper Truckee River. All work on the pipeline's new routing was expected to be completed in approximately five years.[414]

1996 **(May)** The Nevada Division of Environmental Protection discovered that a small sewage treatment plant, which has been in operation for 21 years near Verdi, Nevada, has been leaking for ten years or more. The plant, owned by the Verdi Meadows Utility Company, is located less than one mile from the Truckee River, north of Verdi, and about 1,700 feet from the company's water well used by the River Oak subdivision's 50 homes. In the fall of 1995, this same well tested positive for ammonia, indicating that in addition to groundwater contamination, the leaking sewage treatment plant may have also affected the utility's drinking-water well.[415]

1996 **(May 7)** The Nevada-Tahoe Conservation District, a Lake Tahoe Basin environmental agency, approved a resolution to ask the U.S. Congress to designate the Eurasian watermilfoil (*Myriophyllum sibiricum*) a noxious weed due to its threat to Lake Tahoe's water quality and clarity. The Tahoe Regional Planning Agency has already identified the weed as a major threat to the lake's water quality. If declared a noxious weed, Congress would authorize the U.S. Army Corps of Engineers to release funding for weed control. In addition, the U.S. Department of Agriculture would continue its research on the exotic species, which was introduced into Lake Tahoe in the 1960s. Reportedly, the watermilfoil sucks algae nutrients like phosphorus and nitrogen from lake-bottom sediments and then ejects them into the water. The weed is a fast grower, can warm water temperatures, change fishery habitat, and displace native plants. The State of California Lahontan Regional Water Quality Control Board has established a scientific advisory panel to study the issue.[416]

1996 **(May 21)** Up to 3,000 gallons of partially-treated wastewater spilled into the Truckee River from the Truckee Meadows Water Reclamation Facility. This represented the second time within the last year that wastewater or sludge had escaped from the plant into the river via the plant's storm drain system. The spill reflected a vulnerability in the plant's design in which the storm drain system was not connected to the treatment system.

It was noted by officials of the Bureau of Water Pollution Control, Nevada Division of Environmental Protection, that while the state cannot mandate such a modification to the plant's treatment system, it can encourage such a change in lieu of paying a fine.[417]

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 for 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 western 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."[418]

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 (*Circium arvense*), puncture vine (*Tribulus terrestris*), and whitetop (*Cardaria draba*).[419]

1996 **(June 12)** Phase II of Sierra Pacific Power Company's Chalk Bluff water treatment plant began service bringing the plant's total rated capacity up to 75 million gallons per day. Phase I was brought into service on March 28, 1994. With the removal of SPPCo's Idlewild, Hunter Creek, and Highland water treatment plants, for the first time all of the SPPCo's drinking water is filtered in accordance with more stringent requirements of the federal Safe Drinking Water Act (SDWA).[420] Approximately 75 percent of SPPCo's drinking water comes from the Truckee River while the remaining 25 percent comes from wells located within the Truckee Meadows.[421]

1996 **(June 17)** In a compromise that returned funding to the Tahoe Regional Planning Agency's budget that had been gutted by a Republican-dominated California Assembly, it was noted that frustrations had grown over the TRPA's reported "unfriendly" nature and a general belief that the TRPA represents a "bureaucratic nightmare." The compromise would require the TRPA to contract for an independent audit of agency operations, set up a 120-

day permit deadline, and report on the success of these actions by April 1997 to a California Joint Legislative Budget Committee.[422] With respect to this matter, it was noted by Steve Wynn, a Las Vegas casino owner who serves as Nevada's at-large TRPA member, that constraints of the federal compact which established the bi-state agency require strict adherence to procedures that may limit the agency's ability to move as quickly as desired.[423]

1996 **(June 24)** The Sparks City Council unanimously approved a water quality settlement agreement that would end a number of contentious lawsuits over the Truckee River. [See entries under December 4, 1981, July 20, 1982, and December 1988.] The proposed agreement, which included the cities of Reno and Sparks, Washoe County, the Pyramid Lake Paiute Indian Tribe, and other governmental agencies, calls for the purchase of $24 million of Truckee River water rights to insure that effluent discharges from the Truckee Meadows Water Reclamation Facility (i.e.,Reno-Sparks Joint Wastewater Treatment Facility, formerly the Reno-Sparks Joint Water Pollution Control Plant, and before that the Reno-Sparks Joint Sewage Treatment Plant) receive sufficient dilution even during the most severe drought periods. Supplemental benefits would also provide for more consistent instream flows in the lower Truckee River.[424] Truckee River water rights will be purchased from willing sellers below Vista, in Fernley and in the Swingle Bench and Hazen areas that are served by TCID. The cost will be evenly shared by the federal government on one hand, and Reno, Sparks, and Washoe County on the other. Water rights purchases were expected to begin by August 1996.[425]

1996 **(June 26)** The Tahoe Regional Planning Agency approved a 20-year master plan for Heavenly Ski Resort located at South Lake Tahoe in the Lake Tahoe Basin, reportedly the "biggest thing" the TRPA had done in 20 years. The plan, seven years in preparation, called for $90 million for construction of new ski lifts and ski runs and improvements to existing lodges and restaurants. Central to the project was a high-speed gondola which would link the ski area to the Park Avenue Project, a $150 million redevelopment complex. Supporters claimed the two projects would boost an ailing tourism economy and help protect the environment, while environmentalists and residents claimed the project would pollute the lake and "...send it on a nose-dive from which it can never recover..."[426]

1996 **(June 28)** After several days of rain in the Lake Tahoe Basin, Lake Tahoe's surface elevation reached 6,229.09 feet MSL, 0.01 feet (0.12 inch) below is maximum legal limit of 6,229.1 feet MSL, prompting Federal Water Master Garry Stone to increase discharges at the Lake Tahoe Dam at Tahoe City, California. This was reportedly the highest lake level since 1957 and insured sufficient water in the Truckee River for at least the next two years. Sierra Pacific Power Company reported that it had enough stored water in its Sierra reservoirs to supply the Truckee Meadows through a ten-year drought period.[427]

1996 **(July 9)** Washoe County District Health Department reported that 21 five-gallon containers of a toxic pesticide were found dumped along the Truckee River in Verdi, Nevada. None on the containers, which contained a toxic solution of pentachlorophenol (a petroleum-based solution) and carbamate (a pesticide used to treat wood and prevent insect infestations), had leaked into the river.[428] The location of the dump site was upstream from the diversion point of Sierra Pacific Power Company's Chalk Bluff Water Treatment Plant, which serves much of the municipal in industrial water needs of the entire Truckee

Meadows and the cities of Reno and Sparks.

1996 **(July 9)** The City of Sparks, Nevada, broke ground on an $8.2 million pipeline project intended to use treated effluent from the Reno–Sparks Sewage Treatment Plant to irrigate the Don Mello and Shadow Mountain sports complexes and the Wildcreek Golf Course.[429] The pipeline has a capacity of one million gallons per day[430] (1.55 cubic feet per second, or 1,120 acre-feet per year) and represented the first effort in the Truckee Meadows to use effluent discharges from this treatment plant for such purposes.

1996 **(July 10)** U.S. Senator Harry Reid (Nevada) reported that he had asked President Clinton to convene a federal conference on issues surrounding the environmental condition and degradation of Lake Tahoe. Senator Reid, noting that the lake's clarity had declined from 140 feet to 70 feet over the last 70 years, stated that it had been at least 20 years since the federal government had taken a look at the Lake Tahoe area. Senator Reid's action followed a similar request in February 1996 by the Tahoe Regional Planning Agency.[431]

1996 **(July)** An unpublished study by University of Nevada, Reno, Geological Engineering Professor and statistician James R. Carr, which was commissioned by Sierra Pacific Power Company, estimated that a railroad accident that spilled toxins into the Truckee River could happen once ever 80 to 154 years.[432] The study was based on present rail traffic of 14 trains per day; however, based on the proposed merger between the Union Pacific and Southern Pacific railroads, this figure could go as high as 32 trains per day (Union Pacific estimate) or 38 trains per day (City of Reno estimate), thereby increasing the risk proportionally.[433] It was noted that risks of accidents increased with steeper grades, sharper curves, and higher trains speeds. All these factors are most prevalent in the upper Truckee River canyon between Truckee, California, and Verdi, Nevada, where the probability of a spill is therefore greatest. It was also noted that one possible mitigation to such a spill that would virtually shut down the water supply for the Truckee Meadows would be to run a pipeline from either Boca or Stampede Reservoir to SPPCo's Chalk Bluff water treatment plant.[434]

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 via the Truckee Canal later in the spring.[435] This would have allowed a more accurate determination of Carson River shortfalls which would then be made up by TCID's Truckee River allocation. [See related entry for December 9, 1996.]

1996 **(August 2)** Congress overwhelmingly voted to revamp the Safe Drinking Water Act (SDWA) and created a $7.6 billion revolving loan fund by which local water agencies would be able to improve decaying municipal and rural water systems.[436] More important changes included: (1) allowing small water systems (i.e., those serving in most cases no more than 3,330 customers) greater flexibility, including less monitoring and record keeping, in meeting federal water standards to reduce costs; (2) freeing the U.S. Environmental Protection Agency to focus federal standards on those contaminants posing the greatest health rises, e.g., the parasite cryptosporidium,[437] instead of regulating a fixed

number of chemicals each year; and (3) allowing $10 million to be spent for increased research into the health effects and ways to protect water from arsenic, radon, and cryptosporidium.[438] The legislation was signed by President Clinton on August 6, 1996.[439]

1996 **(August 29)** The Nevada Division of Water Resources informed the Incline Village General Improvement District (IVGID) that in both 1994 and 1995 the IVGID had used virtually all of the 3,905 acre-feet per year of water permitted to be pumped from Lake Tahoe under state law. According to the California-Nevada Interstate Compact signed by California in 1970 and Nevada in 1971, the Nevada portion of the Lake Tahoe Basin can pump a maximum of 11,000 acre-feet per year from the lake. Officials of the Tahoe Regional Planning Agency noted that before that agency approves any new projects or parcel divisions within the IVGID, it will require the district to show proof of adequate water capacity.[440]

1996 **(September 12)** The U.S. Fish and Wildlife Service, released its Final Environmental Impact Statement *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 U.S. Secretary of the Interior to acquire by purchase or other means, sufficient 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 in July 1995. Based on the comments received from this DEIS, the USFWS developed five alternative actions, to include a required "no action" baseline condition (Alternative 1). Through the public scoping process, eight significant indicators were identified. 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.[441]

1996 **(September 18)** U.S. District Court Judge Howard McKibben denied the Truckee-Carson Irrigation District's motions to dismiss the federal government's water recoupment issue raised in Public Law 101-618 (Negotiated Settlement).[442] This issue centered on the time period of 1973 through 1988 when federal officials contend that TCID over-diverted 1,057,000 acre-feet of Truckee River water at Derby Dam in opposition to current Operating Criteria and Procedures. Judge McKibben cited his reasons for denial as: (1) a general public interest existed in the government seeking the recovery of the water; and (2) the U.S. Supreme Court has noted the government's duty to protect the Pyramid Lake Paiute Tribe's interests.[443]

1996 **(September 30)** A panel of environmental experts[444] speaking at a Nevada Environmental Conference held at the University of Nevada, Reno, reported that government agencies in

California and Nevada have a long way to go before they are prepared to react effectively to a toxic chemical spill along the Truckee River. It was noted that the Truckee River's waters pass through three California counties (Placer, Nevada, and Sierra) and four Nevada counties (Truckee River—Washoe and Storey; Truckee Canal—Lyon and Churchill) before they reach Pyramid Lake (Truckee River Basin) or Lahontan Reservoir (Carson River Basin). It was noted that the various police, fire, and health departments, as well as the newly consolidated Union Pacific and Southern Pacific railroads, have yet to create a plan to coordinate response to a spill along the river. Reno, Sparks, and Washoe County currently have a 90-member hazardous spill response team; however, the team technically cannot respond to upstream spills in California. It was also noted that the Federal Water Master in Reno, Nevada, would have to be included in the planning process if additional releases from upstream reservoirs are required in the event of a spill. Even then, it was noted that river decrees and operating agreements may preclude the Federal Water Master from taking such action.[445]

1996 **(October 1)** The City of Sparks, Nevada, announced its desire to turn off the pumps at the former Helm's gravel pit and turn it into a lake and regional park by the year 2002. By turning off the pumps, the approximately six million gallons of water a day (6,721 acre-feet per year) currently being pumped from the pit and transported via the People's Ditch to the Truckee River would be used to fill the pit. Supporting the termination of pumping, the National Pollutant Discharge Elimination System (NPDES) permit for the pit discharges, issued by the Nevada Division of Environmental Protection, has required significant reductions in nitrogen and phosphorus concentrations in these discharges by July 1997. These compounds contribute to undesirable algae growth in the Truckee River. However, pumping at the pit and the pollution cleanup program at the Sparks Solvent/Fuel tank farm site, located approximately one mile to the west, are closely linked. It is feared that by turning off the pumps the resultant rise in the water table will saturate a "smear zone" which has become contaminated by a plume of petroleum products stretching from the tank farm to the gravel pit. Saturation of this zone could jeopardize decontamination efforts using a combined soil vapor extraction process and groundwater extraction process, and very possibly spread the contamination even further. The responsible parties for this cleanup operation are currently preparing technical reports to demonstrate that filling the pit will not have a detrimental impact on the ongoing cleanup efforts or surface or groundwater quality. These reports are to be submitted to appropriate state regulatory agencies by December 1996 and a final decision on filling the pit is anticipated in early 1997. Alternatives to filling the pit would be to transport the discharged waters to municipal treatment facilities at the Glendale water treatment plant and then use the treated water for municipal purposes.[446]

1996 **(October 8)** In an incident revealing of the potential for environmental damage to the Lake Tahoe ecosystem from existing and continued development within the basin, a double-tanker fuel truck overturned on U.S. Highway 50 near Cave Rock along the lake's western shore in Douglas County, Nevada. One of the tanks ruptured and spilled between 1,500 and 2,000 gallons of diesel fuel onto the road surface and into culverts leading to the lake. Between 200 and 300 gallons actually entered the lake but were largely confined within a private harbor area and later soaked up with absorbent pads. It was noted that quick

action by emergency workers and volunteers was crucial in reducing the scope of the spill.[447]

1996 **(October 9)** Sierra Pacific Power Company announced results of their water meter installation and retrofit program for their customers in the Truckee Meadows. The water meter retrofit program was a requirement of the Truckee River Negotiated Settlement (Public Law 101-618). The settlement provided Reno and Sparks more drought storage in Stampede Reservoir and gave federal agencies authorization to buy water rights for Pyramid Lake's endangered cui-ui fish and Lahontan Valley wetlands, located in the lower Carson River Basin. All new homes built after 1988 are required to have water meters installed. Since July 1995, SPPCo has retrofitted 1,751 homes with water meters, bringing the total number of homes with meters in SPPCo's service area up to 14,500. Meter installation is essentially free to the customer and is funded by developers. Within its service area of the Truckee Meadows, SPPCo has approximately 42,500 homes without meters and at the current rate of installation of approximately 2,000-2,500 installations per year, it is estimated that it will take nearly 12 years to complete the project. Under state law, metered billing will become mandatory for all retrofitted homes in Reno and Sparks once a 90 percent level of retrofit has been attained.[448]

1996 **(October 9)** The U.S. Bureau of Land Management finalized a land exchange in the Lake Tahoe Basin whereby 1,400 acres of urban land in Las Vegas, valued at $27 million, was exchanged for 35 acres of Lake Tahoe property valued at $24 million. The Lake Tahoe land, which is located along U.S. Highway 50 just north of Zephyr Cove in Douglas County, Nevada, features a mile-long stretch of beach. The land was turned over to the U.S. Forest Service for management. National forest lands already surround the acquired land on three sides and the entire area is a wintering area for bald eagles.[449]

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 by an average of 2-4°F by the middle of the next century if greenhouse gases are not reduced. It was also predicted that the more intense warming will occur during the winter months when California (and the Sierras) typically receives more than 80 percent of its precipitation. Consequently, under this scenario, not only will the snowpack melt sooner, but much of what now falls as snow will instead fall as midwinter rain.[450] With respect to western and northern 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. With respect to the Truckee River, which contains a number of upstream storage reservoirs, this implies that releases will have to be extended over a longer period. Currently, nearly 55 percent of the Truckee River's total (average) annual runoff at the USGS Farad gaging station (located 3.5 miles upstream

from the California–Nevada state line) occurs during the months of March, April, May, and June.[451]

1996 **(October 10)** Ending litigation begun in December 1988 (also see entries under December 4, 1981 and July 20, 1982) when the Truckee Meadows Water Reclamation Facility increased its treatment and effluent capacity from 30 to 40 million gallons per day, a signing ceremony was held at Wingfield Park in Downtown Reno to finalize the Truckee River Water Quality Agreement.[452] In exchange for the Pyramid Lake Paiute Indian Tribe dropping its lawsuits and allowing the cities of Reno and Sparks to use the full 40 million gallons per day capacity of their wastewater treatment plant, the cities and the U.S. Department of the Interior agreed to spend $24 million to purchase Truckee River water rights.[453] The water rights acquisition cost will be shared equally between the cities and the USDI. The purchased water, estimated to total approximately 24,000 acre-feet, will be stored in upstream reservoirs and released during low-flow periods.[454] This acquisition represented the first such water purchased specifically for the Truckee River itself and will be used to dilute treated effluent discharges from the treatment plant and to provide more water for Pyramid Lake.[455] A computer model predicted that over a 95-year period the additional water will allow Pyramid Lake to rise by 11 feet over its level without the acquisition. The cost to local residents of the Truckee Meadows was estimated at $0.41 per customer per month, and sewer hookup fees were predicted to rise by $200 per home.[456]

1996 **(October 11)** The Bruce R. Thompson United States Courthouse and Federal Building was officially dedicated in Downtown Reno, Nevada. The ten-story building, containing 194,000 square feet of floor space and costing $35 million, was named in honor of Judge Thompson, who died in 1992 after serving 30 years on the federal bench. During his tenure Judge Thompson heard many northern Nevada water rights-related cases and was the presiding judge for the culmination of the 1980 Alpine Decree, which adjudicated water rights on the Carson River and held the dubious distinction of being the longest running (over 55 years; i.e., May 11, 1925–October 28, 1980, appeal decided January 24, 1983) court battle ever waged over water rights by the federal government against private interests.[457]

1996 **(October 22)** An estimated 230,000 gallons of treated wastewater spilled from a broken portion of the South Tahoe Public Utility District pipeline which is used to pump treated effluent out of the Lake Tahoe Basin. Due to the fortuitous presence of two retention basins located near the site of the break, only about 25 gallons of the spilled effluent actually drained into the Upper Truckee River, which eventually flows into Lake Tahoe.[458] Particularly troubling about this incident was the fact that the break occurred in a portion of the pipeline that had just been installed during the previous summer, and that this spill was only slightly less than one in March 1995 when approximately 250,000 gallons of treated effluent was spilled from STPUD's pipeline near Luther Pass.[459]

1996 **(October 22)** Acting on a 1995 state law, the Washoe County Board of Commissioners voted unanimously to create two assessment districts encompassing all businesses and homeowners who would benefit from the cleanup of contaminated groundwater in a defined area of the Truckee Meadows.[460] The groundwater had become contaminated by a carcinogenic cleaning solvent named perchloroethylene (PCE), used since the 1920's

primarily by dry cleaners, paint shops, and auto-repair businesses. The preliminary map of the assessment districts showed contamination on both sides of the Truckee River from the west side of Reno to the eastern edge of Sparks, with much of the pollution concentrated in the Sparks industrial area south of the river. The cleanup was estimated to cost $6.6 million and take up to 20 years to complete.[461]

1996 **(October 31)** Bill Pugsley, in a testament to the perseverance of (his own and) the Donner Party and its trek across the Great Basin 150 years earlier, walked the 900-mile Donner Party route from South Pass, Wyoming,[462] to Donner Lake State Park near Truckee, California, averaging some 8.4 miles per day. Beginning on July 17, 1996, Pugsley, a resident of Reno, Nevada, was guided along the way by local historians and archeologists who charted the original route of the Donner Party.[463] Pugsley arrived at the park 150 years to the day after the first wagons of the Donner Party had arrived. Subsequent to the Donner Party's arrival at this location, on November 1, 1846, lead elements of the party moved on beyond Donner Lake but found the pass over the Sierras blocked by five feet of snow. By November 6, 1846, snowdrifts ten feet high precluded further efforts to cross the pass. They then had to return to the east end of the lake where they would become entombed in extremely heavy snowfall until the following Spring, by which time starvation and deprivation reduced their number to nearly half.[464]

1996 **(November 5)** Voters in Nevada and California approved $30 million in total funding for the issuance of general obligation bonds to support erosion control and stream restoration projects within the Lake Tahoe Basin. With matching grants and other contributions, it was estimated that the total amount of available funding may be expanded to $40 million. Voters in Nevada passed Question 12 (by a margin of 52 percent to 48 percent) which provided for $20 million in general obligation bonds, while voters in California passed Proposition 204 (by a margin of 63 percent to 37 percent) which, among other state water projects, allocated $10 million to Lake Tahoe restoration projects.[465]

1996 **(November 7)** Only sixteen days after an estimated 230,000 gallons of treated effluent spilled from a broken portion of the South Tahoe Public Utility District's out-of-basin transfer pipeline, another 5,000 gallons of treated wastewater spilled directly into the Upper Truckee River. Unlike the prior spill, which was virtually entirely contained within holding basins located at the pipeline break, this most recent spill flowed directly into the Upper Truckee River and thence into Lake Tahoe. The leak occurred when contractors installing the new sewer line failed to plug three small holes prior to testing.[466]

1996 **(November)** Rocketdyne, a division of Rockwell International Corporation, announced its intention to formally request permission from state and county health agencies to expand its existing cleanup operations for trichloroethylene (TCE) at three sites in Warm Springs Valley,[467] located some 20 miles north of Sparks, Nevada.[468] Between 1962 and 1970, Rocketdyne did extensive development and testing of rocket engines used in the Gemini, Apollo, Space Shuttle, and other NASA and military space programs. Based on the federal government's listing of TCE standards in 1989, Rocketdyne began extensive groundwater testing in 1990 and in the Spring of 1991 announced their findings of high levels of TCE at three locations in the valley. A Rocketdyne official estimated that it will take 20 years and $30 million to clean up the contamination.[469]

1996 **(December 2)** In what portended to be a dry winter after two previous relatively wet

winters,[470] Natural Resources Conservation Service SNOTEL (snowpack telemetry) measuring sites showed the Sierra Nevada Mountain snow water content at only 62 percent of average for the Truckee River Basin (excluding the Lake Tahoe Basin) and only 48 percent of average for the Lake Tahoe Basin (measurements taken from October 1, 1996). However, due to higher levels of rainfall (versus snowfall), total precipitation for this time of year stood at 95 percent of normal for the Truckee River Basin and 129 percent of normal for the Lake Tahoe 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.[471] 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 adjusting the 1988 Newlands Project Operating Criteria and Procedures. 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 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. The new target level was to be set at 101,000 acre-feet. The proposed rule consisted of five major components: (1) reduced end-of-month Lahontan Reservoir storage targets; (2) reduced Project efficiency target to reflect the lack of Project growth that had been anticipated by the 1988 OCAP; (3) 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.[472]

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 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.[473]

1996 **(December)** Having failed to settle through mediation the $26.7 million lawsuit originally

filed in 1984, the Tahoe Sierra Preservation Council and the Tahoe Regional Planning Agency notified the U.S. District Court in Reno, Nevada, which had ordered mediation in October 1995, of their intention to resume litigation. The original lawsuit was based on the classic "taking" of property barred by the U.S. Constitution without just compensation. The Council, representing hundreds of Lake Tahoe Basin property owners, claimed damage through a series of TRPA regulations that they said reduced property values and restricted land use. Specifically, the case challenged TRPA's 1984 (and subsequent 1987) regional plans, a 1981 land-classification ordinance, and a 1983 building moratorium.[474] Should the TRPA lose the case, not only would it owe monetary damages and interest, but its existence as a planning body for future development in the Lake Tahoe Basin would be seriously jeopardized.

1997 **(January 1—The Flood of 1997)** Due to heavy, warm rains on above-normal accumulated snowpack, the Lake Tahoe and Truckee River Basin experienced severe and extensive flooding.[475] The flood event, which generally exceeded 100-year flood records above Truckee, California, and below the Truckee Meadows, resulted from the combined effects of extremely heavy rain-on-snow and rain on saturated soils (wet mantle effect).

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 Friday and Saturday, December 27-28, 1996. Both these snowfall events significantly boosted 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, an extensive storm system moved in from the central Pacific region (the "Pineapple Express," or "Hawaiian Hoser"), resulting in extremely warm and heavy rains throughout the Sierra Nevada Mountains at elevations even above 10,000 feet 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. This combination of heavy rainfall and snowpack meltdown sent torrents of water down unregulated streams along the Truckee River's upper reach between Tahoe City and Truckee, California.

Between December 30, 1996, and January 5, 1997, the effects of the storm caused Lake Tahoe to rise by 1.11 feet from 6,228.26 feet MSL to 6,229.39 feet MSL, equating to a lake inflow of nearly 136,000 acre-feet (over 166,000 acre-feet including concurrent Lake Tahoe outflows). In a "normal" water year, the Lake Tahoe Basin produces approximately 530,000 acre-feet of runoff. Within the basin, the Echo Peak Natural Resources Conservation Service (NRCS) SNOTEL (snowpack telemetry) site located at 7,800 feet MSL recorded 15.8 inches of rainfall while the Fallen Leaf site at 6,300 feet MSL recorded 11.8 inches of rainfall. However, the Fallen Leaf site also experienced 5.2 inches of snowpack water content "depletion," boosting total available runoff to 17.0 inches.[476] This inflow required the Federal Water Master to keep open all 17 gates of the Lake Tahoe Dam (which had been open since December 11, 1996), producing a lake outflow of 2,500 to 2,600 cfs (peak flow of 2,690 cfs on January 5, 1997).

Due to the runoff from a number of tributary creeks entering the upper Truckee River between Tahoe City and Truckee, California, flows recorded at Truckee just below the

entry of Donner Creek (which contributed approximately 2,600 cfs) were nearly 12,000 cfs, an increase in the rate of flow of over 9,000 cfs in only 15 miles of river reach. The extensive water releases from the accumulated snowpack combined with extremely heavy precipitation increased total available runoff by up to 50 percent at some locations, particularly at elevations between 6,000 and 7,000 feet. Truckee River flows at Reno, Nevada, reached 18,200 cfs, below the record flow of 20,800 cfs recorded in 1955. However, without the strict dam regulation and detention of flood waters in several upstream reservoirs, i.e., Martis Creek Reservoir (constructed in 1971), Prosser Creek Reservoir (constructed in 1962), and Stampede Reservoir (constructed in 1970), which were not present during the 1950 (peak flow of 19,900 cfs) or 1955 flood events, river flows at Reno would certainly have set new record levels. [Boca Dam and Reservoir was completed in 1939.]

Extensive flooding occurred in Downtown Reno, the Sparks industrial area north of the river, and at the Reno-Tahoe International Airport. On January 2, 1997, the airport was flooded with up to three feet of water and flight operations were terminated for 36 hours until the early afternoon of January 3, 1997. The Truckee River peaked at approximately 8:00 a.m. on the morning of Thursday, January 2, 1997. Primarily due to unregulated flows entering from Steamboat Creek and flooding within its extensive drainage area (of about 240 square miles), Truckee River flows below Reno attained new record flow and flood levels. Flows recorded at the USGS Wadsworth gaging station located above Pyramid Lake recorded a peak flow of 19,200 cfs.[477] 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.[478]

1997 **(January 1—Flood Related)** Truckee River flood waters washed out Sierra Pacific Power Company's timber and rock diversion dam located at Floriston, California. The Floriston diversion dam was used to divert Truckee River waters into a flume for the company's Farad hydroelectric power plant located nearly two miles further downstream. The flume had been damaged in June 1996, and the power plant has been closed since that time. Repairs from the current flood damage were expected to be completed by late summer 1997.[479]

1997 **(January 1—Flood Related)** Sierra Pacific Power Company's Glendale water treatment plant suffered extensive flooding which caused nearly $1.5 million in damages and required the plant to be taken off line through at least April 1, 1997. The plant's filter monitoring equipment, automated valves, solids pumps, and a pilot plant were all damaged. Part of the Highland Ditch near the Truckee River and upstream of SPPCo's Chalk Bluff water treatment plant was also damaged. The Highland Ditch, with a capacity of up to 40 million gallons per day (mgd), represents a seasonal source of water for the 70 mgd capacity Chalk Bluff treatment plant. This plant's primary source of water, which comes from the 40 mgd capacity Orr Ditch pump station located at the Orr Ditch diversion, was not damaged during this flood event. Even so, the Highland Ditch will need to be repaired before the summer water season.[480]

1997 **(January 1—Flood Related)** Flooding effects on the Truckee Meadows Water Reclamation Facility were severe and extensive. The sewage treatment plant's capacity is currently

rated at 40 million gallons per day (mgd) for sewage treatment and 60 mgd for stormflow treatment.[481] Under normal operations, this facility handles approximately 28–29 mgd of sewage. After treatment the effluent is discharged into Steamboat Creek just upstream from the Truckee River near Vista. The "best guess" estimate of sewage and stormwater treated during the flood approached 90 mgd. In addition, the extremely high stage levels in the Truckee River near the plant, actually backed up Steamboat Creek effectively blocking effluent discharge into the Truckee River.[482] Due to infiltration from the high surrounding waters, the plant was forced to re-circulate river water for nearly two and one-half days. The sewage treatment plant also suffered extensive silt deposition throughout its piping and holding tanks.[483]

1997 **(January 2—Flood Related)** Due to extensive flooding of the Reno–Tahoe International Airport, airport authorities announced that it would require approximately $33 million to rebuild and upgrade Runway 7/25 (70 degrees east/250 degrees west), the only east–west runway at the airport. While this 7,600-foot runway is used primarily by smaller aircraft, commercial jets are sometimes forced to use it when severe crosswinds prevent landing on the two north–south runways. Floodwaters, which spilled over from the Truckee River and into the Hilton pond, and then crossed Greg and Mill streets, severely undermined the east–west runway forcing its closure to heavy aircraft. Primary Taxiways A and B, which cross this runway, were also closed due to the flood.[484] In addition, the airport sustained another several million dollars in flood damage to its passenger terminal, baggage handling equipment, and telephone systems.[485]

1997 **(January 4)** Maintenance crews attempting to repair a damaged portion of the South Tahoe Public Utility District's wastewater export pipeline, which takes treated effluent out of the Lake Tahoe Basin, accidently breached the line near Luther Pass, spilling an estimated 50,000 gallons of treated effluent. By Tuesday, January 7th, South Lake Tahoe residents were asked to restrict their water use as the wastewater retention basin, located at the spill site, was nearing its 58 million gallon capacity due to heavy runoff from the rainfall and melting snow.[486]

1997 **(January 5)** Due to the extremely heavy runoff from the recent rain-on-snow event, and despite having all 17 gates wide open at the Lake Tahoe Dam at Tahoe City since December 11, 1996, Lake Tahoe exceeded its maximum upper legal limit surface elevation (6,229.10 feet MSL), rising to 6,229.39 feet MSL.[487] This represented the lake's highest level since 1907 (when it attained 6,231.26 feet MSL), and its highest level since the signing of the 1935 Truckee River Agreement, which implemented the regulation of Lake Tahoe's surface elevation between 6,223.0 feet MSL (its natural rim) and 6,229.1 feet MSL.

1997 **(February 4)** Due to high flood flows and continued discharges from upstream reservoirs, over the two-month period of December 4, 1996, to February 4, 1997, Pyramid Lake rose 5.28 feet in surface elevation from 3,800.00 feet MSL to 3,805.28 feet MSL.[488] This increase corresponded to a new lake volume of approximately 22,310,000 acre-feet, an increase of 590,000 acre-feet since December 4, 1996. The lake's surface area increased by some 1,784 acres (2.8 square miles) to 113,084 acres (176.7 square miles).

1997 **(March 1)** Based on reports from cross-country skiers, a crack was found in an 8-inch pipeline at Donner Summit above Donner Lake. The pipeline, owned by Sante Fe Pacific

Pipeline, is used to carry 2.1 million gallons of gas, diesel and jet fuel a day from San Francisco Bay area refineries to the Sparks Tank Farm. The break, which was repaired by Thursday, March 6, 1997, was located near the headwaters of Summit Creek. Summit Creek flows some 2.5 miles into Donner Lake, which then flows into the Truckee River and provides drinking water for the Truckee Meadows.[489]

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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. 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.

4. Subsequently, San Francisco would launch its campaign to acquire water from the Tuolumne River, a plan that led eventually to the infamous Hetch Hetchy Dam in Yosemite National Park. [See Douglas H. Strong, *Tahoe: An Environmental History*, University of Nebraska Press, Lincoln, Nebraska, 1984, page 98.]

5. 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.]

6. Townley, *Turn this Water into Gold: The Story of the Newlands Project, op. cit.*, page 25.

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, two 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. Townley, *Turn this Water into Gold: The Story of the Newlands Project, op. cit.*, page 47.

12. 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.]

13. *TRUCKEE RIVER ATLAS*, Department of Water Resources, The Resources Agency, State of California, June 1991, page 44.

14. *Water Treatment Master Plan*, Gas/Water Engineering & Planning Department, Sierra Pacific Power Company, March 1987, page A–3.

15. 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.

16. *Biennial Report of the State Engineer, 1909–1910*, State of Nevada, State Printing Office, Carson City, Nevada, 1911, page 3.

17. 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.

18. 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, *op. cit.*, page 18.]

19. 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.]

20. Strong, Douglas H., *Tahoe: An Environmental History*, University of Nebraska Press, Lincoln, Nebraska, 1984, page 44. Also see Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, page 49.

21. Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, page 47.

22. ToolWorks electronic encyclopedia, Grolier Electronic Publishing, Inc., 1992.

23. 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 54.

24. Nevada Historical Marker 43, "Derby Diversion Dam."

25. Nevada Historical Marker 88, "Sparks."

26. *TRUCKEE RIVER ATLAS*, *op. cit.*, page 81.

27. Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, page 49.

28. *Water Treatment Master Plan*, *op. cit.*, pages A-3 through A-5.

29. Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, page 33.

30. Shamberger, *op. cit.*, page 20.

31. *Water Resource Plan 1988-2008*, Water Resources Department, Westpac Utilities, Sierra Pacific Power Company, Reno, Nevada, January 1989, page IV-4.

32. The Washoe hydroelectric plant is not currently operational. Its capacity has been estimated based on its possible rehabilitation. [See *TRUCKEE RIVER ATLAS*, *op. cit.*, page 81.]

33. Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, page 33.

34. Townley, *The Orr Ditch Case*, *op. cit.*, page 27.

35. Nevada Historical Marker 230, "Mount Rose Weather Observatory."

36. Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, page 49.

37. *Ibid.*, page 5.

38. Nevada Historical Marker 234, "Moana Springs."

39. Townley, *The Orr Ditch Case*, *op. cit.*, page 6.

40. Shamberger, *op. cit.*, page 21.

41. Boardman, H.P., Professor Emeritus, "Truckee River Floods and High Water Years," June 1952, page 2.

42. *Water Resources Data, Nevada*, 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.

43. Townley, *The Orr Ditch Case*, *op. cit.*, page 7.

44. Strong, *op. cit.*, page 101.

45. Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, page 49.

46. *Indian Water Rights: Negotiating the Future*, Water Resources Research Center, University of Arizona, College of Agriculture, Tucson, Arizona, June 1993, pages 8-10.

47. *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.

48. *Truckee River System Briefing Data*, Westpac Utilities, Sierra Pacific Power Company, Reno, Nevada, April 1988, page 3-10.

49. Townley, *The Orr Ditch Case*, *op. cit.*, page 7.

50. *Ibid.*, page 9.

51. *Ibid.*

52. Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, page 49.

53. Strong, *op. cit.*, page 101. Also see Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, pages 49-50.

54. *TRUCKEE RIVER ATLAS*, *op. cit.*, page 81.

55. *Ibid.*, page 44.

56. Townley, *The Orr Ditch Case*, *op. cit.*, page 11.

57. *Ibid.*

58. *TRUCKEE RIVER ATLAS*, *op. cit.*, pages 32 and 41.

59. From Pyramid Lake surface elevation information provided by the U.S. Geological Survey, Water Resources Division, Carson City, Nevada.

60. Wheeler, Sessions S., *The Desert Lake—The Story of Nevada's Pyramid Lake*, The Caxton Printers, Ltd., Caldwell, Idaho, 1967, pages 94-96.

61. Townley, *The Orr Ditch Case*, *op. cit.*, pages 11-12.

62. 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.

63. Houghton, *op. cit.*, page 84.

64. *TRUCKEE RIVER ATLAS*, *op. cit.*, page 44.

65. Strong, *op. cit.*, page 103.

66. *TRUCKEE RIVER ATLAS*, *op. cit.*, page 47.

67. In additional to crucial operating criteria for Truckee River operations, the 1935 Truckee River Agreement 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.]

68. *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.

69. Shamberger, *op. cit.*, pages 23-28.

70. Townley, *The Orr Ditch Case*, *op. cit.*, page 15.

71. *Nevada State Journal*, March 4, 1913, page 1.

72. Townley, *The Truckee Basin Fishery*, *op. cit.*, page 72.

73. 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.] In a U.S. Geological Survey Reconnaissance Report (Rush, F. Eugene, "Water Resources-Information Series Report 17: Bathymetric Reconnaissance of Lake Tahoe, Nevada and California," 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, 1973) a Lake Tahoe surface elevation of 6,229 feet MSL was used in which case the lake's total volume was estimated to be 125 million acre-feet.

74. 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 54.

75. *A Study of Water Rights and Their Enforcement [in the] Lake Tahoe, Truckee and Carson River Basins, op. cit.*, page 163.

76. *Water Treatment Master Plan, op. cit.*, page A-5.

77. *CARSON RIVER ATLAS*, Department of Water Resources, The Resources Agency, State of California, Sacramento, California, December 1991, page 26.

78. *Ibid.*, page 97.

79. Townley, *Turn this Water into Gold: The Story of the Newlands Project, op. cit.*, pages 49–50.

80. Houghton, *op. cit.*, pages 65-66.

81. Wheeler, *The Desert Lake*, page 100.

82. *Reno Gazette-Journal*, July 31, 1995, page 6A.

83. Strong, *op. cit.*, page 104.

84. Townley, *The Orr Ditch Case, op. cit.*, pages 28-29.

85. Nevada Historical Marker 62, "Truckee River–West," and Historical Marker 63, "Truckee River–East."

86. Strong, *op. cit.*, page 104.

87. Townley, *The Orr Ditch Case, op. cit.*, page 30.

88. La Rivers, Ira, Ph.D., F.A.Z., F.O.M.S., *Fishes and Fisheries of Nevada*, Nevada State Fish and Game Commission, State Printing Office, Carson City, Nevada, 1962, page 263.

89. While it was recognized that this amount of water, even when combined with that obtained from the Carson River, would not irrigate the entire 232,800 acres, it was also recognized that no more than 65,000 acres of land had ever been irrigated in the project.

90. Supreme Court of the United States, Syllabus, *Nevada v. United States et al.*, Certiorari to the United States Court of Appeals for the Ninth Circuit, Argued April 27, 1983, Decided June 24, 1983, page 5–6.

91. *TRUCKEE RIVER ATLAS, op. cit.*, page 51.

92. *Ibid.*, page 27, and Nevada Historical Marker 18, "Pyramid Lake."

93. Houghton, *op. cit.*, page 81.

94. Townley, *The Orr Ditch Case, op. cit.*, page 36.

95. *A Study of Water Rights and Their Enforcement [in the] Lake Tahoe, Truckee and Carson River Basins, op. cit.*, pages 116-119.

96. Of this total amount, for the period of record of 1910–1966, approximately 240,000 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.

97. *A Study of Water Rights and Their Enforcement [in the] Lake Tahoe, Truckee and Carson River Basins, op. cit.* page 103.

98. *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. For a more recent summary of the events associated with this event, see "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.

99. "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.

100. For the complete chronology relating to this incident, see Horton, Gary A., *Carson River Chronology—A Chronological History of the Carson River and Related Water Issues*, Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada, August 1996.

101. *TRUCKEE RIVER ATLAS, op. cit.*, page 34.

102. *Ibid.*, page 11.

103. *Ibid.*, page 51.

104. *Truckee River System Briefing Data, op. cit.*, page 1.

105. ToolWorks electronic encyclopedia, Grolier Electronic Publishing, Inc., 1992.

106. *TRUCKEE RIVER ATLAS, op. cit.*, page 51.

107. *Ibid.*, page 50.

108. *Reno Gazette-Journal*, July 31, 1995, page 6A.

109. Corrected application was filed on March 6, 1931.

110. Application file, Office of the State Engineer, Nevada Division of Water Resources, Department of Conservation and Natural Resources, Carson City, Nevada.

111. Corrected application was filed on March 9, 1931.

112. Based on testimony provided by TCID Project Manager to the Nevada State Engineer.

113. Horton, Gary A., *Nevada: A Historical Perspective of the State's Socioeconomic, Resource, Environmental, and Casino Gaming Development*, Business & Economic Research Associates, Reno, Nevada, pages 20–21.

114. *Ibid.*, page 33.

115. *Reno Gazette-Journal*, July 31, 1995, page 6A.

116. U.S. Fish and Wildlife Service (USFWS), Nevada State Office, Reno, Nevada.

117. *TRUCKEE RIVER ATLAS, op. cit.*, page 52.

118. *Ibid.*, page 51.

119. Supreme Court of the United States, Syllabus, *Nevada v. United States et al., op. cit.*

120. La Rivers, Ira, Ph.D., F.A.Z., F.O.M.S., *Fishes and Fisheries of Nevada*, Nevada State Fish and Game Commission, State Printing Office, Carson City, Nevada, 1962, page 125.

121. Such provisions included: (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.]

122. 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 11.

123. *TRUCKEE RIVER ATLAS, op. cit.*, page 23.

124. 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 77.

125. Boardman, *op. cit.*, pages 3–4 and 7.

126. *Ibid.*

127. Rusco, *op. cit.*, page 11.

128. Strickland, *op. cit.*, page 77.

129. *TRUCKEE RIVER ATLAS, op. cit.*, page 23. Mud Lake was also the name given by La Rivers, perhaps erroneously, to a natural depression to the west and slightly south of Marble Bluff, located to the south of Pyramid Lake, which was more commonly referred to as Duck Lake. [See La Rivers, *op. cit.*, page 140.]

130. Shamberger, *op. cit.*, page 31.

131. "Nevada Water Supply and Use," U.S. Geological Survey Water-Supply Paper 2350, Water Resources Division, USGS, Carson City, Nevada, 1987, page 359.

132. *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.

133. *TRUCKEE RIVER ATLAS, op. cit.*, page 11. Another source lists this storage capacity at 40,800 acre-feet.

134. *Reno Gazette-Journal*, July 31, 1995, page 6A.

135. Townley, *The Truckee Basin Fishery, op. cit.*, page 80. According to the pamphlet "Bring Back the Lahontan Cutthroat," a publication sponsored by the U.S. Fish and Wildlife Service, U.S. Bureau of Land Management, U.S. Forest Service, Humboldt-Toiyabe National Forests, Nevada Division of Wildlife, and Trout Unlimited, Sagebrush Chapter and Northeastern Nevada Chapter, the Lahontan cutthroat trout was extirpated from Lake Tahoe by 1939 and from Pyramid Lake five years later (1944).

136. *Ibid.*, page 26.

137. La Rivers, *op. cit.*, page 139.

138. *Truckee River System Briefing Data, op. cit.*, page 3-3.

139. *A Study of Water Rights and Their Enforcement [in the] Lake Tahoe, Truckee and Carson River Basins, op. cit.*, pages 116–119.

140. Of possible interest here is that while less than 6,000 acres were determined to be irrigable on the Pyramid Lake Paiute Indian Reservation, the U.S. Reclamation Service in 1912 had documented that over 32,678 acres of irrigable land had been surveyed on the reservation. In reducing this allowable irrigable acreage to less than 6,000 acres from over 32,000 previously documented, the Department of Justice felt a compromise was needed as so little acreage was then under cultivation and because the Indians "had not proven to be particular agricultural successes." As a result, the Indians received only 20 percent of that due by precedent (Winters Doctrine based on *Winters v. United States*). [See Townley, *The Orr Ditch Case, op. cit.*, pages 55–56.]

141. *TRUCKEE RIVER ATLAS, op. cit.*, page 53.

142. Correspondence, Office of the Solicitor, U.S. Department of the Interior, Washington, D.C., November 29, 1983.

143. Houghton, *op. cit.*, page 56.

144. *Reno Gazette-Journal*, July 31, 1995, page 6A.

145. From information supplied by the Nevada Division of Wildlife (NDOW), Department of Conservation and Natural Resources, Reno, Nevada, and U.S. Fish and Wildlife Service (USFWS), Nevada State Office, Reno, Nevada.

146. Strong, *op. cit.*, page 113.

147. *Ibid.*

148. *Ibid.*, page 114.

149. Boardman, *op. cit.*, pages 4–5.

150. La Rivers, *op. cit.*, page 125.

151. Boardman, *op. cit.*, page 5.

152. *CARSON RIVER ATLAS, op. cit.*, pages 76–77.

153. 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.

154. 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, 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 65.]

155. *Public Law 780*, 3 September 1954, Eighty-Third Congress, Second Session.

156. *Operation and Maintenance Manual for Truckee River and Tributaries, California and Nevada*, U.S. Army Engineer District, Corps of Engineers, Sacramento, California, July 1964, pages 1–2. Also see *Lower Truckee River, Nevada, Reconnaissance Report*, U.S. Army Corps of Engineers (COE), Sacramento District, July 1995, page 2–1.

157. *Lower Truckee River, Nevada, Reconnaissance Report*, Appendix C—Flood Damage Reduction, U.S. Army Corps of Engineers (COE), Sacramento District, January 1992.

158. *A Study of Water Rights and Their Enforcement [in the] Lake Tahoe, Truckee and Carson River Basins, op. cit.*, page 64.

159. 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.]

160. *TRUCKEE RIVER ATLAS*, *op. cit.*, page 59.

161. *Reno Gazette-Journal*, July 31, 1995, page 6A.

162. *TRUCKEE RIVER ATLAS*, *op. cit.*, page 34.

163. *CARSON RIVER ATLAS*, *op. cit.*, page 78.

164. ToolWorks electronic encyclopedia, Grolier Electronic Publishing, Inc., 1992.

165. Cross defendants in this action included Washoe County Water Conservation District and Sierra Pacific Power Company. [Office of the Solicitor, U.S. Department of the Interior, *op. cit.*]

166. *TRUCKEE RIVER ATLAS*, *op. cit.*, page 60.

167. *A Study of Water Rights and Their Enforcement [in the] Lake Tahoe, Truckee and Carson River Basins*, *op. cit.*, pages 123–125.

168. Personal communication with Richard Moser, P.E., Senior Water Resource Engineer, Glendale Water Treatment Plant, Sierra Pacific Power Company, Reno, Nevada, 1995.

169. *A Study of Water Rights and Their Enforcement [in the] Lake Tahoe, Truckee and Carson River Basins*, *op. cit.*, pages 92–95.

170. *Truckee River System Briefing Data*, *op. cit.*, page 3–13.

171. Eutrophication is the process of enrichment of water bodies by nutrients. Degrees of eutrophication typically range from *Oligotrophic* water (maximum transparency, minimum chlorophyll-*a*, minimum phosphorus) through *Mesotrophic*, *Eutrophic*, to *Hypereutrophic* water (minimum transparency, maximum chlorophyll-*a*, maximum phosphorus). The eutrophication of a lake normally contributes to its slow evolution into a bog or marsh and ultimately to dry land. Eutrophication may be accelerated by human activities and thereby speed up the aging process. States of eutrophication are typically measured by the Carlson's Trophic State Index (TSI) or the (mean) Trophic State Index (TSI). Eutrophic lakes are rich in nutrients and organic materials, therefore, highly productive for plant growth. These lakes are often shallow and seasonally deficient in oxygen in the hypolimnion (bottom layer of a stratified lake). [See Horton, Gary A., *WATER WORDS DICTIONARY*, Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada.]

172. Strong, *op. cit.*, pages 114–115.

173. Office of the Solicitor, U.S. Department of the Interior, *op. cit.*

174. *Report of the Lake Tahoe Joint Study Committee*, March 1967, and Houghton, *op. cit.*, page 59.

175. *TRUCKEE RIVER ATLAS*, *op. cit.*, page 12.

176. *Ibid.*, page 11.

177. *Lower Truckee River, Nevada, Reconnaissance Report*, Appendix C—Flood Damage Reduction, January 1992, *op. cit.*

178. *Ibid.*, page 15.

179. *Ibid.*, Appendix C—Flood Damage Reduction.

180. Between August 1959 and September 1963, under authorization of the Flood Control Act of 1954, a number of channel modifications were performed along the Truckee River. [See *Operation and Maintenance Manual for Truckee River and Tributaries, California and Nevada*, *op. cit.*, pages 2–3.]

181. *Plan of Study—Truckee Meadows Investigation, Nevada*, Department of the Army, Sacramento District, U.S. Army Corps of Engineers (COE), Sacramento, California, July 1977, page 6.

182. This plant would undergo several name changes over the years. First, in 1978 its name was changed from the Reno–Sparks Joint Sewage Treatment Plant to the Reno–Sparks Joint Water Pollution Control Plant. Next, in 1985 its name was changed to the Reno–Sparks Joint Wastewater Treatment Facility, and finally, in 1991 its name was changed to the Truckee Meadows Water Reclamation Facility. [Personal communication, Duane Baker, Operations Superintendent, Truckee Meadows Water Reclamation Facility, Reno, Nevada, August 12, 1996.]

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

184. *A Study of Water Rights and Their Enforcement [in the] Lake Tahoe, Truckee and Carson River Basins, op. cit.*, pages 150–154.

185. *Plan of Study—Truckee Meadows Investigation, Nevada, op. cit.*, page 1.

186. Houghton, *op. cit.*, page 59.

187. *Ibid.*, page 83.

188. Joplin, Maureen (Geologist), and Hal Fiore (Hydrologist), *Gray Creek Watershed Monitoring Project*, United States Department of Agriculture, Forest Service, April 4, 1995, page 5.

189. Fact Sheet: "Endangered Species Act History and Overview," U.S. Fish and Wildlife Service (USFWS), Nevada State Office, U.S. Department of the Interior, Reno, Nevada, February 1995.

190. *Water Resources Data, Nevada, op. cit.*

191. From Pyramid Lake gaging station records provided by the U.S. Geological Survey, Water Resources Division, Carson City, Nevada.

192. *Plan of Study—Truckee Meadows Investigation, Nevada, op. cit.*, page 7.

193. Houghton, *op. cit.*, page 84.

194. *Water Resources Data, op. cit.*, pages 522–523.

195. *A Study of Water Rights and Their Enforcement [in the] Lake Tahoe, Truckee and Carson River Basins, op. cit.*, page 154.

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

197. "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.]

198. Data provided by Sierra Hydrotech, the consultant who tabulated Truckee Canal diversions from the Federal Watermaster's gage for water years 1910–1966 from TCID files. The average annual diversion for this period of record was 239,700 acre-feet. [From information provided by USBR, Carson City, Nevada.]

199. *Water Resources Data, Nevada, op. cit.*

200. Office of the Solicitor, U.S. Department of the Interior, *op. cit.*

201. 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 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 Congressional approval. [See *WALKER RIVER ATLAS, op. cit.*, pages 69–70.]

202. *TRUCKEE RIVER ATLAS, op. cit.*, pages 75–76.

203. *Pyramid Lake Task Force Final Report*, December 1971, page I.

204. Fact Sheet: "Endangered Species Act History and Overview," *op. cit.*

205. *Truckee River System Briefing Data, op. cit.*, pages 1–2.

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

207. *Plan of Study—Truckee Meadows Investigation, Nevada, op. cit.*, page 1.

208. Houghton, *op. cit.*, page 59.

209. *A Study of Water Rights and Their Enforcement [in the] Lake Tahoe, Truckee and Carson River Basins, op. cit.*, pages 158–160.

210. *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.

211. *Federal Register*, Volume 35, page 13520.

212. *California-Nevada Interstate Compact Between the State of California and Nevada, op. cit.*

213. *Ibid.*, page 18.

214. To show how "typical" this 1971 Truckee River diversion amount actually was, over a subsequent period of record encompassing 22 years from 1973 through 1994, the average annual diversion from the Truckee River (measured at the Wadsworth gage on the Truckee Canal) was 172,380 acre-feet.

215. Houghton, *op. cit.*, page 98.

216. *Pyramid Lake Task Force Final Report*, *op. cit.*, page vi.

217. *Ibid.*, page viii.

218. *Ibid.*, page 35.

219. 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.

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

221. The 42 bird species that were abundant (A), common (C), or rare (R) in 1868 along the lower Truckee River and completely gone by 1976 included (listed alphabetically): American Avocet (C); American Bittern (C); American Goldfinch (R); American Widgeon (A); Ash-throated Flycatcher (R); Bank Swallow (A); Black-chinned Hummingbird (A); Black-crowned Night Heron (R); Black-headed Grosbeak (C); Black-necked Stilt (C); Black-throated Sparrow (C); Cliff Swallow (A); Dunlin (R); Gadwall (A); Golden Eagle (R); Hooded Merganser (R); Least Bittern (R); Loggerhead Shrike (C); Long-billed Curlew (C); Long-billed Marsh Wren (A); Long-eared Owl (C); Marsh Hawk (A); Osprey (R); Peregrine Falcon (One Pair); Purple Martin (R); Rufous-sided Towhee (C); Sandhill Crane (R); Savannah Sparrow (C); Shoveler (C); Solitary Sandpiper (R); Song Sparrow (A); Sora (C); Turkey Vulture (A); Vaux's Swift (C); Virginia Rail (R); Western Tanager (C); White-throated Swift (R); Willet (C); Willow Flycatcher (A); Yellow-billed Cuckoo (R); Yellow-breasted Chat (C); Yellowthroat (C). [See *Reno Gazette-Journal*, June 3, 1996, page 4A.]

222. *Reno Gazette-Journal*, June 3, 1996, pages 1A and 4A. Also see Ammon, Elizabeth, "Historical Changes in Biodiversity Along the Lower Truckee," *The Truckee River Times*, Volume 6, Number 2, May 1996, page 2.

223. Mahannah, *op. cit.*, page 19. Aerial survey was conducted by Cornell, Howland, Hayes and Merryfield Clair A. Hill & Associates (CH2M/Hill).

224. Sill, R., T. Mudd, S. Francis and T. Swedberg, "Progress Report," Sierra Club Pyramid Lake Task Force, August 1972.

225. Mahannah, *op. cit.*, pages 4–5.

226. 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.

227. 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 1900s. [See *CARSON RIVER ATLAS*, *op. cit.*, page 82.] By one estimate [De Bruyn, *op. cit.*] 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 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 on-going $3.55 million annual operations and maintenance cost.

228. *CARSON RIVER ATLAS*, *op. cit.*, page 81.

229. *Ibid.*, pages 90–91.

230. Fact Sheet: "Endangered Species Act History and Overview," *op. cit.*

231. Houghton, *op. cit.*, page 82.

232. *CARSON RIVER ATLAS*, *op. cit.*, page 92, and *TRUCKEE RIVER ATLAS*, *op. cit.*, page 73.

233. Townley, *Turn this Water into Gold: The Story of the Newlands Project*, *op. cit.*, page 149.

234. *Ibid.*

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

236. The Nevada parties included the Truckee-Carson Irrigation District (TCID), 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.*). [Office of the Solicitor, U.S. Department of the Interior, *op. cit.*]

237. *TRUCKEE RIVER ATLAS, op. cit.*, page 63.

238. By the Winters Rights Decision, national parks, national forests, national monuments, national recreation areas, national grasslands, national wildlife refuges, etc., are also considered "reservations" and entitled to their own federal reserved water rights.

239. Office of the Solicitor, U.S. Department of the Interior, *op. cit.*

240. *Ibid.*

241. *Plan of Study—Truckee Meadows Investigation, Nevada, op. cit.*, page 1.

242. Personal correspondence, Lynne L. Hartung, Secretary-Treasurer, Truckee-Carson Irrigation District, June 3, 1996.

243. Phosphorus frequently enters waterways through the use of home laundry detergents. Another important source of phosphorus is from phosphoric acid, an important ingredient in fertilizers. Phosphoric acid is a term applied to any of three oxygen acids of phosphorus known respectively as ordinary or orthophosphoric, pyrophosphoric, and metaphosphoric acids. The most common form, orthophosphoric acid, or simply phosphoric acid, H_3PO_4, is a syrup-like compound and an important ingredient in fertilizers. However, to be available for use by plants, the phosphates must be soluble in water or plant juices. Insoluble normal phosphates, as mineral phosphates, are therefore often converted into soluble acid salts by treatment with sulfuric acid. Phosphoric acid, when used as a fertilizer ingredient, is often blamed for excessive algae growth and oxygen losses in rivers and is frequently a leading toxin to aquatic life. [See Horton, *Water Words Dictionary, op. cit.*]

244. PhoStrip is a proprietary process that removes phosphorus through the biological phenomena If "luxury uptake" and "anaerobiosis" and by chemical treatment of a phosphorus-rich sidestream. The activated sludge microorganisms take up phosphorus in the aeration tank and then are induced to release phosphorus while detained under anaerobic conditions in a holding tank (stripping tank). A clear, phosphorus-rich supernatant liquor (PRS) is then separated from the return activated sludge (RAS) which enters the stripping tank, settles to the bottom, becomes anaerobic, and releases phosphorus. The compacted sludge, anaerobic RAS (ARAS), then contains a mixture of phosphorus-deficient microorganisms and phosphorus-rich liquor. The ARAS is returned to the aeration tank where the phosphorus-deficient microorganisms take up phosphorus to repeat the cycle. [See Peirano, Lawrence, E., and Larry G. Parlin, "Biological-Chemical Phosphorus Removal at Reno-Sparks, Nevada: Update Ten Years after Plant-Scale Test," for presentation at Water Pollution Control Federation 59th Annual Conference, October 5-9, Los Angeles, California, pages 2-3.]

245. *Ibid.*, page 1.

246. *TRUCKEE RIVER ATLAS, op. cit.*, page 27.

247. *Reno Gazette-Journal*, June 13, 1996, page 4C.

248. *Federal Register*, Volume 40, page 29864.

249. Office of the Solicitor, U.S. Department of the Interior, *op. cit.*

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

251. Office of the Solicitor, U.S. Department of the Interior, *op. cit.*

252. *Ibid.*

253. *Reno Gazette-Journal*, July 31, 1995, page 6A.

254. *Water Treatment Master Plan, op. cit.*, page A-5.

255. *Water Production Reliability Study*, Sierra Pacific Power Company, October 1994, page 2-3.

256. *WALKER RIVER ATLAS, op. cit.*, page 53.

257. Fact Sheet: "Endangered Species Act History and Overview," *op. cit.*

258. Information supplied by Terry Retterer, Nevada Division of Wildlife (NDOW), Department of Conservation and Natural Resources, Reno, Nevada.

259. Office of the Solicitor, U.S. Department of the Interior, *op. cit.*

260. *Ibid.*

261. *TRUCKEE RIVER ATLAS, op. cit.*, page 26.

262. In 1996, several years after the death of U.S. District Court Justice Bruce R. Thompson, the newly-constructed federal courthouse and office building in downtown Reno was named in his honor.

263. For lands above Lahontan Reservoir, served only by the Carson River, the net consumptive use was established at 2.5 acre-feet based on 4.5 acre-feet per acre diverted to the canal for the bottom lands, 6.0 acre-feet per acre diverted to the canal for alluvial fan lands, and 9.0 acre-feet per acre diverted to the canal for bench lands. [See 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, Final Decree, United States Federal District Court for the District of Nevada, October 28, 1980, page 3.]

264. *Ibid.*, page 11.

265. Tahoe Regional Planning Agency (TRPA), Resolution No. 82-11, "Resolution of the Governing Body of the Tahoe Regional Planning Agency Adopting Environmental Threshold Carrying Capacities for the Lake Tahoe Region," Adopted by the Governing Body of the TRPA, August 26, 1982.

266. Office of the Solicitor, U.S. Department of the Interior, *op. cit.*

267. *Ibid.*

268. The Pyramid Lake Indian Tribe had filed a similar lawsuit against Truckee River water rights holders in Nevada in 1973 when it attempted to reopen the Orr Ditch Decree. In 1983, the U.S. Supreme Court ruled against the Tribe and refused to open this decree to obtain additional water rights under the federal reservation doctrine.

269. The hydrologic water year runs from October 1st through September 30th.

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

271. *Ibid.*

272. Peirano, *op. cit.*, pages 8-9.

273. Fact Sheet: "Endangered Species Act History and Overview," *op. cit.*

274. Office of the Solicitor, U.S. Department of the Interior, *op. cit.*

275. Tahoe Regional Planning Agency (TRPA), Resolution No. 82-11, *op. cit.*

276. Phase 1 (Whether the provisions of the Washoe Project Act required a cost reimbursement contract with the Carson-Truckee Water Conservancy District) was decided on February 16, 1982; phase 2 (If part 1 is so, whether the provisions of the Endangered Species Act (ESA) of 1973 somehow alter that obligation) was decided on October 4, 1982; judgement was entered on October 22, 1982. After various motions were filed, the court's final order was issued on December 22, 1982. [Office of the Solicitor, U.S. Department of the Interior, *op. cit.*]

277. Rusco, *op. cit.*, page 12.

278. *Reno Gazette-Journal*, May 31, 1983, page 1, and March 20, 1997, pages 1A and 9A..

279. A Nevada Bureau of Mines study revealed that the oldest known slide in this area occurred some 50,000 years ago. The instability of the region was also well known to early Washoe and Paiute Indians, which referred to Slide Mountain as "Mountain Which Fell Upon Itself."

280. The original lawsuit was actually based on *U.S. v. TCID*; however, the U.S. Supreme Court consolidated several law suits 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. [Office of the Solicitor, U.S. Department of the Interior, *op. cit.*]

281. *TRUCKEE RIVER ATLAS*, *op. cit.*, page 63.

282. Office of the Solicitor, U.S. Department of the Interior, *op. cit.*

283. *TRUCKEE RIVER ATLAS*, *op. cit.*, page 33.

284. The California State Water Resources Control Board (SWRCB) consists of five members whose responsibility it is to "protect water quality and allocate water rights" within the State of California. To assist in these functions, the SWRCB is served by a staff and nine (9) Regional Board Executive Officers serving the regions of: (1) North Coast Region; (2) San Francisco Bay Region; (3) Central Coast Region; (4) Los Angeles Region; (5) Central Valley Region; (6) Lahontan Region; (7) Colorado River Basin Region; (8) Santa Ana Region; and (9) San Diego Region. [These regions generally correspond, with some combinations and renaming, to the ten (10) California Hydrologic Regions or Hydrologic Study Areas (HSAs). [See *1995 Conservation Directory*, 40th Edition, National Wildlife Federation, Washington, D.C., page 169.]

285. *Ibid.*, page 95.

286. *Reno Gazette-Journal*, January 19, 1997, page 5C.

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

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

289. *Reno Gazette-Journal*, July 31, 1995, page 6A.

290. "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.

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

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

293. Janik, *op. cit.*, page 57.

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

295. *Lower Truckee River, Nevada Reconnaissance Report*, U.S. Army Corps of Engineers (COE), Sacramento District, July 1995, page 2-25.

296. *Reno Gazette-Journal*, April 30, 1996, page 3B.

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

298. *Ibid.*, page 70.

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

300. *CARSON RIVER ATLAS*, *op. cit.*, page 82.

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

302. 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.]

303. Conversation with Alan Biaggi, Chief, Corrective Actions, Nevada Division of Environmental Protection (NDEP), Department of Conservation and Natural Resources, Carson City, Nevada, September 1995.

304. *Final Environmental Impact Statement for the Newlands Project Proposed Operating Criteria and Procedures (OCAP)*, *op. cit.*, page 1-2.

305. *Ibid.*, page 1-7.

306. Fact Sheet: "Endangered Species Act History and Overview," *op. cit.*

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

308. 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. [Personal communication, Al Olson, U.S. Bureau of Reclamation, Lahontan Basin Projects Office, Carson City, Nevada.]

309. Olson, *op. cit.*

310. *TRUCKEE RIVER ATLAS*, *op. cit.*, page 95.

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

312. *Ibid.*

313. Biaggi, *op. cit.*

314. Personal communication, Duane Baker, Operations Superintendent, Truckee Meadows Water Reclamation Facility, Reno, Nevada, August 12, 1996.

315. *Water Resources in the Walker River Basin: A Search for Water to Save Walker Lake*, Public Resource Associates, Reno, Nevada, November 1994, page 28.

316. 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.

317. *Reno Gazette-Journal*, July 31, 1995, page 6A.

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

319. *Ibid.*

320. *Reno Gazette-Journal*, July 31, 1995, page 6A.

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

322. *Public Law 101-618*, U.S. Congress, November 1990.

323. Parties to the suit included Santa Fe Pacific Pipeline, Inc., Southern Pacific Transportation Company, Shell Oil, Time Oil Company, Berry-Hinckley Terminal, Inc., Chevron USA, Inc., Texaco Refining and Marketing, Inc., Golden Gate Petroleum, Inc., and UNOCAL. One original participant, British Petroleum Air, was dropped from the suit. [Biaggi, *op. cit.*]

324. U.S. Fish and Wildlife Service (USFWS), Nevada State Office, Reno, Nevada.

325. See Rowe, *op. cit.*

326. *Reno Gazette-Journal*, April 28, 1996, page 10A.

327. 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 water logging. 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. Water logging 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.]

328. 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.]

329. 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 chronology entries under April 1994 and December 1995.]

330. *Reno Gazette-Journal*, April 28, 1996, page 10A.

331. Joplin, *op. cit.*, page 5.

332. Personal conversation with Faith Bremner, reporter for the *Reno Gazette-Journal*, August 7, 1995.

333. *Reno Gazette-Journal*, April 28, 1996, page 10A.

334. *Reno Gazette-Journal*, July 31, 1995, page 6A.

335. *Water Resources Data, Nevada, op. cit.*

336. *Lahontan Valley News*, September 5, 1995, page 1.

337. *Reno Gazette-Journal*, April 28, 1996, page 10A.

338. Hartung, *op. cit.*

339. *The Reno Gazette-Journal*, March 4, 1995, pages 4A-5A.

340. *Ibid.*

341. *Reno-Gazette Journal*, January 22, 1996, pages 1B and 4B.

342. *Ibid.*

343. The Surface Water Treatment Rule (SWTR) pertains to water quality treatment standards as prescribed under the Safe Drinking Water Act (SDWA) and amendments thereto. The rule is a set of treatment technique requirements which apply to all water systems using surface water and those using ground water which is under the influence of surface water. Surface water systems are those using water exposed to the atmosphere, such as rivers, lakes, reservoirs, or streams. Ground water systems that are under the influence of surface water may include shallow wells, infiltration galleries, and springs which may contain the same disease-causing microorganisms of concern in surface water. The rule requires that these systems properly filter the water, unless they can meet certain strict criteria. The rule also requires that these systems disinfect the water. There are no exceptions from the disinfection requirement. [See Horton, *WATER WORDS DICTIONARY, op. cit.*]

344. *Water Production Reliability Study, op. cit.*, page 2-1.

345. Rieke, Statements to Congress, *op. cit.*

346. *Water Production Reliability Study, op. cit.*, page 2-1.

347. Dickerson, Richard, "Pyramids, Fish Tails and Other Myths," *The Truckee River Times*, Vol. 6, No. 5, December 1996, pages 1-2.

348. Water right application file 9330, Office of the State Engineer, Nevada Division of Water Resources, Department of Conservation and Natural Resources, Carson City, Nevada.

349. 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..." [For a reprint of the Preliminary Settlement Agreement, see *TRUCKEE RIVER ATLAS, op. cit.*, Appendix 2, pages 119-126.]

350. Water right application file 9330, *op. cit.*

351. *Reno Gazette-Journal*, April 28, 1996, page 10A.

352. *Ibid.*

353. RESOLVE, Center for Environmental Dispute Resolution, 2828 Pennsylvania Avenue, NW, Suite 402, Washington, D.C., 20007. Telephone: (202) 944-2300; Fax: (202) 338-1264.

354. *Reno Gazette-Journal*, April 28, 1996, page 10A.

355. Truckee-Carson Settlement Negotiations Meeting Notes, Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada, April 1995.

356. *Reno-Gazette Journal*, January 22, 1996, pages 1B and 4B.

357. This amount was derived from the difference between the old rate that developers had to purchase, which was 1.72 acre-feet for every acre-foot of water demand, and the new rate, 1.1 acre-feet. The new lower rate requirement is based upon more efficient operation of the Truckee River under the implementation of the Negotiated Settlement and a new Truckee River Operating Agreement. The difference, 0.62 acre-foot, is equal to the $1,350 fee based on the approximate cost of this amount of water on the local water market (i.e., approximately $2,180 per acre-foot).

358. *Reno Gazette-Journal*, July 31, 1995, page 6A.

359. *Sparks Tribune*, June 25, 1996.

360. Gotta, Sandi, "Steamboat Creek Restoration Project News," *The Truckee River Times*, Vol. 6, No. 5, December 1996, page 2.

361. *Reno Gazette-Journal*, April 30, 1996, page 3B.

362. TCID 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 (NDOW) water rights for the reservoir (up to 20,000 acre-feet). [Hartung. *op. cit.*]

363. On July 20, 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 (EPA) 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. [Office of the Solicitor, U.S.

Department of the Interior, *op. cit.*]

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

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

366. "Algae Threatens Tahoe's Clarity, Plants and Animals," *North Lake Tahoe Bonanza*, June 21, 1996, page 5A.

367. Eutrophication is the process of enrichment of water bodies by nutrients. Eutrophication may be accelerated by human activities and thereby speed up the aging process. [See Horton, *WATER WORDS DICTIONARY, op. cit.*]

368. *Reno Gazette-Journal*, pages 1A and 7A, July 22, 1995.

369. Joplin, *op. cit.*

370. *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.

371. See NRS 540A.080.

372. Non-voting members to the Washoe County Regional Water Planning Commission included: (1) one member appointed by the Public Service Commission (PSC) of Nevada; (2) one member appointed by the advocate for customers of public utilities in the office of the Attorney General; (3) one member appointed by the administrator of the Nevada Division of Environmental Protection (NDEP) of the state Department of Conservation and Natural Resources (DCNR); (4) one member appointed by the State Engineer; (5) one member appointed by the administrator of the Nevada Division of Water Planning (NDWP) of the DCNR; (6) One member appointed by the board of directors of the water conservancy district which is largest in area which includes any part of the region; (7) one member appointed by the county District Board of Health; (8) one member of the public at large appointed by the affirmative vote of a majority of the voting members; and (9) additional members with expertise in an area that the majority of the voting members determines is necessary and appointed by the affirmative vote of a majority of the voting members. [See NRS 540A.090.]

373. Sun Valley General Improvement District.

374. Sierra Pacific Power Company (SPPCo).

375. Pyramid Lake Paiute Indian Tribe.

376. Washoe County Water Conservation District (WCWCD).

377. The regional water plan must consist of the following required major elements (along with sub-requirements): (1) quality of surface water; (2) quality of ground water; (3) supply of surface water; (4) supply of underground water; (5) control of floods and drainage of storm water, as it relates to surface water; (6) control of floods and drainage of storm water, as it relates to underground water; and (7) cost and financing of each major project. [See NRS 540A.140.]

378. NRS 540A.250–NRS 540A.280.

379. NRS 540A.290 and NRS 540A.300.

380. By August 1996, five wells had been identified as having high levels of perchloroethylene (PCE): (1) High Street (High and Kuenzli streets), PCE level 18.3 parts per billion; (2) Morrill Street (at Commercial Row), PCE level 4.5 parts per billion; (3) Kietzke Lane (at Kuenzli Street), PCE level 4.9 parts per billion; (4) Mill Street (Market Street and Harvard Way), PCE level 5.45 parts per billion; and (5) Corbett Street (at Roger Corbett Elementary School), PCE level 4.9 parts per billion. At least 320 potential sources for the chemical had been found in the Truckee Meadows contaminating the groundwater and the above five (5) Sierra Pacific Power Company wells.

381. *Reno Gazette-Journal*, July 22, 1995, page 1C.

382. 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).

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

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

385. 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 Projects Office, Carson City, Nevada.] All Truckee River diversions were made in accordance with the prevailing OCAP and were based on the most recent snow-pact water content forecasts by the Natural Resources Conservation Service (NRCS). Subsequent spills from Lahontan Reservoir were based on an unusually wet spring, which was not forecasted. [Hartung. *op. cit.*]

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

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

388. *Public Law 101-618*, Section 209.(a)(1)(B).

389. *Reno Gazette-Journal*, September 14, 1995, page 3B, and conversation with Alan Biaggi, *op. cit.*, September 1995.

390. 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, TCID was forced to spill water from Lahontan Reservoir. [Figures provided by the U.S. Bureau of Reclamation, Lahontan Basin Projects Office, Carson City, Nevada.]

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

392. *Reno Gazette-Journal*, January 19, 1997, page 5C.

393. *Reno-Gazette Journal*, November 2, 1995, pages 1B and 4B.

394. 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 NEPA 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.*]

395. *Reno Gazette-Journal*, December 3, 1995, pages 1C and 4C.

396. In April 1994, Elizabeth Ann Rieke, Assistant Secretary of Water and Science at the U.S. Department of the Interior, reported to Congress that the Bureau of Reclamation had calculated the amount of Truckee River excess water diversions by TCID 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, Statements to Congress, *op. cit.*]

397. *Reno Gazette-Journal*, December 12, 1995, page 2B.

398. *Lahontan Valley News*, Fallon, Nevada, December 12, 1995.

399. *Reno Gazette-Journal*, December 24, 1995, pages 1C-2C.

400. *Reno Gazette-Journal*, December 26, 1995, page 2B.

401. Since October 1994 these daily average discharges were reported to have been: October 1994—804 pounds; November 1994—765 pounds; December 1994—623 pounds; January 1995— 683 pounds; February 1995—813 pounds; March 1995—1,414 pounds; April 1995—901 pounds; May 1995—1,858 pounds; June 1995—1,327 pounds; July—1,092 pounds; August 1995—1,121 pounds; September 1995—1,923 pounds; October 1995—1,160 pounds; November 1995—1,034 pounds; December 1995—2,084 pounds. [See *Reno-Gazette Journal*, January 22, 1996, pages 1B and 4B.]

402. *Reno-Gazette Journal*, January 25, 1996, page 2B.

403. Snow telemetry [Natural Resources Conservation Service (NRCS), U.S. Department of Agriculture].

404. *Reno-Gazette Journal*, February 21, 1996, page 1, and February 22, 1996, page 1B. SNOTEL information was provided by Natural Resources Conservation Service (NRCS), U.S. Department of Agriculture.

405. Young, Desna, "Noxious Weed Update," *The Truckee River Times*, Vol. 6, No. 5, December 1996, page 3.

406. The Nephelometric Turbidity Unit, or NTU, is a unit of measure for the turbidity of water resulting from the use of a Nephelometer and based on the amount of light that is reflected off the water. This unit is not identical to the Jackson Turbidity Unit (JTU). [See Horton, *WATER WORDS DICTIONARY, op. cit.*]

407. Personal communication, Randy Alstadt, Senior Water Treatment Engineer, Sierra Pacific Power Company, Reno, Nevada, January 29, 1997.

408. Director's Office, Department of Conservation and Natural Resources, State of Nevada, Carson City, Nevada.

409. *Reno Gazette-Journal*, August 3, 1996, page 1B.

410. Interestingly, in the same paper in which the Reno City Council's resolution to oppose this merger was reported, an article appeared noting the accomplishments of economic diversification as exemplified by a Reno–Sparks firm called Quality Bearing Service, a subsidiary of Brenco, Inc. It was noted that the Southern Pacific Railroad will be buying more than half of the 20,000 reconditioned bearings from Quality Bearing Service's Sparks, Nevada, plant. [See *Reno Gazette-Journal*, March 29, 1996, pages 4C.]

411. *Reno-Gazette Journal*, March 29, 1996, pages 1B and 4C.

412. *Reno-Gazette Journal*, March 17, 1996, page 8A.

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

414. *Reno Gazette-Journal*, April 30, 1996, page 3B.

415. *Reno Gazette-Journal*, May 13, 1996, page 1A, and June 19, 1996, page 2B.

416. *North Lake Tahoe Bonanza*, May 10, 1996, pages 1 and 18A.

417. *Reno Gazette-Journal*, August 10, 1996, pages 1B and 4B.

418. *Reno Gazette-Journal*, June 8, 1996, pages 1A and 6A.

419. *Reno Gazette-Journal*, June 17, 1996, pages 1D and 5D.

420. The sequence of steps taken to purify SPPCo's water consists of eleven (11) steps including: (1) Begin with unpurified water; (2) Screening—removal of leaves, sticks and large foreign material; (3) Pre-Chlorination—removal of disease organisms, bad taste, and odors; (4) Pre-Settling—settling out large dirt particles; (5) Flash Mix—a process in which chemicals are added to cause fine dirt to clump together; (6) Coagulation/Flocculation—a process in which flash mix particles are gathered and made even larger; (7) Sedimentation—a process in which gravity is used to settle out the large particles formed in coagulation/flocculation; (8) Filtration—removal of any remaining particles; water is at least 99 percent particle-free at this point in the process; (9) Final Chlorination—removal of any remaining disease organisms and adds necessary chlorine to prevent microbe regrowth in the distribution system; (10) Corrosion Control—a step in which chemicals are added to neutralize the corrosive effects of "soft" water systems, thereby preventing damage to plumbing and fixtures; (11) Finally, effluent pumps send the purified water to residential, commercial, and industrial establishments.

421. *Reno Gazette-Journal*, August 7, 1996, page 2C, and personal communication, Sandra Canning, Manager, Water Treatment, Sierra Pacific Power Company, Reno, Nevada, August 7, 1996.

422. *North Lake Tahoe Bonanza*, June 19, 1996.

423. *Reno Gazette-Journal*, June 27, 1996, page 1D.

424. *Sparks Tribune*, June 25, 1996.

425. *Reno Gazette-Journal*, June 25, 1996, page 4D.

426. *Reno Gazette-Journal*, June 27, pages 1A and 4A.

427. *Reno Gazette-Journal*, June 20, 1996.

428. *Reno Gazette-Journal*, July 9, 1996, page 1B.

429. Prior to this time, the Wildcreek Gold Course relied on the Orr Ditch for its water. During the drought period of 1987–1994, this ditch was cut off in 1992 and 1994, severely damaging the golf course.

430. *Reno Gazette-Journal*, July 10, 1996, page 4C.

431. *Reno Gazette-Journal*, July 11, 1996, page 1B.

432. The reported noted that the likelihood of a toxic spill was once every 80.8 years along the Truckee River above the California-Nevada border and once ever 154.75 years below the border. With respect to interpreting the probability of occurrence, the author noted that "There are people who have lived on the Mississippi River for 30 years who have been through five 100-year floods." The most likely substances in a spill, listed in decreasing order included: (1) sulfuric acid; (2) phosphoric acid, diesel fuel, ammonium nitrate; (3) anhydrous ammonia; (4) sodium hydroxide; and (5) butyl ether. Other likely substances of equal but lesser likelihood included butane, calcium carbide, carbon disulfide, methyl alcohol, methyl ether, naphtha, potassium, hydroxide and propane. In a related incident, in July 1991, seven cars of a slow Southern Pacific Railroad train derailed near Dunsmuir, California, dumping 19,000 gallons of a fungicide and herbicide into the Upper Sacramento River. The river carried the chemicals into Lake Shasta, located nearly 40 miles downstream. According to the California Department of Fish and Game, that spill virtually killed all aquatic animals and thousands of plants along the river's 37-mile course. More than 1 million fish were killed, including 275,000 wild trout. Also killed along the river were as many as 250,000 willows and 300,000 cottonwoods, which would not regrow for 14-16 years.

433. For the Union Pacific estimate, this would decrease the most frequent probability of occurrence to just over once ever 35 years and for the City of Reno estimate to just under once ever 30 years.

434. *Reno Gazette-Journal*, July 28, 1996, pages 1C and 2C.

435. *Reno Gazette-Journal*, August 3, 1996, page 1B.

436. Apparently, Congress was anxious to shed its more recent anti-environment label, voting 392-30 in the House of Representatives and 98-0 in the Senate.

437. Cryptosporidium is a parasite often found in the intestines of livestock which contaminates water when the animal feces interact with a water source. In healthy individuals, infection may result in an acute diarrheal illness lasting for 2–3 weeks. In immuno-suppressed individuals (e.g., AIDs patients, children, elderly), cryptosporidiosis may be life-threatening. [See Horton, *WATER WORDS DICTIONARY*, *op. cit.*]

438. *Reno Gazette-Journal*, August 3, 1996, page 3A.

439. Because Congress missed the August 1, 1996, deadline to renew the Safe Drinking Water Act, more than $725 million for a revolving loan fund to improve water systems disappeared. Congress will now have to enact separate legislation to restore this money. [*Reno Gazette-Journal*, August 7, 1996, page 12A.]

440. It was noted that the following actions may be justified in obtaining this adequate water capacity: (1) Obtain additional water rights elsewhere within the basin; (2) undertake an aggressive program to limit leaks within its system, which is now estimated to lose up to 20 percent of the water pumped from the lake; and (3) limit outdoor water use. [See *Reno-Gazette Journal*, November 19, 1996, page 1B.]

441. *Final Environmental Impact Statement, Water Rights Acquisition for Lahontan Valley Wetlands*, *op. cit.*, Executive Summary, pages Summary-1 through Summary-7. Also see the NDWP's *Carson River Chronology* for a listing of the eight (8) indicators and a more complete description of the five (5) alternatives.

442. Section 209(h)(1) of P.L. 101–618 states that "The provisions of subsections 209(d) [Water Bank], (e) [Recreation Study], (f) [Effluent Reuse Study], and (g) [Repayment Cancellation] of this section shall 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."

443. *Lahontan Valley News*, September 25, 1996.

444. The panel consisted of Carl Cahill (Washoe County District Health Department), Frank Luchetti (Sierra Pacific Power Company), Bill Owen (Nevada Office of Emergency Planning), Brad Shipley (U.S. Environmental Protection Agency, Region IX), and the panel moderator, Allen Biaggi (Nevada Division of Environmental Protection). See Conference Program, Assessing the State of Nevada's Environment, Lawlor Events Center, University of Nevada, Reno, September 30–October 1, 1996.

445. *Reno Gazette-Journal*, October 1, 1996, page 1B.

446. Should it be determined that pumping of the pit must continue, then the responsible parties involved in the site cleanup would need to construct a pipeline along the railroad right-of-way and then over to the Glendale water treatment plant, located nearly three and one-half miles upstream and to the west of the pit. It has been estimated that this pipeline will cost as much as $3 million to construct. [Sources: Personal communication, Allen Biaggi, Deputy Administrator, Nevada Division of Environmental Protection (NDEP), Department of Conservation and Natural Resources, Carson City, Nevada, October 18, 1996, and *Reno Gazette-Journal*, October 2, 1996, page 1C.]

447. *Reno Gazette-Journal*, October 10, 1996, page 3B.

448. This level of retrofit is defined as the ratio of the retrofitted homes to those homes which needed to be retrofitted at the time of the passage of the law. Once this level is attained, all homes retrofitted become subject to metering billing and all homes subsequently retrofitted will also be subject to metered billing. Personal communication, John Erwin, Water Meter Project Manager, Sierra Pacific Power Company, October 9, 1996.

449. *Reno Gazette-Journal*, October 11, 1996, page 3B.

450. *Reno Gazette-Journal*, October 11, 1996, page 4A.

451. From data supplied by the U.S. Geological Survey, Water Resources Division, Carson City, Nevada. Using the 1900–1995 (water year) period of record, 54.6 percent of the Truckee River's annual runoff was recorded during the March–June time frame and 45.8 percent was recorded during just the three month period of April–June. Monthly runoff by month as a percent of the annual average was as follows: October–4.4 percent; November–4. percent; December–5.6 percent; January–5.9 percent; February–6.3 percent; March–8.8 percent; April–13.8 percent; May–19.0 percent; June–13.6 percent; July–7.4 percent; August–5.7 percent; and September–5.0 percent.

452. Principal agencies and/or dignitaries represented at the signing ceremony included: Kathleen A. McGinty, Chairperson of the White House Council on Environmental Quality; Senator Harry Reid (Democrat-Nevada); Bureau of Indian Affairs; Attorney General's Office, Environment and Natural Resources, U.S. Department of the Interior; U.S. Environmental Protection Agency, Region IX; U.S. Attorney's Office, District of Nevada; Pyramid Lake Paiute Indian Tribe; Mayor, City of Reno; Mayor, City of Sparks; Chairman, Washoe County Commission; and the Nevada Department of Environmental Protection, Bureau of Water Quality Planning.

453. Specifically, the agreement included the dismissal of two pending lawsuits both entitled *Pyramid Lake Paiute Tribe v. U.S. Environmental Protection Agency* (CV-R-85-025-DWH and CV-R-86-438-DWH). See "Western States Water", Western States Water Council, Midvale, Utah, January 10, 1997, Issue No. 1182.

454. Unlike California, which typically mandates a minimum instream flow for fishery and environmental purposes, Nevada has no such law to maintain minimum flows in its streams and rivers. Twice in recent history (August 1992 and 1994) the Truckee River completely dried up between Sierra Pacific Power Company's Glendale water treatment plant and Steamboat Creek, i.e., the outflow of the Truckee Meadows Water Reclamation Facility, a distance of nearly four miles.

455. This may be the first time ever in the United States that a community committed money to purchase water rights to dilute the effects of its effluent discharges rather than spend even more money on expensive plant and equipment. In this regard, it was noted by the U.S. EPA representative, Mike Schulz, Associate Director of the EPA's Region IX Water Division, that this water rights purchase for pollution dilution was "extremely unusual" and something that he was not aware of anywhere else.

456. *Reno Gazette-Journal*, October 11, 1996, pages 1A and 8A.

457. *Reno Gazette-Journal*, October 12, 1996, pages 1A and 5A. The Bruce R. Thompson Federal Building contains six courtrooms and provides space for the U.S. Marshal Service, probation and pretrial services, as well as the Reno offices of Nevada's Congressional delegation. The front of the building has a gentle inward curve. The first floor exterior is made of polished Sierra white granite while the entrance consists of a two-story rotunda of glass and polished black and creme marble with a vaulted ceiling. In the front of the building is a replica of an object, probably a pendant, believed to have belonged to a prehistoric shaman, discovered in 1936 during the first excavation of Humboldt Cave in central Nevada. The original artifact measured 4.6 inches long, 1.7 inches wide and less than 1/8-inch thick. The exterior sculpture, a welded steel work designed by Michael Heizer and named "Perforated Object," measures 27 feet long, 9 feet 9 inches high and weighs nearly two tons, and is characterized by its Swiss cheese appearance. Michael Heizer is the son of anthropologist and archaeologist Dr. Robert Heizer, who discovered the original pendant.

458. While the treated effluent is practically pure enough to drink, the treated wastewater nonetheless is still rich in nitrogen and phosphorus which stimulate algae growth, and residual chlorine which can kill fish.

459. *Reno-Gazette Journal*, October 24, 1996, pages 1B and 2B.

460. The smaller assessment district would cover property owners in the immediate area of the contamination. The larger district would include virtually the entire Truckee Meadows water service area of Sierra Pacific Power Company and other locations where the quality of drinking water would improve.

461. *Reno-Gazette Journal*, October 23, 1996, page 5C.

462. South Pass (7,550 feet above mean sea level) was discovered in 1812 and provided early pioneers and emigrant parties a relatively easy route through the Rocky Mountains and across the Continental Divide. It is situated some 110 miles northeast of Fort Bridger, which is located in southwestern Wyoming along the present-day route of U.S. Interstate Highway 80. It was at Fort Bridger where the Oregon-Mormon Trail separated into the Oregon Trail (which ended near The Dallas along the Columbia River in Oregon) and the Mormon Trail (which went on to Salt Lake City, then across the Great Salt Lake Desert, into Nevada and then down the Humboldt Valley where it met the California, or Humboldt Trail at Wells, Nevada).

463. Pugsley traveled the Donner Party's original route with his dog Samantha ("Sam") and, for a while, with a donated horse named Patches. The horse had to be left in Carlin, Nevada, when it went lame. While losing 70 pounds in body fat and 7 inches from his waistline, Bill Pugsley claimed he will never lose the memory of those persons who helped him along his arduous route through the Great Basin.

464. *Reno-Gazette Journal*, November 1, 1996, page 1D.

465. *Reno-Gazette Journal*, November 7, 1996, page 8A.

466. *Reno-Gazette Journal*, November 9, 1996, page 1A.

467. Nevada hydrographic area 84 (Truckee River Basin).

468. Warm Springs Valley, also locally referred to as Palomino Valley, is located in the Truckee River Basin, Nevada Hydrographic Region Number 6, Hydrographic Area 84. In 1970, Rocketdyne closed down its facility and sold the property to developers who began selling 40-acre parcels to the public. Early water analyses found high levels of nitrates and beryllium in the soil and groundwater, but none of the tests at that time were designed for TCE, which was not listed as hazardous until 1989.

469. *Reno Gazette-Journal*, November 12, 1996, pages 1A and 4A.

470. As of April 1, snowpack water content in the Lake Tahoe Basin was reported at 168 percent (of normal) in 1995 and 116 percent in 1996, while in the Truckee River Basin (excluding the Lake Tahoe Basin) the snowpack water content was reported at 184 percent in 1995 and 121 percent in 1996. [Source: Natural Resources Conservation Service, *op. cit.*]

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

472. 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.

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

474. *Reno Gazette-Journal*, January 19, 1997, page 5C.

475. For an extensive analysis of this flood event, 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.

476. Available runoff is not the same as effective or actual runoff. The Natural Resources Conservation Service (NRCS) has estimated that on saturated soils and saturated snowpack 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*, Nevada Division of Water Planning, Department of Conservation and Natural Resources, Carson City, Nevada, January 1997.]

477. For a more extensive analysis of the causes and effects of "The Flood of 1997," see Horton, *The Flood of 1997, Preliminary Report: An Analysis of Snowpack Water Content and Precipitation Changes in the Waterbasins of Western Nevada and the Effect on Runoff and Stream Flows, December 16, 1996-January 6, 1997, op. cit.*

478. The disaster declaration number (contract number) assigned to this disaster declaration was FEMA-1153-DR-NV. The amended incident period was December 20, 1996 through January 17, 1997.

479. *Reno Gazette-Journal*, January 9, 1997, page 10A.

480. Alstadt, *op. cit.*

481. Sewage enters the plant through the South Sewer Interceptor, serving only Reno, and the North Sewer Interceptor, serving both Reno and Sparks. It is believed that stormwater inflows enter the sewer system from older neighborhoods where some storm water sewers may still be tied into the sewer system. Personal communication, Greg Ritland, Operations Superintendent, Truckee Meadows Water Reclamation Facility, Reno, Nevada, February 3, 1997.

482. Initial, provisional readings by the U.S. Geological Survey, Water Resources Division, Carson City, Nevada, indicated a flow at the Steamboat Creek gaging station, located just upstream from the sewage treatment plant's outflow, of -300 cubic feet per second (i.e., water movement upstream). Personal communication, Larry Bohman, Supervisory Hydrologist, USGS, Carson City, Nevada, January 30, 1997.

483. Personal communication, Greg Ritland, Operations Superintendent, Truckee Meadows Water Reclamation Facility, Reno, Nevada, January 29, 1997.

484. Taxiway A was repaired on January 29, 1997 through the efforts of the Nevada Air National Guard, 152nd Airlift Wing, which sent two C-130 cargo aircraft to acquire 64,000 pounds of metal runway mats from a military stockpile in Charlotte, North Carolina. The mats were installed by Granite Construction and Air National Guard personnel. Taxiway B was to be repaired in a similar manner.

485. *Reno Gazette-Journal*, January 30, 1997, page 7D.

486. *Reno Gazette-Journal*, January 7, 1997, page 4B.

487. Personal communication, Chad Blanchard, U.S. District Court, Office of the Federal Water Master, Reno, Nevada, January 7, 1996.

488. U.S. Bureau of Reclamation, Lahontan Basin Area Office, Carson City, Nevada.

489. *Reno Gazette-Journal*, March 7, 1997, page 1A.

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