

Truckee Storage Project

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The Truckee Storage Project

United States citizens have utilized California's Truckee River for irrigation and power generation since the nineteenth century. One of Reclamation's first tasks, the Newlands Project, focused on channeling it for incoming settlers. A follow-up accompaniment to the Newlands Project, the Truckee Storage Project was completed in 1939. This project's main features, the Boca Dam and Reservoir, have helped regulate the Truckee River's flow and have offered supplemental storage for irrigation in the area.

Project Location

Situated in Reclamation's Mid-Pacific region, the Truckee Storage Project's main features are Boca Dam and Reservoir. Boca Dam is located in the northeastern portion of the Sierra Nevada mountains, approximately six miles from the Nevada state border. It is situated directly north of United States Interstate 80, adjacent to the South Pacific Railroad, and six miles northeast of Truckee, California. Boca Dam is roughly twelve miles north of Lake Tahoe, and one-third mile north of the confluence of the Truckee River and the Little Truckee River. The dam lies on the Little Truckee River; the reservoir lies directly north of the dam. The project stores water to regulate the Truckee River and furnishes supplemental irrigation water to roughly 29,000 acres of land in the Truckee Meadows, adjacent to Sparks and Reno, Nevada. The project's features lie within Nevada County, California, at an elevation of 5,490 feet.¹

The region encompassing the Truckee Storage Project has an annual precipitation of thirty-two and eight tenths inches, with a maximum temperature of ninety-seven degrees, and a minimum temperature of minus forty-five degrees. Since Boca Dam and Reservoir lie at the

1. United States Department of the Interior, Water and Power Resources Service, *Project Data*, (Denver: U.S. Government Printing Office, 1981), 1217; United States Department of the Interior, Bureau of Reclamation, "Mid-Pacific Region-Truckee Storage Project-California and Nevada." Dataweb, Internet, <http://dataweb.usbr.gov/html/truckee.html>, accessed, 6/15/01.

bottom of a small depression where cold air sinks, they are located in the coldest spot in California, ten to twenty degrees colder on average, than the city of Truckee.² The climate of the region is dry in summer months, with precipitation limited to mainly winter months. Pacific high-pressure and its adjacent location to the wintertime storm track make Boca Dam and its surrounding territory an island of moisture. Therefore, the area surrounding Boca Dam holds more vegetation, permitting a thriving lumber industry. The area designated as Truckee Meadows (in Nevada) is dry, warranting irrigation with shrub-like chaparral being the principle ground cover.³

The complex physical geography of the Sierra Nevada Mountains includes peaks that range in elevation from 11,000 to 14,000 feet above sea level. Finger-like glaciers existed around Lake Tahoe during the Pleistocene ice ages. They created the necessary carving effects for some lakes around Tahoe (the largest lake at its altitude in North America) and the original Boca Lake.⁴ The entire area connected with the project lies in a volcanic section with the oldest rocks deemed to be volcanic sediments (breccia with intervening lava flows.) A depressed water table lies below the area covered by the reservoir. At no place in the reservoir does stored water come in contact with lava, however.⁵

The Truckee Storage Project's water flow from the Little Truckee River accumulates in the Boca Reservoir and spills through the Boca Dam, reestablishing its river course southward till it meets the Truckee River bound for Nevada.

2. State of California, Department of Water Resources, *Truckee River Atlas*, (1991), 34.

3. *Project Data*, 1220.

4. William Wyckoff and Lary M. Dilsaver, eds, *The Mountainous West: Explorations in Historical Geography*, (Lincoln and London: University of Nebraska Press, 1995), 333-5; George Wharton James, *The Lake of the Sky, Lake Tahoe*, (P.R.C. Publications, Inc., 1956), 1.

5. National Archives and Records Administration, Rocky Mountain Region, Records of the Bureau of Reclamation, Record Group 115, Project Histories: Mid-Pacific Region: "Truckee Storage Project" 1934-7, 34-7, 57-9 (hereafter cited as "Project History" with year, volume number, unit name, and page.)

Historic Setting

The area adjacent to the Truckee Storage Project has a rich history. In prehistoric times, the pluvial lake system that includes Lake Tahoe was formed by glaciers. The inhabitants of this Lake Tahoe region at European contact were the Washo Indians, and they assert that their ancestors originated in this area. The Washo Indians, like other groups living in present day California, were geographically isolated by desert to the south, ocean to the west, and the mountainous terrain in which they lived. Due to this isolation, these Hokan-speaking people lived a quiet existence.⁶ Due to the dramatic and often inhospitable climate of the Great Basin in which they resided, the Washo followed a seasonal existence where they used Lake Tahoe in the summer months for sacred purposes and simultaneously garnered much of their store of food there. At other times of the year they migrated to and from the Truckee Meadows area. Because of the lake's abundant fish and waterfowl, it was considered to be the life-sustaining center of the Washo world. Seasonal campsites surrounded the lake in order to capitalize on the fishing there. In order to trap the fish, the Washo constructed the first dams in the area to divert streams from their original channels. They fished with either harpoons or hooks in regional streams or constructed weirs for the lake. The abundant whitefish and cutthroat trout were pursued in a selective manner, since the Washo only kept the male fish in order to not disrupt reproductive cycles.⁷

In the early 19th century, the first non-Indians recorded in the area were a small group of fur trappers (led by Jedediah Smith in 1826) who utilized the local lakes and rivers. These trappers and explorers quickly recognized the importance of the water that flowed on both sides

6. James F. Downs, "Indians of the Great Basin," in *The Encyclopedia of the American West*, 534.

7. Nevers, Jo Ann, *Wa She Shu: A Washo Tribal History*, (Salt Lake City: University of Utah Printing Service, 1976), 1-9.

of the Sierra.⁸ In 1846, the Donner Party reached the Truckee project region, in hopes of acquiring free farm land on the western side of the Sierra Nevada Mountains. Since the party did not start its migration from Independence, Missouri until May, the severe weather conditions of the Boca area trapped them. They were forced to resort to cannibalism to keep themselves alive. The fierce weather in this region kept future migrants from establishing settlements here, therefore the mid-1800's were still quiet years of sporadic migration and exploration.⁹

When gold was discovered at John Sutter's mill near Sacramento in 1848, the mania began in California, with migrants from all over the country using Washo hunting trails around the Truckee project area to reach the mines, including the routes over Donner Pass. Since many white miners never found gold, some came back to this region of California to squat on Washo land and look for gold there, eventually establishing farms in some cases.¹⁰ Whites established trading posts near the present day project, including Mormon Station in Genoa, Nevada (on the southwest side of Lake Tahoe) that were popular among pioneers.

Despite the commotion created by the 1848 gold strike, Tahoe remained relatively untouched for the next ten years. However, when gold was discovered in 1859, at the head of Six-Mile Canyon in what is now western Nevada, the lake's tranquil setting was a thing of the past. This "Comstock Lode" near Washoe Lake, south of Reno, would forever alter the life of the Washo Indians and the landscape of the Truckee area. The Washo Indians demanded a treaty to stop white farming and exploitation of their lands in 1861. Agents' reports confirmed the Washo's problems, but the government never stopped white settlement in these lands.¹¹ Not only did early squatters find gold, but the blue-gray mud that affixed itself to the miners'

8. Nevers, 38-9.

9. Frank Mullen Jr., *The Donner Party Chronicles*, (New Humanities Committee, 1997), 10.

10. Nevers, 38, 45.

11. Nevers, 52-3.

equipment turned out to be an abundance of silver ore which put the Comstock Lode's Virginia City on the map and escorted the region into statehood in 1864.¹²

An influx of people began settling in western Nevada and using the Truckee area for timber. Fir, spruce, lodgepole pines, and ponderosa pines were the principle trees in this region. Suddenly the resources of the Truckee area became subject for discussion. A California resident described these resources: "The valleys and lowlands produce berries, grass seed, and roots of various kinds. ...Truckee Lake [Lake Tahoe]– the river which bears the same name and its tributaries, furnish immense quantities of fish. . ." ¹³ Miners had no real concern about the Sierra's environment, which they ruined by damming and diverting stream channels and applying hydraulic mining which silted up many streams and rivers. Such silting caused crop and water loss in the valleys below.¹⁴

During the widespread logging era of the 1860's and 1870's, mass numbers of trees were cut, choking runoff with debris and causing flooding and water quality issues. The Donner Lumber and Boom Company was the company with rights to the region's lumber market, as well as the Truckee River, and it collected tolls from power companies for use of the river until 1897.¹⁵ Over a period of thirty years, much of the timber at Lake Tahoe was shipped to Carson City (adjacent to Virginia City) for use in the Comstock cities and mines. Unfortunately, the lumbering of Lake Tahoe created a great deal of silt in the lake. The introduction of the first railroad in the area in 1866 assisted this industry. Another product to come out of the Truckee region was ice. By 1870, the little town of Boca, present site of the Boca Dam and Reservoir, was developing as a lumbering and ice-producing center. A small lake, situated near the present

12. "History of Virginia City, Nevada and the Comstock Lode," Internet, <http://www.vcnevada.com/history.htm>, accessed on 6/19/01.

13. Nevers, 49.

14. Wyckoff and Dilsaver, 340.

15. George and Bliss Hinkle, *Sierra Nevada Lakes*, (Reno: University of Nevada Press, 1987), 336-7.

site of Boca Reservoir, would acquire a layer of ice on its surface due to its elevation. In order to utilize the icy lake, the ice was harvested by horses that pulled saws to cut it off the surface; the ice was transported then by rail to the Comstock mines to cool the mine shafts.¹⁶

As more settlers moved into the area, they began to see the Truckee area as an important source of water for the region. A dam was constructed in 1870 at Tahoe's outlet, Tahoe City, in order to control water flow to local residents' farms and towns. Those benefitting from Truckee's river water downstream initiated its construction. As more settlers moved into the region, it became clearer that water storage would be needed in the Truckee region to meet the growing water demand. As the Comstock discoveries grew scarcer, the population began to dwindle in Virginia City, and consequently the need for lumber declined. But by the late 1880's, tourism was developing around the Lake Tahoe area, and wealthy figures were purchasing the rights to property around the lake. The lake was opened to rail traffic in 1890, with a sixteen-mile narrow-gauge railroad operated by D. L. Bliss's Lake Tahoe Railway and Transportation Company.¹⁷ Meanwhile, the indigenous Washo were pushed to resettle on land allotments in the Carson Valley, which was impossible to irrigate since white settlers had preempted the water rights there.¹⁸ Lake Tahoe, with a steamer owned by Bliss, a railroad, and the region's ever-present natural beauty, began to represent the ingenuous and patriotic spirit of the American citizen at that time. However, as soon as a community became firmly entrenched at Lake Tahoe and began to grow, the local water controversy was born.¹⁹

While Washo Indians were having to fight for the right to keep their territory and fish in the regional waterways, Nevada farmers urged the Department of the Interior to devise a

16. *Truckee River Atlas*, 21; Hinkle, 336-7.

17. Wyckoff and Dilsaver, 331-2.

18. Nevers, 64, 69, 79.

19. Wyckoff and Dilsaver, 341.

reclamation program that would provide them with irrigation via water storage under the terms of the Reclamation Act of 1902. Nevada senator Francis Newlands was committed to the idea of Nevada's future as an agricultural state. He proposed the creation of a network of reservoirs that would store the combined water of the Truckee and Carson Rivers to irrigate what he overestimated would be 400,000 acres in western Nevada, now known as the Newlands Project. (The project now only irrigates between 58,000 and 73,000 acres.) Newlands surveyed potentially irrigable land in western Nevada, boosted interest in irrigation plans among current Nevada landholders, and then acquired tracts of land on the Carson and Truckee Rivers for potential water storage sites.²⁰ His project was authorized by Reclamation on March 14, 1903. Furthermore, Newlands organized the Truckee-Carson Irrigation District to serve his project. The district would dictate how surplus waters of the Truckee would be assigned for farming interests in Nevada.²¹

Within the goals of the Newlands Act, Reclamation planned to cut a new outlet channel at Lake Tahoe, but D. L. Bliss and W. S. Tevis (both owners of adjacent lake-front property) tried to stop the plans with injunctions to halt the digging of the proposed canal. Bliss specifically had acquired extensive rights to waters coming into the lake, and he argued that the lake should be used for its beauty alone. This argument is noteworthy in that it greatly predates the Environmental Movement of the 1960's and 1970's. Therefore, Reclamation could not build the new channel. Meanwhile, a syndicate organized by W. P. Hammon bought all of the powerplants along the Truckee river under the name Truckee General Electric Company, and acquired control of the property and dam near Lake Tahoe's outlet. Reclamation offered to buy

20. John M. Townley, *Turn This Water Into Gold: The Story of the Newlands Project*, 2d ed. (Reno: The Nevada Historical Society, 1998), 16-20.

21. Hinkle, 337; Townley, 17-8.

the dam and gates, but Hammon would only sell if he got 400 cubic feet per second for his power company.²²

Plans did not make any headway until 1909, when the new Secretary of the Interior, Richard Ballinger, reopened negotiations between Reclamation and Hammon. The electric company would get legal title to the lake and river holdings, and the government would pay half of the construction costs for a new dam and dredging since it had control of the dams and gates. The most controversial item to come out of the resolution was the proposal to drain the lake to an elevation of 6,230 feet and use the water for surplus irrigation water. (Reclamation thought the water could be stored at this elevation without damaging the shoreline.²³) Lake-front property owners were opposed to this measure. Gifford Pinchot, then Chief Forester, felt the contract was illegal, since it allowed the government to grant a perpetual franchise to a private company that would consequently have control over public domain. Truckee General Electric Company would not only hold its legal title to the lake and river holdings, but it would have the right to locate reservoirs and transmission lines on public lands. President Taft appointed a commission, who deemed the contract to be legal. But the California legislature responded by enacting a law against depriving an owner of water resources for public use (in defense of the Lake Tahoe property owners.)²⁴

With the contract drawn, the battle had begun between Nevada farmers and California lake property owners. Nevada claimed that Tahoe belonged to the Great Basin region in general, and that it was an appropriate storage site for Nevada's water supply. California residents' formed the Tahoe Protective Association, which maintained that Nevada farmers should be

22. Hinkle, 338.

23. Townley, 39.

24. Hinkle, 339.

satisfied with the water they already got from the lake. The battle prevented the draining tunnel from being built.²⁵

Ultimately, Truckee General Electric Company used its title to Lake Tahoe water to lower the lake level fifty-one inches by widening the outlet channel. Then the California State Water Commission got involved by suggesting a suit against Nevada for an equitable appropriation of available water. In 1913, Secretary of the Interior, Franklin K. Lane, met at Truckee, California to draw a compromise between the California state representatives and Tahoe landowners. The government and the power company would cooperate to build a new dam and gates, but no timber would be cut and no more than the normal flow of water taken from Tahoe. (Normal flow was determined by taking an average of a series of river measurements.)

In 1913, the Federal Government filed the Orr Ditch case in order to fix a limit on Reno water diversions off of the Truckee River. Prior to 1913, Reclamation's goals were to determine water allotments for users while identifying the Truckee River's flow. With the Orr Ditch proposal, government water rights as well as the water rights of other owners would be determined. In 1913, the Federal Government filed the Orr Ditch case in order to fix this limit on Reno water diversions off of the Truckee River. Prior to 1913, Reclamation's goal was to determine water allotments for users while identifying the Truckee River's flow. With the Orr Ditch proposal, government water rights as well as the water rights of other owners would be determined. The government would have control of water distribution by setting the Floriston rates, or flow targets on the Truckee River. (Since downstream users did not want to bear the costs of providing water to upstream users, a resolution for Orr Ditch was not agreed upon until

25. Hinkle, 340.

1944.)²⁶

In 1915 the Department of the Interior had condemned the Truckee General Electric Company's rights and received an easement of use of Lake Tahoe Dam for a court-ordered payment of \$139,500, even though the electric company would still receive a certain amount of water. This resolution only made matters worse since it did not take lake-front property owners into consideration. And even still, Nevada farmers felt they were not getting their fair share of water storage in Tahoe. The dilemma reached a pinnacle in 1919 when Nevada farmers and the Tahoe Protective Association confronted one another at the lake. Secretary Lane recruited Stone and Webster Corporation (which now controlled Truckee General Electric Company) to cooperate with the government to build a new dam and control gates at the lake, but work was called off due to the ensuing trouble. Reclamation began surveying the region for alternative storage sites as early as 1919.²⁷

In 1924, Reclamation head Elwood Mead negotiated a new agreement between Will Bliss, one of the primary owners of riparian rights at Lake Tahoe, and the Truckee Meadows Conservation District, a Nevada farmers' organization. On December 31, 1926, full management of Newlands Project irrigation transferred to a local organization (the Truckee-Carson Irrigation District) after farmers determined that Reclamation was failing to grasp their agricultural troubles. This organization would prove to be the middle-man between the government and the local water users, and would also be better positioned to fix the mechanics of Truckee River water distribution. For six years, no water pumping occurred at the lake, and nothing was done to disturb the lake's rim. By 1930, pumping had resumed, and the lake level grew alarmingly low. Threats came from Nevada farmers to cut its rim in order to release

26. Townley, 38-9, 49.

27. Hinkle, 341.

irrigation water from the lake.²⁸

Despite the state of the economy at the time due to the Great Depression, Lake Tahoe was becoming an increasingly popular tourist spot for its natural aesthetic beauty. Lake-front residents were staunchly opposed to any Reclamation decision that marred the beauty of the area. It was imperative that a permanent resolution be obtained.²⁹

Project Authorization

By the 1930's, the National Industrial Recovery Act was under way--a plan devised by Franklin D. Roosevelt to help assist the nation's recovery during the Great Depression. In order to reduce unemployment, the act provided funding for the expansion of public works, with attention given to storage upstream for the Newlands Project on August 3, 1933.³⁰

In the early 1930's, the Lake Tahoe Water Conference Committee was formed to deal with claims and conflicts related to the water controversy between Nevada and California. Reclamation began pumping water out of the lake again in 1934, and the "Save Lake Tahoe League" responded by appealing to Secretary of the Interior Harold Ickes. Ickes ordered his own representatives, as well as representatives from the Lake Tahoe Water Conference Committee, Truckee General Electric Company, Truckee-Carson Irrigation District, and the Washoe County Water Conservation District (the Truckee Meadows water users and eventual operators of the Truckee-Storage Project) to come to some sort of consensus with a contract that honored the National Industrial Recovery Act's goals.³¹

The written agreement contained various resolutions that provided further conservation of water by constructing additional features to maintain river flows at designated spots. The

28. Hinkle, 342.

29. Douglas Strong, *Tahoe: An Environmental History*, (Lincoln: University of Nebraska Press, 1984), 40.

30. "The National Civilian Conservation Corps." Internet, <http://pages.prodigy.com/reunion/history.htm>, accessed 6/27/01; "Project History, Truckee Storage Project," 1974-5, A-1.

31. Hinkle, 344.

intended Truckee Storage Project's Boca Dam would be built to accommodate a reservoir that would hold 40,000 acre feet from the flow of the Little Truckee River (which would reduce the demands from Tahoe) and its water level would be established and maintained.³² The designs of this resolution coincided with the goals of the National Industrial Recovery Act. The Washoe County Water Conservation District would acquire all easements necessary in connection with the proposed Boca Dam and Reservoir.³³ On July 1, 1935, the resolution was approved and dubbed the Truckee River Agreement. The agreement included criteria for operating Lake Tahoe and Boca Reservoir to meet flow targets for the city of Floriston (called Floriston rates) downstream from both storage areas. Today, reduced Floriston rates are maintained when Tahoe's level is too low. Furthermore, within the Truckee River Agreement, up to 25,000 acre feet of water was to be maintained in Boca Reservoir each year. The Truckee River Agreement would now monitor the water right priority of filling Boca Reservoir, and make releases to serve downstream users based on the time of year and user's classification of water right.³⁴

After the National Industrial Recovery Act was deemed unconstitutional, Congress then re-authorized the project on September 21, 1935.³⁵ The government provided an allotment of \$1,000,000 for construction.³⁶ At the same time, the Washo finally acquired additional land in Carson Valley that was agricultural, with excellent water rights.³⁷ The Truckee Storage Project was authorized to irrigate about 29,000 acres in Truckee Meadows of western Nevada on April 7, 1936.³⁸ On December 18, 1936, a repayment contract was developed with the Washoe County Water Conservation District. It stated that a landowner could not secure Truckee Storage Project

32. Hinkle, 344.

33. "Project History, Truckee Storage Project," 1934-7, 24.

34. *Dataweb*, 6/15; *River Atlas*, 94.

35. *Dataweb*, 6/15.

36. "Project History, Truckee Storage Project," 1974-5, A-1.

37. Nevers, 89, 92.

38. *Truckee River Atlas*, 55.

water for land in excess of 160 acres unless an excess landowners contract was signed. Excess land could be sold at no more than the appraised value as a function of the Reclamation Act.³⁹

Construction History

In August of 1934, Reclamation began detailed investigations and surveys of Little Truckee Canyon's dam sites for potential water storage areas. By May of the next year, Reclamation had transferred its attention to the current Boca Dam site. In June of 1935, control lines and benchmarks were established at the site, dike and spillway locations were made, and test pit locales and borrow areas were produced. Meanwhile, water level measurements were conducted on the Truckee River.⁴⁰ Reclamation secured the 1,952.8 acres of land needed for the project for \$27,911.79. Diamond drills were used at 183 test pits to determine the physical character of the rock at the site. Maps, charts and records were produced. On September 30, 1936, bids opened to construct Boca Dam. The contract was awarded to George W. Condon of Omaha, Nebraska for a bid of \$729,435 on February 15, 1937. Construction work began on April 24, 1937.⁴¹

The first year, construction was preempted many times due to several circumstantial limitations. For example, the Boca site was so remote, a contractor's camp had to be established first at the construction site with an office, lab, and garage included. Condon divided his workers into task groups. One group would handle concrete work on the spillway and outlet tunnel, and the other group would handle earth work on this earthfill dam. Unfortunately, Condon did not appoint a head superintendent and efficiency was sacrificed. Furthermore, the original Reclamation construction engineer on site was needed at the Yuma Project, and a new

39. "Project History, Truckee Storage Project," 1934-7, 27.

40. "Project History, Truckee Storage Project," 1934-7, 40-1.

41. "Project History, Truckee Storage Project," 1934-7, 14-6.

one had to be appointed.

Initially, four miles of road were relocated at the project site. The Civilian Conservation Corps, a government run organization developed for youth employment during the Great Depression, constructed, graded, and surfaced roads for the project site by the end of 1937. The group installed water and power lines as well.⁴²

Embankment material was needed, and there were no sufficient borrow areas at the project's site. Therefore concrete aggregates, sand, and gravel needed for the project were transported to the Boca site from the Reno area. By September, the outlet tunnel excavating was completed. The pouring of the outlet tunnel's concrete lining was nearly finished in October, with only seventy-three feet of arch section left. All spillway excavation was also complete in October. Then labor difficulties in the summer of 1937 caused twenty-four days of delay in work. The contractor had to discontinue work for the purpose of reorganization and rehiring.⁴³

One of the major issues workers encountered during the construction of Boca Dam was the weather. The site location in the mountains was such that weather could not be forecasted with certainty.⁴⁴ In the fall of 1937, workers had difficulty producing the desired quality of concrete due to wide temperature fluctuations from night to day. Consequently, this affected the curing of the concrete, and the Hunt Process-clear membrane method had to be employed instead. (This is a membrane-curing procedure, developed by Hunt Manufacturers in the late 1930's, to seal moisture within concrete without the use of water. It proved to be the most efficient method of concrete-curing for canals.⁴⁵) By October 16, the outlet tunnel was holed through. On October 24, spillway excavation was complete, yet spillway concreting was

42. "Project History, Truckee Storage Project," 1934-7, 17-8, 64; "The National Civilian Conservation Corps," Internet, <http://pages.prodigy.com/reunion/history.htm>, accessed 6/27/01.

43. "Project History, Truckee Storage Project," 1934-7, 90-3.

44. "Boca Dam Construction Work Resumed," *Reclamation Era*, (June 1939): 143.

45. Tim Dolan, Concrete Researcher, interview by author, 19 July 2001, Denver.

discontinued due to cold nights. Furthermore, unprecedented flood conditions on the Little Truckee River caused much inconvenience and delay during December of 1937. The flood inundated the outlet tunnel, aggregate stockpiles, and necessary equipment at the site.⁴⁶

The year of 1938 was characterized by a general increase in the quantity of available water, making the possibility of flooding a consideration in ongoing construction. The first work completed in 1938 was on the main feature of the outlet works, a tunnel. Its concrete lining was added on January 15. By the end of the month, heavy snowfall became so harsh that it interfered with earth material production for embankment construction. Work was consequently suspended until April 19, but real progress did not occur until May due to high water levels. Spillway work was immediately underway as well in May. Fine grading-form work began, and was finished by November, with special heating mechanisms used to help work proceed despite low temperatures. It was important to bring the spillway to completion at this point in order to provide protection for the dam embankment in case of high water. Also in May, work commenced on the dam. The river bottom was stripped and cofferdams built. Outlet tunnel grouting was completed at the end of May and river diverted through it.⁴⁷

By July, the water surface of Lake Tahoe reached its highest point since 1917. In August, the dam's cutoff walls were completed across the river bottom, and embankment placing work was increased to a three-shift basis to speed the construction. Special arrangements were made that fall for heating the outside concrete work. In November, severely cold weather prevented further work on the project. During the year, the lack of satisfactory labor was still a big issue. Condon's lack of control over the situation exacerbated the problem. In 1938, incidental plans for Boca Dam were redrawn to accommodate a fishscreen, which was installed in December to protect aquatic

46. "Project History, Truckee Storage Project," 1934-7, 90-3.

47. "Project History, Truckee Storage Project," 1938, 19-24.

life in the reservoir.⁴⁸

In contrast to the project's private labor difficulties, the Civilian Conservation Corps work at Boca Dam was exceptional. These youths hauled concrete aggregates, cleared the reservoir area, built bridges, and did side-firefighting prevention work in 1938.

Finally, the separating plant which produced earth and rock was unsatisfactory and therefore was abandoned. Consequently, a chief earthwork inspector in charge of aiding field and lab work was added that year. Stop logs were placed at the outlet tunnel's entrance on December 8 in order to allow water accumulation in the reservoir. (Boca Reservoir was now available for storage from the Little Truckee River.) Work on the high pressure slide gate installation was the final work of the year 1938.⁴⁹

The final year of construction on Boca Dam and Reservoir was 1939. On January 1, water impounded in the Boca Reservoir was finally released into the outlet tunnel through the high-pressure gates by removing the stop-logs. Inclement weather at the end of January suspended construction work until April 5. By April 23, the water impounded in Boca Reservoir reached the spillway crest for the first time. On the spillway, the operating and roadway decks for the gate were cast. In July, the final concrete pour occurred at the dam site.⁵⁰

Condon closed his office at Boca Dam on June 22, 1939. The outlet works and spillway gates were tested in late August, and were found to operate perfectly. Boca Dam was considered ready for operation, with the exception of riprap placement in the outlet channel. The Civilian Conservation Corps handled landscaping work and road construction after work on

48. "Project History, Truckee Storage Project," 1938, 17.

49. "Project History, Truckee Storage Project," 1939, 5-8; 1938, 4, 19-26.

50. "Project History, Truckee Storage Project," 1939, 2-3.

the dam was complete.⁵¹

In November of 1939, a meeting occurred between Reclamation, the Washoe County Water Conservation District, and the large landowners of the project. The final cost of the dam had been approved the previous month by the participating parties, but a new issue was at hand. The large landowners had now removed the excess land agreement requirements from the project contracts. (The House of Representatives approved this action a year later.) That same month the final releases from Boca Reservoir were made. The project was utilized during the 1940 irrigation season.⁵²

Snow and resulting run-off quickly became serious issues at Boca Dam. Therefore, protective measures were mandatory for the site. Riprap maintenance and drain installations were required in 1940. That year, light earthquake shocks were felt at the site, yet no damage to the dam was recorded. Work was also necessary on road upkeep, since the Truckee Storage Project began acquiring heavy visitor traffic. That same year, seepage and springs from natural underground reservoirs required investigation of the dam's west side. Drains were installed to defray any seepage damage. A bridge was added to the site that year as well.⁵³ At the end of November, excess land provisions on Truckee Storage (and Humboldt Project lands) were removed by federal law.⁵⁴ Boca Dam was accepted as complete on May 29, 1941. The project was turned over to the Washoe County Water Conservation District for operation and maintenance on January 2, 1942.⁵⁵

51. "Completion of Construction Contract: Boca Dam, Truckee Storage Project," *Reclamation Era*, (October 1939): 278.

52. "Project History, Truckee Storage Project," 1939, 3, 10-1; 1940, 3.

53. "Improvement Activities at Boca Dam," *Reclamation Era*, (December 1940): 348.

54. "Project History, Truckee Storage Project," 1940, 3.

55. United States Department of the Interior, Bureau of Reclamation, *Federal Reclamation and Related Laws Annotated*, Volume I, through 1942, Ed. Richard K. Peltz, (Washington: U.S. Government Printing Office, 1972), 713.

When finished, the zoned earthfill Boca Dam measured 116 feet high, with a crest length of 1,629 feet and a crest elevation of 5,615 feet. The spillway crest measured 5,589 feet. The structure's spillway is concrete-lined with a maximum capacity of 8,000 second-feet controlled by two radial gates. The main feature of the outlet works, located through the right abutment of the dam, is its tunnel, which is 369.54 feet long with a gate chamber at its end. Here, two four-by-four foot slide gates control the release of water into two fifty-inch steel pipes. These pipes lead to two forty-two inch needle valves located at the downstream opening of the tunnel. They have a combined capacity of 900 second-feet. Boca Reservoir has an active capacity of 40,900 acre-feet.

Post Construction History

In January of 1942, jurisdiction and operation over Boca Dam was transferred to the Washoe County Water Conservation District. At this time, Lake Tahoe and Boca Reservoir were deserted due to the gas rations imposed by World War II.⁵⁶ The Orr Ditch Decree was finally determined and issued in 1944. It provided for individual water rights along the Truckee River and gave guidelines dictating how to operate the river in order to satisfy those rights.

The Truckee River region experienced significant floods in 1950 and 1955. In 1963, major flooding occurred again; the Truckee River reached 18,400 cubic feet per second at the Virginia Street Bridge in Reno. Prosser Creek Reservoir, completed in 1962, helped mitigate some of the flooding with upstream flood storage.⁵⁷ By 1965, Boca's dam crest was modified to accommodate larger floods. (This action foreshadows the need for Stampede Dam, which was constructed beginning in 1966.) The condition of the dam was deemed to be good in 1965, with no indication of settlement, shifting, or seepage. Examiners reported that the Washoe County

56. Strong, 40.

57. State of Nevada, Division of Water Planning, *Truckee River Chronology*, 1995.

Water Conservation District was doing a commendable job of operating and maintaining the dam, spillway, and outlet works.⁵⁸

A hypothetical maximum credible earthquake of seven and five tenths has been proposed for Boca Dam.⁵⁹ On June 27, 1966, an earthquake of 6.0 magnitude hit. Earthquake damage at Boca Dam was not extensive, though. There was minor cracking in the concrete structures, and the door frame to the spillway gate control house was sprung. Therefore, it was impossible to fully open the door. Workers had to adjust the door to open it. The year 1966 also marked the first year of biannual investigations at the site; underwater examinations of the spillway stilling basin were conducted, then similar tests were administered in 1967 for the outlet works.⁶⁰

Fishscreens were examined (while the reservoir was nearly empty) for flood control in 1969. In the year 1970, needed repairs to a needle valve at the outlet works were conducted, but the dam was found to be in good condition. Riprap on the upstream face was found to be minimized, but still satisfactory. The spillway gates worked properly, yet the district did install a pervious drain along the left side of the spillway stilling basin. It dried up the area to the left of the basin, where water had previously accumulated. No logboom or safety floatlines were present at the face of Boca Dam. (These structures would have prevented boaters from reaching the upstream face of the spillway gates.) Inspectors felt this was not an issue in 1970 since the flow through the spillway gates was low enough during summer recreation periods. Stampede Dam was completed this same year, drawing excess water storage requirements off of Boca

58. "Project History, Truckee Storage Project," 1964-5, 2.

59. "Project History, Truckee Storage Project," 1966-7, 3.

60. "Project History, Truckee Storage Project," 1974-5, A-3.

Dam.⁶¹

By 1971, the needle valves were rebuilt. In 1973, the reservoir was emptied in September at the request of the California Department of Fish and Game in order to poison “trash” fish and restock the reservoir with game fish.⁶² In 1974, geologic and structural investigations of Boca Dam were conducted under the Safety of Dams program and the condition and maintenance of the site were considered satisfactory. Erosion control was under way at Boca Dam now. Also, trespassers had damaged the access road and the old timber bridge at this time, therefore recommendations were made to repair or remove the bridge downstream from the dam. At this point, the project’s water was increasingly being used by an urban population, even though much of the water was still being fed to farms for ranching and farming purposes. In order to deliver water to urban areas, the water rights were sold by private parties to cities and urban water diversions were then put into place.⁶³

By 1980, conservation work was underway at the Boca site. The United States Forest Service and the Youth Conservation Corps created and placed signs around the dam to block off routes unauthorized for vehicles. Thirty-six campfire rings were installed and fifteen acres of trees were thinned. After examining the dam, the concrete was found to be in good condition on the spillway and river outlet works. Furthermore, no high-risk landslide areas were found.

Sealant was used on concrete in the spillway chute floor to coat and repair it. Vegetation control was required on the upstream and downstream faces of the dam as well. Some erosion had occurred at the entrance of the left and right walls of the inlet transition. Inspectors recommended that riprap be placed in these areas to prevent further erosion. No

61. “Project History, Truckee Storage Project,” 1970-1, 2-3; “Project History, Truckee Storage Project,” 1974-5, A-2.

62. “Project History, Truckee Storage Project,” 1972-3, 2.

63. “Project History, Truckee Storage Project,” 1974-5, 1-3; Seney, 7/18.

work was needed on the outlet works.⁶⁴

In 1997, a kayaker got stuck in a weir, above Boca Reservoir and died. Since Reclamation and the United States Geological Survey wanted to maintain data continuity for tracking water flows, the weir was not removed. The lower portion of the dam was filled with large boulders to help reduce the turbid water movement in the surge pool instead.⁶⁵

Work on the Truckee River Operating Agreement has proceeded over many years, and at this editing in 2008 is apparently nearing completion. Its provisions included drought protection measures for Reno and Sparks, Nevada, storage to aid Fernley, Nevada, improved in-stream water flow in the Truckee River, better recreational levels at Boca Reservoir, wetlands restoration and fish recovery at the site, and formal allocation of waters between California and Nevada. Due to its recent origination, the guidelines of the Truckee River Operating Agreement have not yet been implemented, therefore operations at the Boca site have not changed yet. However change is inevitable, since storage has been deemed more important than the maintenance of Floriston rates, and the flow requirements will eventually be waved within the agreement. The Federal Water Master, Garry Stone, now operates the Truckee Storage Project and will be enforcing the Truckee River Operating Agreement.⁶⁶

Settlement of the Project

The Truckee Storage Project occupies one of the coldest spots in California. Because of its location and rugged terrain, the area near the dam has not experienced sizable settlement. Outdoors enthusiasts primarily visit the site, The Lake Tahoe region still maintains its tourism business, but permanent settlement has not increased dramatically near Boca Dam since the

64. "Project History, Truckee Storage Project," 1980-1, 2.

65. "Little Truckee Dam Site Remains Safety Hazard," Internet, <http://tahoe.com/sun/stories.4.23.98/news/littletruckdam23Apr6497.html>, accessed 6/19/01.

66. Don Seney, Professor of Political Science, interview by author, July 18, 2001, Denver.

project was completed in 1939.

However, the Truckee Meadows area, fed by the irrigation waters from the project, has grown in population since the introduction of Boca Dam. The irrigation waters have promoted extensive crop growth, including alfalfa, wheat, and potatoes. Farmers who handle livestock have also benefitted from irrigation water. Essentially, the irrigation provided by the Truckee Storage Project has made it possible for people to not only subsist in the western part of Nevada, but thrive there.⁶⁷

As mentioned earlier, by the time the project was being built, the Washo had acquired land in the Carson Valley that was agricultural, with excellent water rights. They had always lived in this region of the country, but their standard of living improved with the unprecedented water rights and irrigation.⁶⁸

Uses of Project Water

The Truckee Storage Project brought much benefit to western Nevada and Eastern California. One of the most obvious benefits is the irrigation it provides approximately 29,000 acres of land in the Truckee Meadows in Nevada. Helping to make the dairy and livestock business a thriving one in western Nevada, diversion control is now under the jurisdiction of the Federal Water Master. The most important crops grown on the lands irrigated by the project are alfalfa, meadow hay, feed grains, and potatoes. In 1934, the shortage of water was so acute that domestic water was even limited, and sanitary conditions in the Truckee River were bad. Boca Dam not only provided the needed storage for irrigation waters and more sanitary waterways, but it furnished additional stream flow regulation as well.⁶⁹ Lake Tahoe releases are

67. "Project History, Truckee Storage Project," 1934-7, 106-8.

68. Nevers, 92.

69. F. M. Spencer, "Boca Reservoir: New Playground," *Reclamation Era*. (March 1942): 55.

controlled by the Truckee-Carson Irrigation District.⁷⁰

Boca Dam and Reservoir are also recreation areas that support fish and other wildlife. Administered by the United States Forest Service, the dam promotes better conditions for fish in the streams due to its sediment retention. Public visitation of the recreation area is in the hundreds of thousands each year. Fishing increased in popularity in the Little Truckee River, since fish propagation conditions vastly improved. Boca Reservoir, three miles long and one mile wide, furnished a playground for camping, fishing, and boating in the area.⁷¹

Conclusion

The Truckee Storage Project provided an answer to the controversies surrounding water usage between California and Nevada. Its completion in 1939 helped alleviate the drought issues and disputes of the thirty years prior to its construction.⁷² The project furnished irrigation waters to the Truckee Meadows and acted as a recreation area as well. Primarily considered a water storage unit, the Truckee Storage Project was an integral part of the Truckee River Agreement's plan to draw need away from Lake Tahoe.

Significantly, the Truckee Storage Project was constructed during the heart of the Great Depression. It was originally funded by the National Industrial Recovery Act. Furthermore, the Civilian Conservation Corps completed much of the preparatory and incidental work on the site. In this vein, the construction of Boca Dam figures into our nation's history as part of an economic recovery movement.

About the Author

Carolyn Hartl attended Indiana University, where she obtained a BA in

70. "Project History, Truckee Storage Project," 1934-7, 105.

71. Spencer, 55.

Education. She taught in inner-city Chicago for six years, and simultaneously volunteered at the Chicago Historical Society. Having relocated to Colorado, she worked for the Denver Art Museum and volunteered at the Colorado History Museum. She is currently pursuing a Masters in History at Colorado State University.

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