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Boca Dam, Truckee Storage Project

NEVADA-CALIFORNIA

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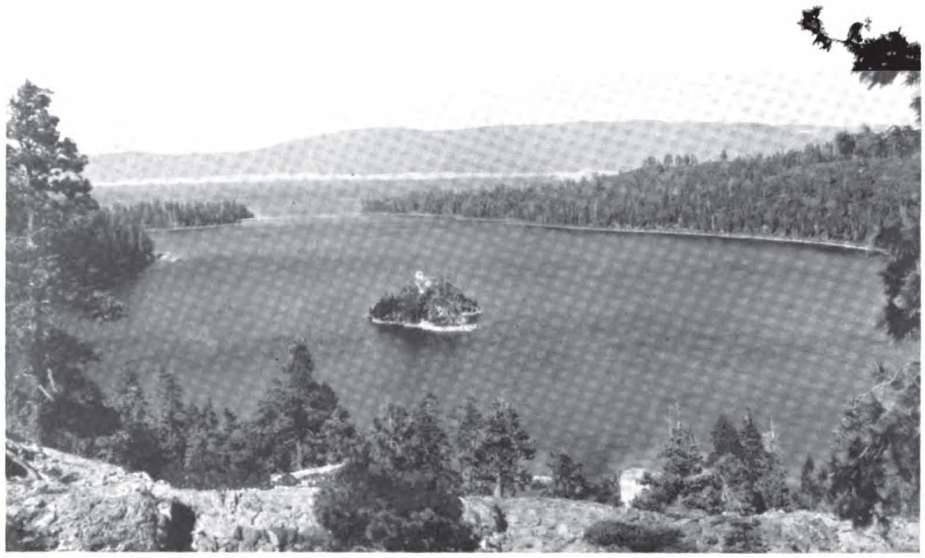
THE water problems and related conditions of the Truckee storage project probably are as involved as are those in any other territory of comparable area. Complications are due to many causes, among which are: Unusual geographical and topographical conditions, the chronological order of the establishment of water uses, diverse and opposed industrial interests, and, perhaps of most concern, the limited water resources.

Lake Tahoe, situated in eastern California and west central Nevada with State boundary line dividing the lake between the two States, is the source of the Truckee River, whence the river flows about 100 miles, descending nearly 2,500 feet, to discharge into Pyramid Lake. The outlet at Lake Tahoe is in California and the river remains in California for about the first 35 miles of its course. From Lake Tahoe to the California-Nevada State line the channel is rather deeply cut and is confined throughout most of that distance by steep canyon walls, there being no diversions for agricultural purposes. The first such diversion is made by a low rock dam placed almost at the point where the river enters Nevada, and though this particular diversion is for water use several miles distant, other diversions are made and irrigation begins a short distance downstream. As the valley widens nearer to Reno and Sparks, which are separated by a distance of only 3 miles, irrigation becomes extensive and continues so to a point about 7 miles below or east of Reno, where the river enters a narrow canyon with only occasional points of sufficient width to permit agricultural activities. At Wadsworth the river swings to the north toward Pyramid Lake.

Beginning with the irrigation diversion at the California-Nevada boundary line and counting all diversions which are made for the irrigation of lands adjacent to the Truckee River between that point and Wadsworth, Nev., there are 47 separate diversions, 33 of which are made before the river enters the narrow canyon below Reno and Sparks.



Emerald Bay

Between Wadsworth and Pyramid Lake there are a few more scattered diversions, principally for the irrigation of Pyramid Lake Indian Reservation lands, and at Derby, about 20 miles east of Reno, a diversion is made by the Derby Dam for delivery of water, by the 30-mile long Truckee Canal, to the Lahontan Reservoir for use on the Newlands project, now operated by the Truckee-Carson Irrigation District.

Above or west of Reno and principally in the steeper canyon above the State boundary, the rapid fall of the river is utilized at several different points to generate hydroelectric power for the Sierra Pacific Power Co.'s system. Power thus generated is supplemented by power purchased from the Pacific Gas and Electric Co. which is conducted from over the summit of the Sierra Nevada Mountains to help supply demands in Nevada.

The Washoe County Water Conservation District

In 1929, the Washoe County Water Conservation District was organized as a public corporation, organized and operating under the laws of the State of Nevada, with offices at Reno. The district does not yet have an operation and maintenance department, its activities to date being solely of a business nature. District lands are located around Reno and Sparks with two small, separated tracts, one up the river and one downstream from the main body, the total area amounting to about 30,000 acres. Thirty-one of the river diversions mentioned serve district lands and it is worthy of note that this area is served by many small diversions, ranging from ½ to 90 second-feet, instead of one or a small number of main canals and their

accompanying laterals, also that the diversion ditches are owned and maintained by corporations, voluntary organizations, unorganized groups and individuals. The first water rights for the local district irrigation diversions date back to about 1860, for a generation to about 1890, and the Derby Dam and Truckee Canal water rights to 1902, the last in the amount of 1,500 cubic feet per second.

Adverse Interests

Both Lake Tahoe and Pyramid Lake are well-known points of interest and resort centers. The latter, however, is on an Indian reservation, is in more or less of a desert area with little vegetation, and has been only slightly developed as a resort. The Lake Tahoe area has the combination of a beautiful lake, picturesque mountains, heavy timber, and a bracing climate. It has been developed, in recent years, as a popular resort and summer play ground. The value of land around the lake has greatly advanced, expensive homes and resorts and other places of business have been constructed and recreational activities have become profitable and important. Also summer homes and camps have been built along the upper part of the Truckee River and extensive recreational developments have been made at Donner Lake, which is located a few miles from the main stream on a tributary, Donner Creek. The latter development is not greatly affected by water storage in Lake Tahoe, but it can readily be seen that the Tahoe recreational improvements would create a desire for a stabilized lake surface elevation and a uniform river flow, while irrigation interests around Reno seek upstream storage and withdrawals during the irrigation season. The Truckee-Carson Irrigation District desires releases from Lake Tahoe to fill Lahontan Reservoir and upstream storage in Tahoe to supplement reserves in Lahontan Reservoir. The power company needs river flows adjusted to meet its daily and seasonal power demands. The situation is further complicated by the need in the valley areas for flood control during wet periods and for additional water during dry seasons for sanitary and domestic purposes. Sportsmen have added to the problems by asking certain regulations for the protection and increase of fish and other wildlife. These problems are more serious on account of some interests being in one State, some in the other, and some in both, also because the water laws of the two States differ.

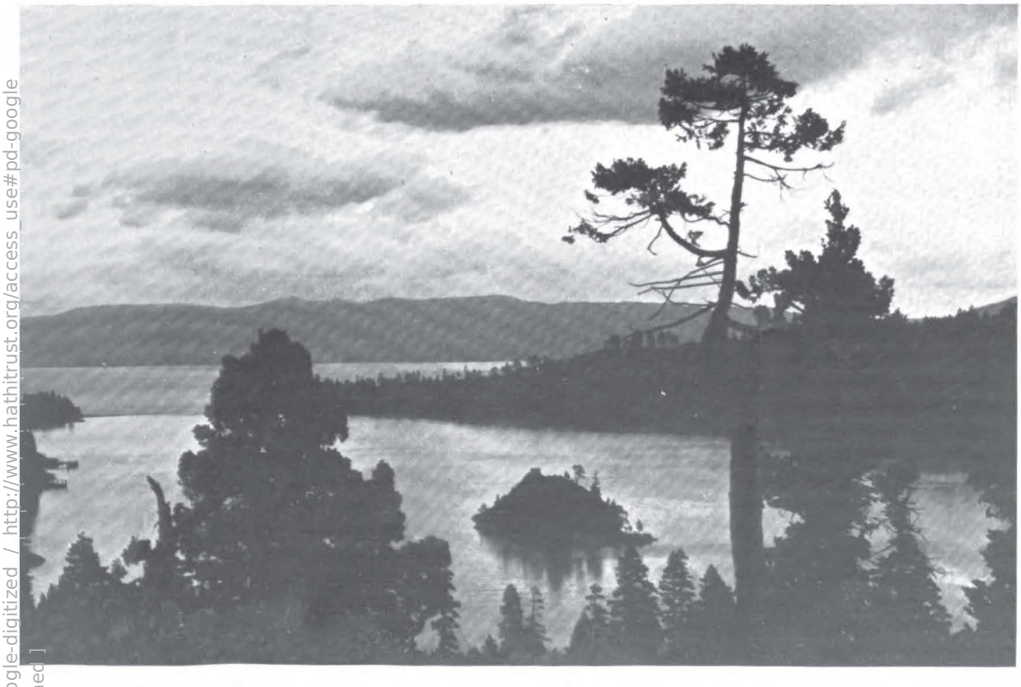
Advancement by Agreements

Lake Tahoe has an area of approximately 187.5 square miles and a drainage area of 519 square miles, the run-off from which is partially controlled by the concrete dam at the lake outlet constructed in connection with the Newlands project. Outside of that section, the Truckee River drainage area is extensive but steep and has created, by sudden run-off, flood flows at Reno as high as 16,000 second-feet. The need for combined upstream storage and flood control was recognized many years ago and after years of study, investigation, and controversy, the first step in bringing the various interests together was made by the execution of the Truckee River Agreement. The last signature to this agreement was secured on February 11, 1937, the parties to the agreement being: United States of America, Truckee-Carson Irrigation District, Washoe County Water Conservation District, Sierra Pacific Power Co. and a certain percentage of the water users of the Truckee River within the conservation district. The purpose of this agreement has been stated briefly as "to effect the security of mutual and individual benefits, the clarification and protection of rights, to fix the methods of operation for the entire river, and to establish the long-desired understanding among all parties." The Truckee River Agreement was a prerequisite to and made possible the execution of a repayment contract by and between the United States and the Washoe County Water Conservation District. That repayment contract was authorized by a conservation district election on April 7, 1936, and was executed December 18, 1936, thereby making possible the construction of additional upstream storage facilities.

Although the Truckee Storage project includes the Washoe County Water Conservation District adjacent to Reno and Sparks, Nev., and the Boca Dam and reservoir at Boca, Calif., the only construction contemplated was that of the Boca Dam. The district is an old established area ready to handle releases from the proposed reservoir even though considerable improvement could beneficially be made in the distribution system.

Crystal Bay, Mount Rose in the distanc

Sundown at Emerald Bay



Investigations, Conditions, and Progress

Reservoir and damsite surveys were made in the Truckee River drainage area for the purpose of attempting upstream storage as early as 1889 or 1890, but it was not until the investigations by the Bureau of Reclamation which resulted in the report of Truckee River conditions by E. B. Debler in April 1929 that work leading directly to the Boca Dam was done. This work was followed in August 1934 by surveys and testing at a recommended site about 4 miles above Boca but on May 25, 1935, such surveys and testing were abandoned to commence on the finally selected site at Boca.

The Boca site is located on the Little Truckee River, in California, a tributary to the Truckee River which supplies about 40 percent of the total discharge of the latter. The dam is situated at a point about one-half mile upstream from the confluence of the tributary with the main stream. The location is practically on United States Highway 40 and the Southern Pacific R. R. main line, 27 miles from Reno, Nev. The conditions for economical and practical construction at this site generally are favorable except those of a climatic nature. Operations after winter snows begin are impossible and the temperatures usually become too low about the latter part of October to carry on concrete work without costly protection. Winter weather conditions are usually too severe for economical work until about the middle of March and then if the snowfall has been heavy during the winter, construction work may be delayed until late in April. High-water conditions in the spring and possibly in the fall are also serious problems. The record flood flow occurred in December 1937, when a peak of an estimated 4,000 second-feet was reached in the Little Truckee River at Boca and 16,000 second-feet in the main stream at Reno. Construction work was under way at that time and considerable delay, inconvenience, and damage resulted.

Under the repayment contract of December 18, 1936, made in pursuance of the National Industrial Recovery Act, the Emergency Relief Appropriation Act, and the National Reclamation Law, there was to be constructed a reservoir with a capacity of 40,000 acre-feet, for which purpose $1,000,000 was made available from an allocation of $1,500,000. Repayment of costs is to be made by the Washoe County Water Conservation District in the usual manner, over a period of 40 years. An unusual arrangement whereby Washoe County participated in the cost of Boca Dam and Reservoir to the extent of $500,000, by the authorized issuance of noninterest-bearing bonds in that amount, very greatly reduced the district's burden. Subsequent to the execution of the repayment contract agreements were made by the United States, the Sierra Pacific Power Co. and the Washoe County Water Conservation District whereby the capacity of the reservoir was increased to 40,800 acre-feet, the power company agreed to pay a proportionate part of the construction costs amounting to about $20,000, and the joint operation and maintenance of the Boca Dam by the power company and conservation district was provided for. This change was made to provide power company pondage regulation of river flows in connection with power generation as provided for in the Truckee River Agreement.

Bids for the construction of Boca Dam under Specifications No. 696, were opened at the Reno office of the Bureau of Reclamation on September 30, 1936, there being 18 bidders. The contract was awarded to George W. Condon Co., of Omaha, Nebr., as a result of the low bid of $729,435, and was executed February 15, 1937. Construction work was commenced on March 30, 1937. Counting the extensions of time granted the contractor on account of unavoidable delays and orders for changes, the date for completion under the contract is August 26, 1939.

The dam will be the earth-fill type with rock fill and rock riprap facings, 107 feet high above the stream bed with a crest width of 35 feet and a length of 1,650 feet. Its construction will involve about 1,350,000 cubic yards of excavation, the driving and concrete lining of an outlet tunnel 726 feet long, the placing of 8,350 cubic yards of reinforced concrete and the placing of 790,000 cubic yards of zoned embankment and 150,000 cubic yards of rock fill and riprap. The outlet tunnel, driven around the west end of the embankment through the right abutment, is circular, 12 feet in diameter, for 369.54 feet of its length and horseshoe shaped, 10.5 by 14 feet, for the last 315.36 feet. A gate chamber makes up the remaining total length wherein two control slide gates, each 4 by 4 feet, are to be installed. Two 50-inch diameter steel pipes will lead from the gate chamber to two 42-inch needle valves in the valve house at the outlet portal. The spillway with a capacity of 8,000 cubic feet per second is constructed at the left end of the embankment, is of the concrete-lined, open channel type, and will be controlled by two radial gates, each 19 by 16 feet.

During the fall and winter of 1936–37 three wood frame Government buildings, an office, a laboratory, and a garage, were constructed at the dam site. These buildings were well built as permanent structures and will be used as the caretaker's residence, an auxiliary power unit station, and for garage and storage purposes after construction is complete. No Government camp was constructed, the employees being supplied transportation from Reno. A contractor's camp was built at Boca, consisting of the necessary shops, warehouses, cookhouse, bunkhouses, cabins, and residences. The camp was well provided with a water system, sewage disposal facilities, fire protection, and other modern improvements. The main bureau engineering and clerical office has been maintained at Reno, Nev. It was established in the Federal building in April 1934, where work has been handled for the Humboldt project and CCC Regional Office, as well as the Truckee Storage project.

Lake Tahoe from Mount Rose

Construction

Although most of the work done during April, May, and part of June of 1937 was of a preparatory nature, some contracted construction work was kept underway after March 30, 1937. The first concrete pour, which was on the spillway gate structure cut-off wall, was made June 23; outlet tunnel lining concrete pours began September 12; the outlet tunnel excavation driven from both portals was holed through on October 16; and outside concreting was discontinued, because of low temperatures, on October 24, 1937. At the outlet tunnel lower portal, where the work could be housed economically, concreting was continued until a later date. For the winter of 1937–38 all construction operations were discontinued on January 31, 1938, all operations after October being confined to the outlet works.

In the spring of 1938 some work was attempted late in April, but weather, wet ground, and high water conditions prevented much progress until about the middle of June. The river was completely diverted through the outlet tunnel to permit work in the river bottom part of the dam area on June 12, 1938.

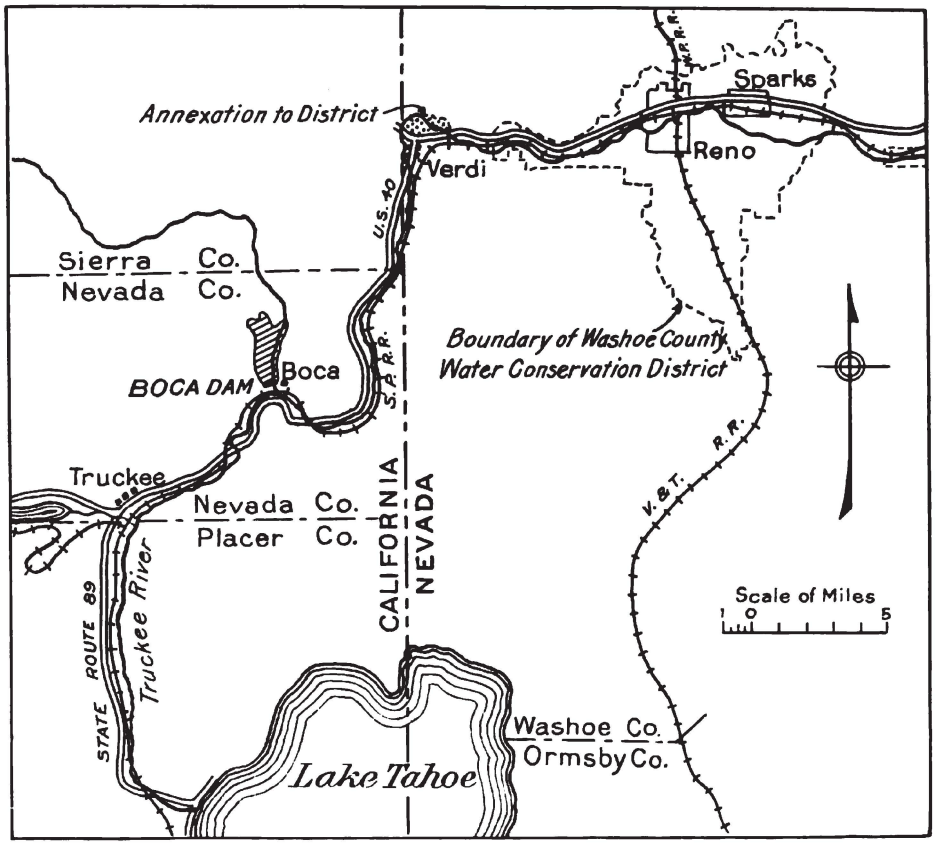
Early in November 1938, the embankment, exclusive of rock fill and riprap, had been placed to elevation 5,602, there remaining only 10 feet of height to reach the contemplated crest elevation of 5,612. Rock placing had not progressed as rapidly as the earth fill, but at that time the speed of such work was being materially increased. Of the outside concrete work there remained only a few spillway pours and part of the outlet control valve house structure, all of which is economically applicable to the use of covering and artificial heat and may be continued to completion even though colder weather begins. Because mechanical and electrical installations, spillway channel excavation, riprapping and any inside concreting or general clean-up work may be accomplished during colder weather, it is believed that the Boca Dam will be brought practically to completion this year.

One of the main hindrances to construction during the work months of 1938, the period of most progress, was the result of the heavy snowfall and severe winter of 1937–38. Unusually high moisture was in evidence during the entire summer, adding to the difficulties of spring floods and bad ground surface conditions by preventing the use of material from borrow pits which were previously considered the main source of such material. The ground was found to be more deeply saturated than for many years, with actual spring conditions at many points.

Concrete aggregates have been supplied by the Government and, due to the lack of suitable local materials, were shipped by railroad from Marysville and Fair Oaks, Calif. In connection with these shipments, as well as with any material shipments, a very marked advantage has been had by having the railroad main line so near the work and by having a spur track in existence by which the material was brought directly to the site. This spur was situated along a side hill with sufficient slope to permit the construction of aggregate unloading bins directly under the track and also to permit withdrawals from the bins into trucks backed under the bins. CCC forces and equipment were used to transport the aggregates from the bins to stockpiles near the concrete mixers.

The contractor is to be commended for the adequate quantity and quality of his equipment. In connection with all parts of the job he has maintained suitable equipment for the work in hand.

Interstate features of the Truckee storage project



Owyhee Livestock in Good Condition

REPORTS from the Owyhee project indicate that cattle and sheep are in better condition than for some years past, and a big calf and lamb crop is expected. Feeder stock are high in price. With an abundance of cheap hay, grain, beet pulp, and other feed on the project, the stockman is in a very favorable position.

Izaak Walton League of America Organizes Chapter in Boulder City

THE Boulder Dam Lake Mead Chapter of the Izaak Walton League of America was organized in Boulder City on December 14. More than 50 enthusiastic sportsmen attended the meeting and signed as charter members.

Belle Fourche Livestock

EARLY fat lambs shipped in December from the Belle Fourche project brought an average of $8.75 at central markets, and feeders were well pleased with the profits. Dressed turkey shipments for the holiday trade were heavier than usual, a total of 480 crates, or about 93,000 pounds, going out from project towns.

Shoshone Livestock

SHEEP and cattle on the Shoshone project are in excellent condition. It is reported that more livestock are being fed on the project than in previous years. Farmers who went out of the sheep business when the prices of agricultural products were good are purchasing a few ewes to start up farm flocks again.