RTD-105

Trinity Division
Central Valley Project

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Trinity River Division
Central Valley Project

The Central Valley Project (CVP) continued expanding in California after completion of the Project's initial features. The Trinity River Division was part of this expansion. California picked up on the idea for the Division from a Federal Power Commission investigation for developing hydroelectric power on the Trinity River. After Reclamation investigated the economic feasibility of the plan in 1942, California dropped it in 1945. California's move did not deter Reclamation, and they gave the Trinity River Division life as part of the CVP in the 1950s.

Project Location

The Trinity River Division lies in the Klamath River Basin, of which the Trinity River is a tributary. The Division transfers water from the Klamath Basin to the Sacramento River Basin. Trinity River Division is located in Trinity County. It consists of Trinity Dam and Powerplant, Clair Engle Lake, Lewiston Dam, Lake, and Powerplant; Clear Creek Tunnel, Judge Francis Carr Powerhouse, Clair A. Hill Whiskeytown Dam and Whiskeytown Lake, Spring Creek Power Conduit and Powerplant, Spring Creek Debris Dam and Reservoir, and other, related facilities.[1]

Historic Setting

Several groups of Native Americans inhabited northern California prior to the influx of European settlers. Wintun and Yana primarily lived in the Trinity River area. Whites did not settle much of Trinity region, even as they converged on the rest of the state, and the area remained wilderness for many years.[2]

Project Authorization

The Federal Power Commission investigated development of the Trinity River for hydroelectric power in 1924, blazing the trail for its eventual inclusion in the Central Valley Project. California adopted the Power Commission's plan for its State Water Plan in the early

1. Water and Power Resources Service, *Project Data* (Denver: GPO, 1981), 222-4.
2. Stephen Johnson, Robert Dawson, and Gerald Haslam, *The Great Central Valley, California's Heartland: A Photographic Project by Stephen Johnson and Robert Dawson, Text by Gerald Haslam* (Berkeley: University of California Press, 1993), 30-1.

1930s. Reclamation began feasibility investigations in 1942, but California dropped Trinity River from the state plan in 1945. Undeterred, in 1950, Reclamation started survey work on the Trinity River Division to locate tunnel routes, powerplants, and diversion sites on the Trinity River and Clear Creek. The planned division would transfer water from the Trinity River, through the Trinity Mountains to the Sacramento River Basin.[3]

Commissioner Michael Straus received the first draft of the project planning report for Trinity River Division on October 1, 1951. Reclamation held a public hearing at Weaverville, California, on February 2, 1952, to discuss development of the upper Trinity River. About the same time, Reclamation started plans to decide the optimum size of Trinity's reservoir. On January 2, 1953, the Trinity River Division received authorization as part of the CVP. Congress re-authorized the division in 1955, and President Dwight D. Eisenhower gave the Division his approval.[4]

Construction History

Division Operation

Clair Engle Lake, behind Trinity Dam, stores water from the Trinity River for release through Trinity Powerplant. Downstream, Lewiston Dam diverts water from the Trinity River, through the Lewiston Powerplant, into Clear Creek Tunnel for the eleven mile trip through the Trinity Mountains. Water enters Whiskeytown Lake through Judge Francis Carr Powerhouse. Some of the water diverts from the lake into the Clear Creek Unit South Main Aqueduct to irrigate lands in the Clear Creek Unit. The rest flows through the Spring Creek Power Conduit and Powerplant into Keswick Reservoir in the Shasta Division. From there, it goes through Keswick Powerplant, then south in the Sacramento River. The Wintu Pumping Plant diverts

3. Bureau of Reclamation, *Technical Record of Design and Construction, Trinity River Division Features of the Central Valley Project, California: Trinity Dam and Powerplant, Clair Engle Lake, Clear Creek Power Conduit, Spring Creek Power Conduit: Constructed 1956-1964, Volume II--Construction*, Bureau of Reclamation, Denver, 1966, 646; Bureau of Reclamation, *Annual Project History, Central Valley Project, 1950*, Record Group 115, SV-3. Hereafter Record Group 115 cited as RG 115.

4. Bureau of Reclamation, *Annual Project History, Central Valley Project, 1951*, RG 115, SV-7-8; Bureau of Reclamation, *Annual Project History, Central Valley Project, 1952*, RG 115, 3, 38; Bureau of Reclamation, *Annual Project History, Central Valley Project, 1953*, RG 115, 1; Bureau of Reclamation, *Annual Project History, Central Valley Project, 1955*, RG 115, 8.

irrigation water from the Sacramento River into the Cow Creek Aqueduct and Unit.[5]

Trinity Dam

Reclamation awarded twelve major contracts for construction of Trinity Dam in 1956. Allum Brothers of Eugene, Oregon, received the contract for common excavation of the outlet tunnel, and rock disposal at Trinity. The firm commenced operations on June 4, 1956. Reclamation awarded the main construction contract for the dam to Trinity Dam Contractors (TDC) for $48,928,101. Trinity Dam Contractors was a joint venture comprised of Guy F. Atkinson Company, M. J. Bavanda, Charles L. Harney, Inc., Ostrander Construction Company, A. Teichert and Son, Inc., and Trepte Construction Company. The group started work on March 12, 1957.[6]

Gates and Fox contracted to excavate the diversion tunnel. The firm started the upstream portal on September 15, 1956, and holed through on February 2, 1957. The contractor completed excavation of the tunnel April 28, 1957. Trinity Dam Contractors diverted the river through the tunnel with a cofferdam on July 8, 1957. They built a cofferdam downstream of the main dam site, de-watered it, and started excavating Trinity's foundation. High water on October 9, flowed over the upstream coffer and broke through the downstream cofferdam, filling the excavation with water. The event did not prove a total fiasco because it allowed Gates and Fox to line the diversion tunnel with concrete. Trinity Dam Contractors diverted the Trinity River through the tunnel again on June 13, 1958.[7]

Trinity Dam Contractors started dam excavation on May 28, 1957. The firm used bulldozers to clear trees from the dam site. Most excavation went to average depths of four to six feet. Some areas required stripping to ten feet. Right abutment excavation carried on from January 7, 1958, through 1960. The contractor discovered cracks in the rock of the spillway and gate shaft berms on September 25, 1958. TDC excavated the overburden to relieve the stress on the berms. The contractor placed 7.6 million cubic yards of material during 1958, Trinity Dam

5. Water and Power Resources, *Project Data*, 223; Bureau of Reclamation, "Central Valley Project, Shasta and Trinity River Divisions," Map No. 214-208-4469, Bureau of Reclamation, Mid-Pacific Region, April 1991.
6. Reclamation, *Technical Record of Design and Construction, Trinity River Division Features, Vol. II*, 399; Bureau of Reclamation, *Annual Project History, Central Valley Project, 1957*, RG 115, 1.
7. Reclamation, *Technical Record of Design and Construction, Trinity River Division, Vol. II*, 406.

was about half complete at the end of the year.[8]

Trinity Dam's embankment consisted of four zones, or types, of materials; an impervious core material, a semi-impervious layer on either side of the core, river gravel, and rockfill. Rock riprap covered the upstream face of the dam. Trinity Dam Contractors commenced placement of the rockfill, on August 12, 1957, because some of the fill lay under the river gravel. The river gravel placement started on August 19. The contractor started placement of the core material and semi-impervious layer on September 12, 1957. The winter floods on October 9, 1957, which inundated the work area stopped work on the embankment, but no damage occurred. Trinity Dam Contractors expedited work to place the core material in the cutoff trench before the expected flood. Riprap placement started in August 1959. The contractor used a two mile long conveyor belt to transport fill material from the borrow pit to the dam site. Use of the belt risked stoppage of the entire placement operation, should the belt machinery break down. The contractor decided to take the risk, as opposed to hauling the material by truck over steep grades. The conveyor transported an average of 20,000-25,000 cubic yards daily. By the end of 1959, TDC had completed much of Trinity Dam.[9]

Excavation for the spillway tunnel and shaft began at the downstream portal of the diversion tunnel on November 4, 1957. The contractor immediately encountered poor rock in the portal area, requiring more excavation than originally planned. Shaft excavation started April 14, 1958, and finished August 5. Trinity Dam Constructors commenced placement of concrete in the horizontal spillway tunnel on July 6, 1959, and finished November 4 of the same year. The contractor placed concrete in the vertical curve of the spillway with a crane and a bucket from October 5 to 27, 1959. The placement of the core material, semi-impervious

8. Reclamation, *Technical Record of Design and Construction, Trinity River Division Features, Vol. II*, 408; Bureau of Reclamation, *Annual Project History, Central Valley Project, 1958*, RG 115, 1; Bureau of Reclamation, *Final Construction Report on Trinity River Dam, Specifications No. DC-4824 (Final Embankment Construction Report) and Trinity Dam Diversion Tunnel, Specifications DC-4650 and (Overhead Power and Control Wood-Pole Line Between Control House and Penstock and Penstock Gate Structure 200C-471(SF))*, Central Valley Project, California, Trinity River Division, Lewiston, CA, February 1963, *Central Valley Reports*, RG 115, box 50, 100.

9. Reclamation, *Technical Record of Design and Construction, Trinity River Division Features, Vol. II*, 414, 416-7; Reclamation, *Final Construction Report on Trinity River Dam*, 103, 107, 109, 112-3; Bureau of Reclamation, *Annual Project History, Central Valley Project, 1959*, 1; Water and Power Resources *Project Data*, 227; "Two-Mile Belt Speeds Fill Haul at Big Dam," *Engineering New Record*, 16 October 1958, 32; "Highest Embankment Topped Out," *Engineering News Record*, 20 October 1960, 23.

blanket, and the river gravel zones finished in September 1960. The contractor finished the rock surfacing in October and the riprap in November. The contractor built the crest of Trinity to its ultimate height, and nearly finished the dam by the end of 1960. At the time of final completion in 1961, Trinity stood as the highest embankment dam in the world until the California State Water Project's Oroville Dam, on the Feather River, superseded it.[10]

Guy F. Atkinson Company started construction of Trinity Powerplant structure on October 4, 1960. The company finished the building December 15, 1961. Gunther and Shirley Company and E. V. Lane, a joint venture, received the contract for installation work on the powerplant. The contractors started work January 9, 1962, shortly after completion of the structure. They completed all work on December 23, 1963. Congress passed Public Law 88-662 on October 13, 1964, officially naming Trinity's reservoir, Clair Engle Lake after a U.S. Representative who supported construction of the Sacramento Canals Unit of the Sacramento River Division.[11]

Clear Creek Tunnel

Reclamation awarded the contract for Clear Creek Tunnel to Shea-Kaiser-Morrison, a joint venture of the Shea Company, Henry J. Kaiser Company, Morrison-Knudsen Company, Inc.; Macco Corporation, and Raymond Concrete Pile Company. The contractor informed Reclamation in April 1957, of a delay in delivery of their tunneling equipment. The equipment arrived in August 1957. Subcontractors excavated a 721 foot access tunnel, intersecting the main tunnel near the center. They completed the access tunnel July 18, 1957. Shea-Kaiser-Morrison started excavation operations on the main tunnel in September 1957. They rotated operations, shooting one end of the tunnel while mucking the other end.[12]

Tunnel ventilation presented the contractors with a challenge. To alleviate the problem, the group set up a three foot diameter, exhaust fan line, extending from the heading to the portal,

10. Reclamation, *Technical Record of Design and Construction, Trinity River Division Features, Vol. II*, 413, 441; Bureau of Reclamation, *Annual Project History, Central Valley Project, 1960: Annual Report, Central Valley Project*, RG 115, 10; "Highest Embankment Topped Out," 23.
11. Reclamation, *Technical Record of Design and Construction, Trinity River Division Features: Vol. II*, 457; Bureau of Reclamation, *Annual Project History, Central Valley Project, 1964*, RG 115, 1.
12. Reclamation, *Technical Record of Design and Construction, Trinity River Division Features, Vol. II*, 501-2, 505, 651-2.

with booster fans every 4,000 feet. As the heading progressed, they installed additional fan lines in thirty foot lengths. Shea-Kaiser-Morrison started concrete placement in the tunnel floor on December 16, 1958, completing it in April 1961. Concrete placement on the tunnel arch required a little more time, but the contractors finished it May 11, 1961.[13]

Reclamation built the Clear Creek Powerplant at the lower end of the 56,668 foot Clear Creek Tunnel. Construction of the powerplant took place from 1960-63. Congress passed Public Law 88-555 as a joint resolution on August 31, 1964, officially redesignating it Judge Francis Carr Powerhouse for a major supporter of construction of the CVP.[14]

Clair A. Hill Whiskeytown Dam

Reclamation awarded the contract for Whiskeytown Dam to Gibbons and Reed Company, of Salt Lake City. Construction of Whiskeytown Dam commenced in August 1960. Allen and Sturgess subcontracted clearing work on the Whiskeytown Lake site, and started operations September 2, 1960. The company downed trees with power saws, and used bulldozers to push the logs into piles for burning.[15]

Gibbons and Reed and McConstruction Company started excavating the spillway and outlet tunnels, at the downstream portals, on October 11, 1960, as a joint venture. The contractors worked three shifts on the tunnel operations, and rotated the excavation. Workers removed shot rock from the spillway tunnel while drilling and blasting the outlet tunnel. They holed through the outlet tunnel on February 24, 1961. Spillway excavation concluded July 25, 1961. The company stockpiled rock from the diversion tunnel, for use in the embankment.[16]

Gibbons and Reed began excavation for the main dam and two dikes on January 5, 1961. The company stripped, excavated, and hand cleaned the foundation to solid rock. Workers cleaned the upstream area, and marked rock outcrops, for drilling and blasting to remove large

13. Reclamation, *Technical Record of Design and Construction, Trinity River Division Features, Vol. II*, 508, 524-5, 535.
14. Water and Power Resources, *Project Data*, 224; Bureau of Reclamation, *Annual Project History, Central Valley Project, 1964*, RG 115, 1-2; John D. Lawson, *Redding and Shasta County: Gateway to the Cascades* (Northridge CA: Northridge Publications, 1986), 73-4.
15. Bureau of Reclamation, *Annual Project History, Central Valley Project, 1961: Annual Report, Central Valley Project*, RG 115, 6; Bureau of Reclamation, *Final Construction Report on Whiskeytown Dam: Specifications No. DC-5350 Part I*, Trinity River Division, Central Valley Project, May 1964, 50, 52.
16. Reclamation, *Final Construction Report on Whiskeytown Dam*, 53, 56-8.

boulders. Deep weathering of granite, under Dike Two, required excavation of a thirty foot wide cutoff trench, deep enough to reach solid, groutable rock. Gibbons and Reed stripped other foundation areas of unstable material which could move or settle under the load of the embankment. All of the site for Dike One required the same type of stripping. The contractor excavated down only two feet on the stream bed and the steeper slopes. Workers excavated three to ten feet on the more gradual slopes at higher elevation. Excavation went down between fifteen and fifty feet underneath the two dikes.[17]

Gibbons and Reed worked quickly through 1961, drilling and placing a grout curtain in a cutoff trench of the dam foundation, at the stream bed. The company started laying a continuous grout curtain on the upstream side of the main dam and Dike Two on October 20, 1961, to solidify the foundation. Gibbons and Reed accomplished some excavation of the inlet channel leading to the inlet tunnel. They laid concrete in the spillway tunnel elbow and completed over one-half of the dam before the end of 1961. Whiskeytown Dam suffered work stoppages due to a two day strike in November 1960, and one lasting over two weeks in January 1961.[18]

Ferd Drayer, Inc., contracted to clear Whiskeytown Lake of trees and brush. Rain started on November 20, 1961, and continued for several days, soaking brush piles. The company could not burn the wet brush piles, and the soaked ground terminated clearing operations for the rest of the year.[19]

Clearing the Whiskeytown reservoir site required moving a cemetery from the area. Reclamation awarded a contract to Madera Funeral Home, R. L. Moe, and Joseph B. Mashburn in 1961, to relocate the cemetery from the reservoir site. The firm the completed most of the work by the end of the year.[20]

Gibbons and Reed re-commenced placement of the embankment on April 9, 1962. The laborers and hod carriers at Whiskeytown went on strike May 2, 1962, halting work on the dam. The strike ended on June 26, 1962, and Gibbons and Reed completed almost all of the dam by

17. Reclamation, *Final Construction Report on Whiskeytown Dam*, 52-3.
18. Bureau of Reclamation, *Annual Project History, Central Valley Project, 1961: Annual Report, Central Valley Project*, RG 115, 6; Reclamation, *Final Construction Report on Whiskeytown Dam*, 58, 61.
19. Reclamation, *Project History, Central Valley Project, 1961: Annual Report, Central Valley Project*, 10.
20. *Ibid*., 12.

the end of the year. The company completed the dam February 7, 1963, and President John F. Kennedy dedicated the dam on September 28, 1963.[21]

Spring Creek Power Conduit

The Trinity River plan called for a tunnel between Whiskeytown Lake and Keswick Reservoir, to complete the water transfer to the Sacramento River Basin. To use the drop in elevation between Whiskeytown and Keswick, Reclamation opted for a power conduit with a powerplant at Keswick. Reclamation awarded the contract for the Spring Creek Power Conduit to Winston-Green-Drake on May 20, 1960. The contractor started work in June 1960. Reclamation declared the 12,707 foot conduit essentially complete on May 8, 1963, but final completion did not come until June 5. Reclamation placed Spring Creek Powerplant on the west bank of Keswick Reservoir, about one and one half miles northwest of Keswick Dam, with construction concluding in 1964.[22]

Lewiston Dam

Less than a year after getting the contract for Whiskeytown Dam, Gibbons and Reed received the contract for construction of Lewiston Dam in 1961. The dam acts as a storage and diversion facility, sending water through the Clear Creek Tunnel to Judge Francis Carr Powerhouse and Whiskeytown Lake. The company excavated the spillway, separated the materials for the embankment layers, and started placing the embankment. The firm finished almost one-half of the dam by the end of the year. A labor strike hit Lewiston in 1962, approximately the same time strikes afflicted Whiskeytown, Clear Creek Pumping Plant, Clear Creek Tunnel, and Spring Creek Debris Dam. The strike did not halt work long, and Gibbons and Reed completed Lewiston Dam in 1963.[23]

Lewiston Dam is a zoned earthfill structure on the Trinity River about seven miles

21. Bureau of Reclamation, *Annual Project History, Central Valley Project, 1962: Construction Progress Reports*, RG 115, 3; Bureau of Reclamation, *Annual Project History, Central Valley Project, 1963: Annual Report, Central Valley Project*, RG 115, 3; Reclamation, *Final Construction Report on Whiskeytown Dam*, 91-2.
22. Reclamation, *Technical Record of Design and Construction, Trinity River Division Features: Vol. II*, 567, 658, 667; Reclamation, *Project History, Central Valley Project, 1961: Annual Report, Central Valley Project*, 11; Water and Power Resources, *Project Data*, 223.
23. Reclamation, *Project History, Central Valley Project, 1961: Annual Report, Central Valley Project*, 7, 9; Reclamation, *Project History, Central Valley Project, 1962*: Construction Progress Report, 2-5; Bureau of Reclamation, *Safety Evaluation of Existing Dams Analysis Summary: Lewiston Dam*, Bureau of Reclamation, May 11, 1989, 1.

downstream from Trinity Dam. The dam is ninety-one feet high and 745 feet long at the crest. Lewiston Dam is twenty-five feet at the top, 380 feet at its maximum base width, and has a total volume of 265,000 cubic yards. Lewiston Reservoir has a capacity of 14,660 acre-feet. The spillway is gated chute with two thirty by twenty-seven and one-half foot radial gates.[24]

Spring Creek Debris Dam

Gibbons and Reed received the contract for Spring Creek Debris Dam in 1961. The firm commenced operations in July 1961. Reclamation dedicated the dam on September 12, 1961, shortly after construction began. Placement of the embankment commenced on October 20, 1961, and Gibbons and Reed started laying riprap on the upstream face of the dam on November 9. The rash of labor strikes, which struck other Central Valley construction in 1962, hit Gibbons and Reed at Spring Creek, stopping work from May 3 until June 26. Work continued afterwards, but encountered other problems. Pervious material, to blanket the core, ran low on embankment placement near elevation 760-80. The contractor finished the embankment with impervious core material. Work on the dam embankment continued until completion on March 26, 1963, and Gibbons and Reed completed the contract on September 25, 1963.[25]

Reclamation built Spring Creek Debris Dam on Spring Creek to stop sediment and tailings from Iron Mountain Mine from flowing into Keswick Reservoir and polluting it. The dam is an earthfill structure 196 feet high with a crest length of 1,110 feet. Spring Creek Debris Dam has a top width of thirty feet and a maximum base width of 1,040 feet. The total volume of the dam is 1,891,000 cubic yards. The reservoir has a capacity of 5,870 acre-feet.[26]

Cow Creek and Clear Creek Units

Reclamation awarded contracts for the Cow Creek Main and Clear Creek South Main Aqueducts in 1964. Valley Engineers, Inc., the contractor, began construction on the Cow Creek

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24. Water and Power Resources, *Project Data*, 222-3.
25. Reclamation, *Project History, Central Valley Project, 1961*, 10; Reclamation, *Project History, Central Valley Project, 1962*: Construction Progress Reports, 5; Reclamation, *Project History, CVP, 1963*: Annual Report, CVP, 3; Bureau of Reclamation, *Final Embankment Construction Report: Spring Creek Debris Dam; Specifications No. DC-5563*, Central Valley Project, Trinity River Division, Lewiston, California, May 1964, 3, 31, 35; Bureau of Reclamation, *Final Construction Report On Spring Creek Debris Dam: Specifications No. DC-5563*, Central Valley Project, Trinity River Division, Lewiston, Ca., July 1964, *Reports*, box 43, 2-3, 58.
26. Water and Power Resources, *Project Data*, 223.

Aqueduct January 14, 1965. Purtzer and Dutton received the contract for Wintu Pumping Plant in 1965, to supply Cow Creek Unit. The contractor completed the pumping plant in 1966. Reclamation dedicated it September 3, 1966. Baker-Anderson Corporation received the contract for Clear Creek South Main, and Reclamation accepted the aqueduct on January 26, 1967.[27]

Post-Construction History

Reclamation discovered seismic activity offered the greatest threat to Trinity Dam. Investigations in 1985, showed Trinity could not accommodate a probable maximum flood and was in poor condition. Investigators determined seismic activity or heavy rainfall could trigger a landslide and result in overtopping and failure of the dam. Similar examinations of Lewiston Dam revealed water flow of greater than 62 percent of a probable maximum flood would overtop the dam.[28]

Investigators discovered in 1985, that Spring Creek Debris Dam faced possible failure due to foundation liquefaction. Later, controversy hit the debris dam in the early 1990s. Through the decades, Spring Creek Debris Dam trapped sediment flowing into Spring Creek at a rate of up to 50,000 cubic meters per year. The dam soon began trapping mine toxins flowing out of the Iron Mountain Mine. When Spring Creek Dam overflowed, the toxins poured into Spring Creek and went downstream.[29]

Buckhorn Dam

Following completion of the Trinity River Division, annual runs of salmon and Steelhead trout, returning to the Trinity River Fish Hatchery, declined about 90 percent. Inquiries in the 1970s, identified Grass Valley Creek, a tributary of Trinity River; as the main source of sand buildup in Trinity. The Department of the Interior reactivated the Trinity River Task Force in

27. Bureau of Reclamation, *Annual Project History, Central Valley Project, 1966*: Annual Report, Central Valley Project, RG 115, 17; Bureau of Reclamation, *Annual Project History, Central Valley Project, 1965*, RG 115, Construction Progress Report: Tehama-Colusa Canal, December 1965, 3, 4; Bureau of Reclamation, *Annual Project History, Central Valley Project, 1968*: Construction Progress Report, Region 2, Red Bluff Construction Office, June 1968, RG 115, 3; Water and Power Resources, *Project Data*, 223.

28. Bureau of Reclamation, *SEED (Safety Evaluation of Existing Dams) Report on Trinity Dam, Central Valley Project, California*, Mid-Pacific Region, Department of the Interior, Bureau of Reclamation, Division of Dam Safety, Assistant Commissioner-Engineering and Research, Denver, September 24, 1985, 1; Bureau of Reclamation, *Safety Evaluation of Existing Dams, Analysis Summary: Lewiston Dam*, May 11, 1989, 2.

29. Bureau of Reclamation, *SEED (Safety Evaluation of Existing Dams) Report on Spring Creek Debris Dam, Central Valley Project, California*, Mid-Pacific Region, Department of the Interior, Bureau of Reclamation, Division of Dam Safety, Assistant Commissioner-Engineering and Research, Denver, , 1.

1974, and assigned it to investigate methods of controlling sediment in Grass Valley Creek. The task force determined a dam and reservoir on the creek would best control the sediment. Based on the task force's unanimous endorsement, Congress approved construction of Buckhorn Dam and the Trinity River Restoration Program.[30]

Bids for construction opened on July 28, 1988. The joint venture of Sundt-Coffman offered the low bid of $11,237,735, and they received the contract on August 12, 1988. Reclamation gave the firm notice to proceed on August 31, 1988. Stimpel-Wiebelhaus, a subcontractor, started clearing for the spillway and an access road October 18, 1988. The main contractor commenced clearing operations on the dam foundation area on October 27.[31]

Sundt-Coffman excavated the diversion channel, and diverted Grass Valley Creek in April 1989. Stimpel-Wiebelhaus began excavating the dam foundation April 15, 1989. The contractor placed a three inch lining over the foundation and lined the structure drains. The contractor started structural concrete placement on the spillway on July 24, 1989. Stimpel-Wiebelhaus started placing riprap bedding for the upstream side of the dam embankment on October 12, 1989. The contractor followed the process by placing the riprap, consisting of rounded cobblestones. Finally, the firm placed embankment material on top of the fill. Stimpel-Wiebelhaus accomplished the whole process during the same day[32]

Sundt-Coffman began excavation of the left abutment in May 1990. On May 26, 1990, a heavy rainstorm breached the cofferdam, and water flowed over the left side of the existing dam embankment, but caused no significant damage. The contractor started excavating the spillway channel on August 8, 1990, and completed it September 3. The company diverted the creek from the outlet works to the spillway about two weeks later by using pumps. Stimpel-Wiebelhaus finished placing the dam embankment on October 10, 1990. Sundt-Coffman completed spillway excavation two days later. The company finished all the contract work on

30. Bureau of Reclamation, *Final Construction Report, Buckhorn Dam: Specifications No. DC-7740*, Bureau of Reclamation, Trinity River Restoration Program--California, Trinity River Division, Central Valley Project, 16; Water Education Foundation, *Layperson's Guide to the Central Valley Project* (Sacramento: Water Education Foundation, 1994), 10.
31. Reclamation, *Final Construction Report, Buckhorn Dam*, 6, 24.
32. *Ibid*., 149, 151, 162, 184.

March 28, 1991. Dunton Construction Company received the contract for lining the spillway channel May 9, 1991, and completed it November 20, 1991, concluding operations on the dam.[33]

In the early 1990s, Reclamation officially redesignated Whiskeytown Dam, Clair A. Hill Whiskeytown Dam. Clair A. Hill was a member of the California State Water Resources Control Board, and the principle in CH2M Hill, a water resources management and engineering company.[34]

Settlement of the Project

Trinity River Division occupies an isolated and sparsely populated section of northern California. Weaverville is the closest community to the Division. In 1990, the community had 3,390 inhabitants. Trinity County had a population of 13,063 for the same year. The communities associated with agricultural lands, supplied by the Clear Creek and Cow Creek Units, consisted of Anderson and Cottonwood in Shasta County. Anderson had a 1990 population of 8,299, and Cottonwood had 1,673 inhabitants. Shasta County recorded 147,036 residents. Lands directly under the Trinity Division had a 1990 population of 8,103.[35]

Uses of Project Water

Transfer of supplemental water from the Klamath River Basin's Trinity River to the Sacramento Valley comprises the main responsibility of the Trinity River Division. The disparity in elevation between the Trinity River and the Sacramento River facilitates generation of hydroelectric power from the division's facilities, by dropping the water almost 1,500 feet from Clair Engle Lake to Keswick Reservoir on the Sacramento River. In between the two reservoirs, at Lewiston and Clair A. Hill Whiskeytown Dams, the Division generates more electricity. Water from Clair Engle Lake passes through three powerplants before it reaches Keswick Reservoir (see Table. I). Lewiston Dam acts as an afterbay for Trinity, stabilizing water coming from the powerplant.[36]

33. *Ibid*., 9-12.
34. Bureau of Reclamation, Public Affairs Office, Mid-Pacific Region, Sacramento, 20 September 1994; Bureau of Reclamation, Shasta Project Office, Redding, California, 20 September 1994.
35. Department of Commerce, Bureau of the Census, *Twenty-First Census of the United States, 1990: Population and Housing*, Bureau of the Census, 1990, on CD-ROM; Bureau of Reclamation, *Crop Production Report–1990*, Bureau of Reclamation, Sacramento, 1990, 629.
36. Water and Power Resources, *Project Data*, 219, 222.

To a lesser extent, Trinity River Division supplies irrigation water to Shasta and Tehama Counties. Wintu Pumping plant diverts water from the Sacramento River east into the Cow Creek Unit's main aqueduct into Shasta County. Whiskeytown Lake supplies water to Clear Creek Unit through the Clear Creek South Main Aqueduct south into Tehama County. Lands in the two units grow a variety of crops with a significant value (see Table. II).[37]

Conclusion

Trinity River Division primarily transfers water from the Klamath River Basin to supplement the Sacramento River water destined for the arid lands of the San Joaquin Valley. The Division is an engineering feat, transferring water through the Trinity Mountains, but the wonder exacts an ecological price. At times, the Division diverted 90 percent of the Trinity River's flow to the Sacramento Basin, contributing to a decline of Chinook and Coho salmon populations. For a short time, Trinity Dam stood as the highest earth embankment dam in California, but like the rest of the Central Valley Project; such accomplishments soon became overshadowed by other concerns.

About the Author

Eric A. Stene was born in Denver, Colorado, July 17, 1965. He received his Bachelor of Science in History from Weber State College in Ogden, Utah, in 1988. Stene received his Master of Arts in History from Utah State University in Logan, in 1994, with an emphasis in Western U.S. History. Stene's thesis is entitled “The African American Community of Ogden, Utah: 1910-1950.”

37. Bureau of Reclamation, "Central Valley Project, Shasta and Trinity River Divisions," Map No. 214-208-4469, Bureau of Reclamation, Mid-Pacific Region, April 1991.

Table 1. Trinity River Division Powerplants and Capacities.
Source: Water and Power Resources Service, *Project Data* (Denver: Government Printing Office, 1981), 224.

Trinity River Division Powerplants		
Powerplant	Number of Generating Units	Total Capacity in Kilowatts
Trinity (Including Lewiston)	3	75,000
Judge Francis Carr	2	141,444
Spring Creek	2	150,000
Totals	7	366,444

Table 2. 1990 Crops and Total Value on the Trinity River Division.
Source: Bureau of Reclamation, *Crop Production Report, 1990*, Bureau of Reclamation, 1990, 630-2.

Trinity River Division: Full and Supplemental Service		
Crops	Acres	Total Crop Values $
Oats	76	$ 9,310
Alfalfa Hay	136	$ 96,480
Other Hay	718	$ 266,300
Irrigated Pasture	3,324	$ 627,700
Corn, Sweet (Processing)	13	$ 1,404
Corn, Sweet (Fr. Market)	9	$ 28,800
Melons, Cantaloupe, Etc.	8	$ 11,200
Honeydew, Honey Ball, Etc.	7	$ 9,800
Watermelon	6	$ 8,400
Squash	6	$ 14,400
Tomatoes (Fr. Market)	8	$ 35,200
Nursery	20	$ 99,115
Apples	17	$ 6,336
Apricots	6	$ 1,800
Grapes, Table	13	$ 29,570
Olives	810	$ 550,800
Peaches	3	$ 1,650
Pears	1	$ 432
Prunes and Plums	150	$ 45,000
Other Fruits	56	$ 76,764
Almonds	6	$ 8,450
Pecans	20	$ 45,580
Walnuts	5	$ 27,000
Other Nuts	67	$ 205,700
Family Gardens and Orchards	311	$ 155,500
Totals	5,796	$ 2,362,691

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