The Central Valley Project

The American River Division
The Folsom and Sly Park Units
The Auburn-Folsom South Unit

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The American River Division

The American River Division of the Central Valley Project provides water for irrigation, municipal and industrial use, hydroelectric power, and recreation. In addition, units of the American River Division provide a high degree of flood control along the American River, protecting several communities including the California capital city of Sacramento. The American River Division consists of the Folsom, Sly Park, and Auburn-Folsom South Units.

The Folsom and Sly Park Units

The Folsom and Sly Park Units, though separate units of the American River Division, are often referred to together due to the fact that both units were authorized as part of the Central Valley Project by the same legislation. The Folsom Unit consists of Folsom Dam and Lake, Folsom Powerplant, Nimbus Dam and Lake Natoma, Nimbus Powerplant, and Nimbus Fish Hatchery. The Sly Park Unit is made up of Sly Park Dam and Jenkinson Lake, Camp Creek Diversion Dam and Tunnel, and Camino Conduit and Tunnel.[1]

Folsom Dam and Powerplant regulates the flow of the American River and provides water and power for municipal and industrial uses. Nimbus Dam and Lake Natoma act as an afterbay feature, regulating the outflows from the Folsom Powerplant. In addition, the Nimbus Powerplant provides supplemental electrical power to the area. The Nimbus Fish Hatchery compensates for the loss of salmon and trout spawning areas that were destroyed by construction of the dam.[2]

The Sly Park Unit consists of Sly Park Dam and Jenkinson Lake, which provide municipal and industrial water for the nearby community of Placerville, and irrigation water for the El Dorado Irrigation District. Camp Creek Diversion Dam diverts a portion of the flow of Camp Creek to Jenkinson Lake via Camp Creek Tunnel, and Camino Tunnel and Conduit delivers water from Jenkinson Lake to the El Dorado Irrigation District for irrigation and municipal use. All features of the Folsom and Sly Park Units are complete and in operation.[3]

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1. U.S. Department of Interior, Bureau of Reclamation, "Central Valley Project: American River Division," Map No. 353-208-138,(December 1991).
2. *Ibid.*
3. *Ibid.*; United States Department of Interior, Water and Power Resources Service, *Project Data*, (Denver: U.S. Government Printing Office, 1981), 187-8.

The Auburn-Folsom South Unit

The Auburn-Folsom South Unit is designed to supply new and supplemental water for irrigation, municipal and industrial uses, and for ground water restoration in the Folsom South region. In addition, the unit is to provide hydro electric power, flood control, fish protection and enhancement, and recreation. The unit consists of Sugar Pine Dam and Reservoir, Auburn Dam, Reservoir, and Powerplant, Folsom South Canal, and County Line Dam and Reservoir. Of the these features, only Sugar Pine Dam and Reservoir are complete, providing water for irrigation, and municipal and industrial uses in the Foresthill Divide area. Folsom South Canal, about one-third complete, provides water for municipal and industrial use in Sacramento and San Joaquin Counties. The remaining unconstructed portion of about 42 miles is delayed pending reauthorization. Construction of Auburn Dam, Reservoir and Powerplant was well under way when construction was halted due to concerns about the ability of the dam to withstand a major earthquake. Continued construction of the project is currently under study. Construction of the County Line Dam and Reservoir, although approved, has been indefinitely delayed.[4]

Project Location

California's Central Valley is one of the world's largest valleys. It is over 430 miles long and averages over 50 miles wide, and, at 15,000,000 acres, it is almost the size of England. The valley drains two major rivers, the Sacramento from the north, and the San Joaquin from the south. The waters of the two great rivers meet in the Delta region, south-west of Sacramento, before flowing to the Pacific Ocean through San Francisco Bay.[5]

The American River Division is located about mid-way between the northern and southern extremes of the Central Valley in Sacramento, San Joaquin, Placer, and El Dorado Counties. Division lands stretch from Sugar Pine Dam in the north, to Stockton in the south. The city of Sacramento lies at the center of the Division. The primary features of the Division are located along the American River, north-east of Sacramento, and on Sly Park Creek, about

4. "Central Valley Project: American River Division," Map No. 353-208-138; *Project Data*, 175-178; Brickson, Betty, *Layperson's Guide to the Central Valley Project*, (Sacramento: Water Education Foundation, 1994), 11; United States Department of Interior, Bureau of Reclamation, Public Affairs Office, Sacramento Office, Mid-Pacific Region.

5. Johnson, Stephen, Robert Dawson, and Gerald Haslam, *The Great Central Valley, California's Heartland*, (Berkeley: University of California Press, 1992), 5.

60 miles east of Sacramento. The majority of lands served by the Division lie in the southern portion of the Division, between Sacramento and Stockton. When completed, the Folsom South Canal will provide water to these lands.[6]

Historic Setting

Prior to European settlement, many of California's indigenous peoples were the primary inhabitants of the Central Valley. Four native groups were predominant: the Maidu and Wintun in the north, the Yakuts in the south, and the Miwok in the east-central region. The first Spaniards believed to have seen the valley were an expedition led by Captain Pedro Fages in 1772. Four years after Fages is believed to have ventured into the valley, Padre Francisco Garcès entered the valley from the south while seeking a new route from Mexico to the mission at Monterey. Others visited the valley: Francisco Eliza in 1793, Gabriel Moraga in 1808, and Captain Luis Arguello in 1817, 1820, and 1821. Even though visited frequently by the Spanish, much of the valley remained unexplored. The large population of Indians who were willing to defend themselves from the Spanish intrusion limited Spanish settlement to the coast. Even so, the valley became a source of slaves for the coastal missions.[7]

Although Spain, and later Mexico, claimed sovereignty in the valley, they were unable to effectively control the area. During the early 1800's, trappers were common throughout the region. One of the most famous was Jedediah Strong Smith, who amazed Spanish officials in 1826 by showing up at San Bernadino after crossing the supposedly impenetrable desert from the east. Trappers traveled the valley in relative freedom for several decades before a decline in the beaver population and changes in fashion made the trapper an endangered species.[8]

By the late 1830's, more and more Americans were making their way to California. In an effort to halt the American tide, the Mexican government began to award it's citizens large grants in the valley, but by the 1870's, most of the grants were controlled by Americans. One of those who came to California was Swiss born entrepreneur John Sutter. In 1840, Sutter settled a tract of land near the junction of the Sacramento and American Rivers, the future site of the California

6. "Central Valley Project: American River Division," Map No. 353-208-138.
7. *The Great Central Valley: California's Heartland*, 27, 29-30.
8. *Ibid.*, 34-5.

capital, Sacramento. After only a year in California, Sutter had gained the favor of the governing Mexican officials and was awarded a large land grant and Mexican citizenship. Soon Sutter's Fort became a destination for American overland immigration.[9]

Sutter's Fort also became the center of one of the most important events in California's history. In early 1848, Sutter began construction of a saw mill near Coloma, on the American River north-east of Sacramento. During construction, workers discovered gold. Efforts by Sutter to keep the discovery a secret failed, and soon thousands of fortune seekers were headed towards the Sacramento area. The flood of people that descended upon California in the gold rush was staggering. In 1846, the population of Sacramento was about 150 people, by 1852, that number had risen to 12,000. In all, over 80,000 people arrived in California during the first years of the gold rush.[10]

The gold rush signaled the beginning of California's water problems. The delta region had always been subject to flooding, but mining activities worsened the problem significantly. Hydraulic miners washing gold from the earth swept debris into the streams and rivers, forcing the water to overflow into the surrounding areas. To combat the problem, levies were built to keep the streams and rivers in their beds. Silt and debris would accumulate in the river channels forcing rivers to rise, and the levies would then be raised to counter the rising water. Finally the river beds between the levies were higher than the surrounding lands. In 1861, the residents of Sacramento and the Delta region recognized the error of their ways.[11]

The winter of 1861-62 was very wet. Over 30 inches of rain fell in less than three months and the American and Sacramento Rivers quickly rose to flood levels. On December 9, 1861, one of the levies protecting Sacramento failed and a torrent of water flowed through. Ironically, the same levies that had been built to keep the water out now kept the water in, and had to be breached to allow the water to flow out of the inundated area. The rains continued through the winter, and in early March 1862, the events of December 9 were played over again.

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9. *Ibid.*, 36; Lavender, David, *California: A Bicentennial History*, States and the Nation Series, (Nashville: American Association for State and Local History, 1976), 39.
10. *California: A Bicentennial History*, 48-51,59; U.S. Department of Interior, Bureau of Reclamation, "Water Development: Central Valley/Sacramento-San Joaquin Delta," Prepared for the State Water Resources Control Board's Bay/Delta Hearings-1987, (April 1987), 8-10.
11. *The Great Central Valley: California's Heartland*, 88.

The situation became so bad that the state government abandoned Sacramento and moved to San Francisco.[12]

Other problems occurred because the thousands of miners in the Sacramento area had to eat, and agriculture grew to meet the demand. Many miners who had failed in the diggings took up farming, and the area under cultivation slowly grew. The debris from mining severely effected agriculture in the region. When the rivers and streams overflowed, the silt and debris would cover fertile agricultural lands rendering them useless. By 1880, over 43,000 acres of fertile agricultural lands had been lost to the effects of hydraulic mining. The devastating effects of hydraulic mining eventually reached the San Francisco Bay where oyster beds were destroyed by the noxious muck. Antagonism between miners and farmers grew, and suits were filled that, at first, attempted to collect damages from the mining companies, and then later sought to ban hydraulic mining altogether. In 1884, the Sawyer Decision (Woodruff v. North Bloomfield et al), issued by the Federal Circuit Court, prohibited the discharge of mining debris into the streams and rivers, effectively ending the era of hydraulic mining.[13]

The growth of agriculture created its own problems. For untold centuries, the flows from the inland rivers had prevented the intrusion of saltwater from the Pacific Ocean. As agriculture grew, more and more water was diverted from the rivers, thereby reducing flows to such an extent that saltwater was able to flow inland through the Delta. The intrusion of saltwater into the Delta region threatened agriculture in the area through contamination of irrigation waters. The situation reached its peak in the early 1920's when the salinity of the water at the junction of the Sacramento and San Joaquin Rivers reached over 7,000 parts per million (ppm), well over the accepted limit for agriculture of 1,000 ppm. Investigations into how to control the problem were begun, and in 1923, the State Department of Public Works endorsed the development of a barrier to prevent salt water intrusion.[14]

Very early in the settlement of the Central Valley it was realized that most of the water resources of the region were located in the northern one-third of the valley, while the best

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12. *Ibid.*, 88-9.
13. "Water Development: Central Valley/Sacramento-San Joaquin Delta," 14-7; *California: A Bicentennial History*, 63.
14. "Water Development: Central Valley/Sacramento-San Joaquin Delta," 11-12.

agricultural lands were in the southern two-thirds. Investigations into how to correct this imbalance date back to 1873, when Lt. Col. B. Alexander of the U.S. Army Corps of Engineers, outlined a system of canals to transport water from the north for use in the south. In 1920, Col. Robert Bradford Marshall, chief Geographer for the U.S. Geological Survey, developed an extensive storage and conveyance plan to move water from the north to meet the growing needs of the southern valley. Intrigued by Marshall's plan, the California Legislature authorized several studies that culminated in the passage of the California Central Valley Project Act in 1933. The Act called for the sale of bonds to finance construction of several storage facilities and canals to transfer water to the southern valley. But during the Great Depression, the bonds didn't sell, and the state turned to the Federal government for assistance. With the passage of the Rivers and Harbors Act of 1935, the U.S. Army Corps of Engineers assumed control of the project and was authorized to begin construction of the initial features of the plan. When the act was reauthorized in 1937, the Bureau of Reclamation took over construction and operation, and the project became subject to reclamation law.[15]

Project Authorization

The first investigations into water development on the American River were included in the Alexander Report conducted by the Army Corps of Engineers in the 1870's and presented to Congress by President Grant in 1874. In the 1930's the State Water Plan called for the construction 355,000 acre/foot (ac/ft) reservoir near the town of Folsom. The Flood Control Act of 1944 authorized construction of Folsom Dam as proposed by the State of California Water Plan. The final authorization came in the American River Division Authorization Act of October 14, 1949. This act created the Folsom and Sly Park Units and enlarged the Folsom Reservoir to 1,000,000 ac/ft.[16]

On September 2, 1965, the Auburn-Folsom South Unit was created as part of the

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15. *Layperson's Guide to the Central Valley Project*, 6; "Water Development: Central Valley/Sacramento-San Joaquin Delta," 3-5, 21.
16. United States Department of Interior, Bureau of Reclamation, Pamphlet: *American River Division, Central Valley Project-California*, 1959.

American River Division by the Auburn-Folsom South Authorization Act.[17]

Folsom and Sly Park Units

The Folsom and Sly Park Units were authorized in 1949 as part of the American River Division. Folsom Dam was originally authorized in the Flood Control Act of 1944 as a 355,000 ac/ft flood control unit. The reauthorization under the American River Division Authorization Act of 1949 changed the dam to a 1,000,000 ac/ft multipurpose facility with a 162,000 kilowatt (k/w) powerplant. The act also authorized construction of Nimbus Dam and Lake Natoma as a regulating reservoir for the Folsom Powerplant. Included in the authorization for construction of Nimbus Dam was a 13,500 k/w powerplant, and a fish hatchery with a capacity of 30,000,000 eggs. The Sly Park Unit was authorized under the same act as the Folsom Unit to provide irrigation and municipal water to the El Dorado Irrigation District and the communities of Placerville and Camino.[18]

Auburn-Folsom South Unit

Authorized in 1965, the Auburn-Folsom South Unit originally consisted of Auburn Dam, Reservoir, and Powerplant, County Line Dam and Reservoir, Sugar Pine Dam and Reservoir, and the Folsom South Canal. Auburn Dam was to provide flood control on the American River. Partially completed, the construction of the dam has been delayed due to environmental and safety concerns. County Line Dam and Reservoir was to provide water for irrigation, municipal, and industrial use in the Folsom-Malby area. Although authorized for construction, the project has been delayed indefinitely. Sugar Pine Dam and Reservoir provides water for irrigation, municipal, and industrial uses to the Foresthill Divide area. The Folsom South Canal, only partially complete, supplies water for irrigation, municipal, and industrial use in Sacramento and San Joaquin Counties. The headworks for the canal are located at Nimbus Dam.[19]

Construction History

Folsom and Sly Park Units

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17. United States Department of Interior, Bureau of Reclamation, *Central Valley Project, Its Historical Background and Economic Impacts*, by L. B. Christiansen, (Bureau of Reclamation, July 1981), 7.
18. "Central Valley Project: American River Division," Map No. 353-208-138; Pamphlet: *American River Division, Central Valley Project-California*.
19. "Central Valley Project: American River Division," Map No. 353-208-138.

Originally authorized in 1944 for construction by the Army Corps of Engineers as a 355,000 ac/ft flood control unit, Folsom Dam was reauthorized in 1949 as a 1,000,000 ac/ft multi-purpose facility. The dam consists of a concrete main section flanked by two earthfill wing dams, a large, earthfill saddle dam, and eight smaller earthfill dikes. The work to be completed under the $29,500,000 primary contract consisted of construction of the concrete section and wing dams, and three dikes. Initial work at the Folsom site began in November 1948. In October 1951, the primary contractor, a joint venture between Savin Construction Corp. of East Hartford, Connecticut, and Merritt-Chapman & Scott, Inc., of New York, began work on the main section of the dam. First concrete in the main section was poured on October 29, 1952. During work on the foundation for the main section, a fault was discovered that required extensive excavation and grouting. The fault ran under a portion of the main section that had already been poured. To correct the problem, the contractor dug a tunnel that followed the line of the fault until they reach the end. The tunnel was extended 150 feet in each direction along the line of the fault and filled with concrete. The additional excavations in the foundation area required the removal of 70,000 cubic yards (cu/yd) of material, and the placement of an additional 50,000 cu/yd of concrete.[20]

The construction of Folsom Dam and Lake affected 142 parcels of land, and 51 structures had to be moved or torn down. Many who were forced to give up their lands were fifth generation occupants. In at least one case, the sadness over having to give up the family homestead led to tragedy. Rancher Peter Dickinson had owned 400 acres at Folsom since 1918. He was deeply saddened about having to give up his land. Upset by her father's sadness, Dickinson's daughter, Etta, shot Dickinson, set fire to their house, and hanged herself.[21]

While work was underway on Folsom Dam, work on the Folsom Powerplant on the right abutment of the main section, and Nimbus Dam and Powerplant seven miles downstream, was

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20. "Dam Building in Gold Country," *Engineering News-Record*, (July 23, 1953), 39; Pamphlet: *American River Division, Central Valley Project-California*; U.S. Department of Interior, Bureau of Reclamation, *Technical Record of Design and Construction: Nimbus Dam, Powerplant, and Fish Hatchery*, (Denver: U.S. Government Printing Office, 1960), 1.

21. Blenkle, Joe, *The Story of Folsom Dam, Folsom California: Official Souvenir Program Folsom Dam Dedication*. (No Date) A holding of the Archives of the Water Resources Center, University of California, Berkeley, 25.

starting. Work on Folsom Dam was supervised by the Corp of Engineers, and work on the Folsom Powerplant and Nimbus Dam and Powerplant was supervised by the Bureau of Reclamation. The contract for earthwork at the Folsom Powerplant was awarded to the Guy F. Atkinson Company of South San Francisco on June 5, 1951. The bid was $1,463,721 for excavation and earth work for the powerhouse, warehouse, fabrication areas, tailrace channel and access road. Work on the Folsom Powerplant began in early June 1951 with construction of the tailrace channel access road. Excavation for the tailrace channel began on June 27, 1951, with excavations for the powerhouse beginning on July 7.[22]

The primary contract for construction of Nimbus Dam and Powerplant was awarded June 18,1952, to a joint venture between the Winston Brothers Construction Company, and the Al Johnson Construction Company, of Monrovia, California. The winning bid was $6,067,353.50 for construction of the Main dam, powerplant, and appurtenant structures. Excavations for the inlet channel for the future Folsom South Canal were started on July 28, 1952. Excavations for the inlet channel were done first in order to provide access for the contractor's construction bridge. Excavations on the right abutment and foundation began on August 4. Concrete placement in the overflow weirs began on October 21, 1952, with concrete placement in the powerhouse beginning on December 6. Concrete was placed using a crane lifting 2-cubic-yard buckets of concrete that had been hauled to the site by flatbed trucks. The 18 overflow sections of the dam were each poured in single lifts of 29 feet.[23]

The contract for construction of the Folsom Powerplant and appurtenant works was awarded to the Guy F. Atkinson Company on April 10, 1952. The winning bid was $5,772,959.50. Notice to proceed was given on April 13, and accepted by the contractor on April 28. Work under the powerplant contract began on May 28, 1952, with excavations on the first of three power penstock tunnels. Each of the tunnels was driven 30 to 40 feet from the upstream side, and the work was then advanced from the downstream end to meet with the upstream headings. Work from the downstream headings began on May 25, 1953, with the last

22. U.S. Department of Interior, Bureau of Reclamation, *Technical Record of Design and Construction: Folsom Powerplant and Switchyard*, (Denver: U.S. Government Printing Office, 1960), 117, 123, 125.
23. "Nimbus Dam Nears Completion." *Western Construction*, (March, 1954), 47; *Technical Record of Design and Construction: Nimbus Dam, Powerplant, and Fish Hatchery*, 113, 124, 138.

of the three tunnels being holed through on September 14, 1953. The tunnels were cleaned and readied for placement of the penstock pipes by October 9.[24]

Concrete work at Folsom Powerplant began on October 24, 1952, with placement of concrete in the gravity training wall between the powerplant site and spillway stilling basin. It was determined by the Reclamation and representatives of the Guy F. Atkinson Co. that construction of the training wall would be completed first in order to provide protection from flooding to the powerhouse site. First placement of concrete in the powerhouse was on April 3, 1953.[25]

Meanwhile, work continued at Nimbus Dam and Powerplant down stream from Folsom. On August 31, 1953, work in preparation for the installation of the eighteen, 40-foot by 24-foot radial gates was begun. Preparation work consisted of installation of the embedded parts of the gate works. These parts, including the bearing pedestals, seal plates, and anchors, were supplied by the Valley Iron Works, of Yakima, Washington. The radial gate hoists, each with a lifting capacity of 75,000 pounds, were supplied by the Willamette Iron and Steel Company of Portland, Oregon, and the gates themselves were provided by the Berkeley Steel Company, of Berkeley, California. The first gate was placed into position on September 28, 1953, and the final gate was placed on November 2, 1954.[26]

Installation of the three, 15-foot, 6-inch diameter penstock tubes that supply water to the turbines at the Folsom Powerplant began October 5, 1953. The tubes were manufactured by the Southwest Welding Company of Alhambra, California, at a cost of $424,717.96. The tubes were fabricated at Southwest Welding's plant in Richmond, California, and shipped by barge to Sacramento. Fabrication and installation of the tubes was handled in two schedules. Schedule A included sections embedded within Folsom Dam, and schedule B the portions downstream from the dam. Installation of schedule A was done by Merritt-Chapman & Scott, and Savin Construction under contract for Folsom Dam. Installation of schedule B was carried out by the Guy F. Atkinson Company under contract for construction of Folsom Powerplant. Installation of

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24. *Technical Record of Design and Construction: Nimbus Dam, Powerplant, and Fish Hatchery*, 117-8, 131.
25. *Ibid.*, 132.
26. *Ibid.*, 139-40, 144.

the penstock tubes was completed on December 31, 1954.[27]

Installation of the turbines and generators at Folsom Powerplant began with installation of the embedded parts. This included the installation of the turbine pit liners, spiral cases, and draft tube liners. Installation of the turbines was carried out by Stolte, Inc., of Oakland, California, who began work on September 29, 1954. The generators were supplied and installed by Westinghouse Electric Corp. at a cost of $3,069,379. Installation of the first unit began on December 13, 1954, and continued until the unit was started on May 12, 1955. The first unit was placed into service on May 20, 1955, the second unit on October 7, 1955, and the third unit on December 6, 1955. Except for a few minor deficiencies that were corrected by the supplier, the units operated without problems.[28]

Installation of the turbines and generators at Nimbus Powerplant began with installation of the embedded parts. This work began on February 23, 1954, and was carried out by Winston-Johnson under terms of the primary contract. Installation of the first generator unit began on December 15, 1954. The Elliot Company of Ridgeway, Pennsylvania, supplied and installed the generators for a cost of $499,289. Operational tests began April 25, 1955, and continued until early June. Turbine acceptance tests were successfully conducted in September, and the units were then placed online.[29]

Throughout construction at the Folsom and Nimbus sites, high water and flooding was a frequent problem. On January 9, 1953, the coffer dam protecting work at Folsom washed out sending a flood of water downstream. This flood caused the coffer dam protecting work at the Nimbus site to fail, flooding the area. In late April, high water again caused the coffer dam at Nimbus to fail, flooding the construction site. On May 20, the coffer dam at the Folsom site again failed, sending a flood of water downstream, flooding the Nimbus site. As a result of damages and time lost caused by the failures of the coffer dam at the Folsom site, the prime contractor at Nimbus, Winston-Johnson, filed suit against the prime contractors at the Folsom

27. *Technical Record of Design and Construction: Folsom Powerplant and Switchyard*, 159-160, 165, 191.
28. *Ibid.*, 171, 173, 180, 191.
29. *Technical Record of Design and Construction: Nimbus Dam, Powerplant, and Fish Hatchery*, 149, 162, 165, 182.

Dam site, Merritt-Chapman & Scott, Inc., and Savin Construction.[30]

By early 1955, work on Folsom Dam had reached a point were storage of water was possible, and in February 1955, the first storage of water at Folsom was recorded. The final concrete pour in the main dam section was on May 17, 1955, and all work under the contract for construction of the main dam was completed on May 9, 1956. Even before its completion, Folsom Dam demonstrated its effectiveness as a flood control unit. In December 1955 and January 1956, heavy rains caused the American River to rise, filling Folsom to its 1,000,000 ac/ft capacity. The ability of the dam to contain the flows of the river prevented an estimated $20,000,000 in damage downstream. On May 5, 1956, Folsom Dam and Lake were officially dedicated, and on May 14, the dam was transferred by the Corps of Engineers to the Bureau of Reclamation for operation and maintenance.[31]

Folsom Dam is a concrete gravity dam 340 feet high and 1,400 feet long. The main section is flanked by two earthfill wing dams. The right wing dam is 6,700 feet long and 145 high, and the left wing dam is 2,100 feet long and 145 feet high. In addition to the main section and wing dams, there is one auxiliary dam and eight smaller earthfill dikes, The Mormon Island Auxiliary Dam is a rolled earthfill dam 4,820 feet long and 110 feet high. The earthfill dikes range in height from 10 feet to 100 feet, and in length from 740 feet to 2,060 feet. The combined length of the main dam, wing dams, auxiliary dam, and dikes is 26,730 feet: over five miles. The total volume of materials in the dam, wing dams, auxiliary dam, and dikes is 13,970,000 cu/yd, including 1,050,000 cu/yd of concrete in the main section. The spillway, which is located in the concrete main section, is divided into eight sections each controlled by a 42- by 50-foot radial gate. The capacity of the spillway is 567,000 s/f. Folsom Lake has a capacity of 1,010,00 ac/ft with a surface area of 11,450 acres.[32]

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30. "Nimbus Dam Nears Completion," 48.

31. Denver, Colorado, National Archives and Records Administration: Rocky Mountain Region, Records of the Bureau of Reclamation, Record Group No. 115, "Project Histories: Central Valley Project," 1981, chronology,(hereafter referred to as "Project History" followed by year, volume, and page, if applicable); Hagwood, Joseph J., *Commitment to Excellence: A History of the Sacramento District, U.S. Army Corps of Engineers 1929-1973*, (Sacramento: U.S. Army Engineer District, 1976), 160; Department of Natural Resources [California], Division of Beaches and Parks, "Fact Sheet on Folsom Dam Project," (September 24, 1956), Holding of the California State Library, Sacramento, 2.

32. Pamphlet: *American River Division, Central Valley Project-California*; U.S. Department of Interior, Bureau of Reclamation, "SEED Report on Folsom Dam, Central Valley Project, California, Mid Pacific Region," (Denver,

(continued...)

Folsom Powerplant has three generating units each rated at just over 76,000 kilowatts (k/w), with a combined rating of 198,720 k/w. Water is supplied to the three, 74,000 horse power (h/p) turbines that drive the generators through three, 560 foot long, 15-foot, 6-inch diameter penstocks that run through the right abutment of the main dam.[33]

All work on Nimbus Dam and Powerplant was completed and accepted by the Government in July 1955. Nimbus Dam is a concrete gravity dam 1,093 feet long and 87 feet high. Flows are controlled by eighteen, 40-foot by 24-foot radial gates. The total volume of material used in the dam is 121,100 cu/yd. Lake Natoma has a capacity of 8,760 ac/ft with a surface area of 540 acres. Nimbus Powerplant, located on the right abutment of the dam, contains two, 7,763 k/w generators with a combined output of 13,500 k/w. Water is supplied to the two 9,400 h/p turbines that drive the generating units through six, 46.5 foot long, 13.75- foot by 15.95- foot penstocks.[34]

Construction of Folsom and Nimbus Dams blocked access to natural spawning grounds of salmon and steelhead trout. To compensate for the loss of these spawning areas, the Bureau of Reclamation constructed a fish hatchery about a quarter of a mile downstream from Nimbus Dam. Construction of the Nimbus Fish Hatchery involved three contracts. The prime contract was awarded to the George Pollock Company of Sacramento, which bid $272,354. The prime contract involved earth work at the site, construction of the fish ladder and rack, fish rack cableway, and electrical distribution line. The contract was awarded on July 31, 1954, and the contractor began work on August 14, five days before receiving notice to proceed. Work under the contract continued with only minor weather delays until completion on April 7, 1955.

The contract for the installation of the fish rack superstructure was awarded to Don de Roza, of Dutch Flat, California, for $22,752.75. Work under the contract began on August 3, and was completed August 23, 1955. The completion contract was awarded to Johnson, Drake, and Piper, Inc., on April 5, 1955. The winning bid was $457,852.10. Work under the contract

(...continued)
1984), Management Summary: 1-2; *The Story of Folsom Dam, Folsom California*, 4.

33. *Project Data*, 190; *Technical Record of Design and Construction: Folsom Powerplant and Switchyard*, frontispiece.

34. *Project Data*, 189-90; *Technical Record of Design and Construction: Nimbus Dam, Powerplant, and Fish Hatchery*, frontispiece, 116.

began on April 20, 1955, with excavations for holding pond No.1. Lining of the holding ponds began on May 5, with erection of the office, processing, and hatchery buildings beginning on July 28. All machinery, processing equipment and refrigeration systems were installed and tested by October 7. All work was finished and accepted by the government on October 17, 1955.

The Nimbus Fish Hatchery has a capacity of 30,000,000 eggs. Water for the hatchery is supplied through a 1,415 foot long, 42-inch diameter concrete pipe that runs from the left abutment of Nimbus Dam.[35]

While work at Folsom and Nimbus captured the attention of the public, construction on the Sly Park Unit was progressing at a steady pace. Work on the Sly Park Unit began in November 1952, with construction of the Camp Creek Diversion Tunnel to carry water from Camp Creek to Sly Park. The G. L. Tarlton Contracting Company of St. Louis, Missouri, constructed the tunnel. It received the contract on October 30, 1952, with a bid of $412,655. Work on the tunnel began on November 20, 1952, with preparations for "holing in." Excavations on the tunnel itself were underway by the end of 1952, and the tunnel was "holed through" on April 19, 1953. Work on the tunnel was completed by the end of October.[36]

The contract for the construction of the Camp Creek Diversion Dam was awarded to Stolte, Inc., of Oakland, California, on January 8, 1953. Work on the dam began February 25, 1953, and progressed until its completion on November 29, 1953.[37]

Work at the Sly Park site began with clearing operations in early May 1953. Reclamation awarded the contract for construction of Sly Park Dam and the first 8,175 feet of the Camino Conduit to a joint venture between the Frederickson & Watson Construction Company, and the M & K Corporation, of Oakland, California. The award on April 17, 1953, cost $2,716,785. Excavations for the foundation began on June 25, 1953, with work on the right abutment. Excavations for the outlet works began on July 3, with work in the spillway area beginning on July 16. Concrete operations began on August 25, with concrete placement in the

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35. *Technical Record of Design and Construction: Nimbus Dam, Powerplant, and Fish Hatchery*, 118-9, 173-9.
36. "Project History", 1952: D-18; 1953: 1-2; *Reclamation Era*, (December 1952), 300.
37. "Project History" 1953, 29; *Reclamation Era*, (March 1953), 72.

outlet works beginning in early September. Embankment placing operations started on October 28, and continued until work was halted due to weather on December 4. Excavations for the Camino Conduit Tunnel began on December 11, 1953. Embankment placement was completed in November 1954. In early 1955, some cracking and movement was noted in the crest, but the situation corrected itself, and the embankment stabilized without repairs. Reclamation completed the project and transferred it to the El Dorado irrigation District for operation and maintenance in mid-1955.[38]

Sly Park Dam is a zoned earthfill dam 190 feet high. It is made up of the main dam and an auxiliary earthfill dike that is 160 feet high. The combined length of the main dam and dike is 1,360 feet. The total volume of the main dam and dike is 1,130,000 cu/yd. The outlet works consist of concrete conduit through the base of the main dam controlled by two, 2.25-foot square high pressure gates. The capacity of the outlet works is 250 s/f. The spillway is an uncontrolled, concrete lined chute in the left abutment of the auxiliary dike with a capacity of 6,700 s/f. Jenkinson Lake, formed by Sly Park Dam, has a capacity of 41,000 ac/ft with a surface area of 650 acres.[39]

Camp Creek Diversion Dam is a concrete overflow weir, 20 feet high and 119 feet long. The total volume of concrete in the dam is 2,000 cu/yd, and the diversion capacity is 500 s/f. The Camp Creek Dam diverts water into the Camp Creek Tunnel, a 2,845 foot long, concrete lined tunnel, with a diameter of 7 feet, and a capacity of 500 s/f.

The Camino Conduit and Tunnel originate at the outlet works at Sly Park. The conduit is 38,016 feet long with a diameter that starts at four feet and is reduced to three feet. It is constructed of precast concrete and welded plate steel, and has a capacity of 125 s/f. The Camino Tunnel is 2,289 feet long with a diameter of seven feet. It is a steel reinforced, concrete lined structure with a capacity of 125 s/f.[40]

Auburn Folsom South Unit

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38. "Project History" 1953, 30; *Reclamation Era*, (June 1953), 128; United States Department of Interior, Bureau of Reclamation, "SEED Report on Sly Park Dam, Central Valley Project, California, Mid-Pacific Region," (April 1983), Examination Report: 7.
39. *Project Data*, 189-90.
40. *Ibid.*, 190.

The Auburn-Folsom South Unit was designed to provide new and supplemental water for irrigation, municipal and industrial use, and to replenish severely depleted ground water in the Folsom South region. Authorized in 1965, the primary feature of the unit was the Auburn Dam, Powerplant, and Reservoir, located on the American River near the town of Auburn, about 40 miles northeast of Sacramento.

Early studies into a dam at the Auburn site date back to the late 1950's when a proposal for a 515 foot high earthfill dam with a capacity of 1,000,000 ac/ft was put forth. A 1963 study recommended a 690 foot high earthfill dam with a capacity of 2,500,000 ac/ft. This was the planned design when the Auburn-Folsom South Unit was authorized in 1965. This changed when, in June 1967, it was officially announced that the dam would be a concrete, thin arch structure.[41]

Ground breaking ceremonies at Auburn were held October 19, 1968, two days after award of the first major construction contract. That contract, for relocation of the Auburn to Foresthill Road relocation which would be inundated by the reservoir, went to O. K. Mittry and Sons of Gardena, California, on October 17, at a cost of $1,326,648. Although ground breaking took place in late 1968, work at the dam site had begun several months before. In December 1967, the Emil Anderson Construction Company Ltd., of Sacramento, accepted a contract for several exploratory tunnels and shafts at the site, and began work under the contract shortly thereafter.[42]

Construction of the Auburn Dam required relocation of several roads in the area. The relocation of the Auburn-Foresthill road required construction of a bridge that would carry the roadway over a portion of the reservoir that would be created by the dam. The contract for construction of the bridge support structure was awarded to the Hensel Phelps Construction Company of Burlingame, California, on May 5, 1969, at a cost of $2,971,860. On July 31, 1970, the Willamette-Western Corp. of Richmond, California, was awarded the contract for

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41. Engineers International, "Interim Construction Report on Auburn Dam," Prepared for the U.S. Department of Interior, Bureau of Reclamation, (March 1987), 162; U.S. Department of Interior, Bureau of Reclamation, "Auburn-Folsom South Unit, Central Valley Project, California, A Supplemental Evaluation of the Auburn-Folsom South Unit," (March 1963), 17.

42. "Interim Construction Report on Auburn Dam," 162; *Reclamation Era*, (February 1968),25; (February 1969), 25.

construction of the superstructure and roadway. Their bid was $8,990,749. Work on the bridge was completed in mid-1973, and dedication ceremonies took place on September 1, 1973. The Auburn-Foresthill Bridge is the second highest bridge built by the Bureau of Reclamation, surpassed only by the bridge at Glen Canyon. Rising 720 feet above the valley floor, it is a 2,428 foot long, steel truss bridge with a 862 foot long center section, and two 639 foot long approach sections.[43]

The contract for the diversion tunnel at the Auburn Dam site was awarded to Walsh Western, a division of the Guy F. Atkinson Company of South San Francisco. The award was made on May 24, 1971 at a cost of $5,114,000. Preparations for holing in began on June 10, 1971, with excavations on the tunnel itself beginning in October. Tunneling can be a very dangerous profession. This was clearly evidenced on February 29, 1972, when tunnel worker Norman L. Konen was killed when he was struck by a rock that fell from the roof of the tunnel. The tunnel was holed through on March 3, 1972, and concrete placement began in April. On November 29, 1972, the diversion tunnel was accepted as complete.[44]

In May 1974, the contract for the excavation of the foundation was let, and work was begun. On August 1, 1975, an earthquake measuring 5.7 on the Richter Scale occurred near the Oroville Dam, about 50 miles northwest of the Auburn site. Although the large earthfill structure was not damaged, the event raised concerns about the safety of dams like the one proposed for the Auburn site: a thin arch concrete dam, 695 feet tall and 4,150 feet long with a maximum base width of only 196 feet. While engineers and geologists began to look into the safety concerns, work at Auburn continued.[45]

In April 1976, the Association of Engineering Geologists, Seismic Hazards Committee, issued a report stating that a moderate earthquake like the 1975 event near Oroville would caused the proposed dam at Auburn to fail. Concerns about dam safety were further heightened in June 1976, when the Teton Dam in Idaho failed. In July 1976, the Bureau of Reclamation

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43. "Project History" 1973: Vol.38, Part III, Sec.III, 2; *Reclamation Era*, (August 1969), 32; (November 1970), 32; U.S. Department of Interior, Bureau of Reclamation, *Annual Report: Central Valley Project, 1969*, (Sacramento: U.S. Government Printing Office), 11, 13.
44. "Project History" 1971: Vol.36: Sec.III: 1, 7; 1972: Vol.37: Part II: Sec.I: 2; Sec. III; 6, 9, 11; *Reclamation Era*, (August 1971), 23.
45. *Project Data*, 178; "Interim Construction Report on Auburn Dam," 165.

hired a five member panel of consultants to guide and review seismic studies of the Auburn site, and in January 1979, the Secretary of Interior announced that Auburn Dam would be redesigned because of the earthquake hazard. On April 29, 1979, the foundation excavation and treatment work, which had continued even while studies into the proposed dam were being conducted, was accepted as complete. The contract for the construction of the main dam was never awarded.[46]

The debate over Auburn Dam continues. Those who support the project feel that it is needed to provide flood protection for Sacramento. Throughout the 1980's, the debate centered around the construction of a small, flood control-only structure or a larger, multi-use facility. Although still listed as a future unit of the Central Valley Project, the future of Auburn Dam is uncertain. To date, over $200,000,000 has been spent on the project, and the costs of future construction continue to rise. The recent dry years in California has lessened the concerns about flooding along the American River, but it is certain that with the next period of high water and flooding in the Sacramento region, the debate over Auburn Dam will find renewed life.[47]

Construction of the Folsom South Canal began with award of the first contract. The contract for construction of the canal headworks and related structures, and several highway and railroad crossing structures went to the Syblon-Reid Company of Los Banos, California, on February 27, 1970. The winning bid was $2,337,934. The contract for construction of Reach No. 1 of the canal, about 14 miles, went to Gordon H. Ball, Inc. of Oroville, California, on July 31, 1970. Their bid was $15,295,038. The Western Contracting Company of Sioux City, Iowa, won the contract for construction of Reach No.2 with a bid $7,923,497. On February 11, 1971, Reclamation awarded the contract.

Work on the canal headworks, located at Nimbus Dam, and Reaches No. 1 and 2 progressed without significant delays until they were completed. Priming operations for Reach No. 1 began on June 27, 1973, with the release of water into the canal for the first time. Full capacity in Reach No. 1 was reached on July 20, 1973. By the end of 1973, work on the headworks and Reaches No. 1 and 2 was completed. Construction of the remaining three

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46. "Interim Construction Report on Auburn Dam," 166-7.
47. *Layperson's Guide to the Central Valley Project*, 11; United States Department of Interior, Bureau of Reclamation, Public Affairs Office, Sacramento Office, Mid-Pacific Region.

reaches, about 35 miles, is delayed pending reauthorization. The canal has a bottom width of 34 feet, and the maximum water depth is 17.8 feet. The maximum capacity of Reaches No. 1 and 2, approximately 26.7 miles, is 3,500 s/f.[48]

Construction of the Sugar Pine Dam began in early 1979, with work completed in 1981. The contract for construction of the dam was awarded to Auburn Constructors of Danville, California, a joint venture of Guy F. Atkinson, Gordon H. Ball, and the Arundel Corp., on January 4, 1979. Excavations for the foundation began in February, with work on the diversion tunnel starting in June. The tunnel was holed through on August 31, and by the end of 1979, the tunnel and spillway excavations were complete with concrete being placed in the outlet works and spillway chute.

The contract for construction of the eight mile-long Sugar Pine Pipeline that carries water from Sugar Pine Reservoir to the Foresthill Divide area, was awarded to the H. M. Byers Construction Company of Reno, Nevada in October 1979. The winning bid was $6,618,920. Work on clearing the pipeline route began in October with pipe laying operations beginning on December 12.

Sugar Pine Dam was completed in 1982, and the pipeline in 1983. During testing of the outlet works, problems were discover with one of the control valves. The problem was immediately corrected and no further problems have been encountered. The project was transferred to the Foresthill Public Utility District for operation and maintenance in 1984.[49]

Sugar Pine Dam is an earth and rockfill structure, 205 feet high and 689 feet long. The maximum base width from upstream toe to downstream toe is 984 feet, and the total volume of material in the dam is 987,500 cu/ft. Sugar Pine Reservoir has a capacity of 6,921 ac/ft with a surface area of 165 acres. Sugar Pine Pipeline is a steel and iron structure eight miles long. It has a diameter that begins at 27-inches and reduces to 24-inches. The capacity of the pipeline is

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48. "Project History," 1973: Vol.38: Part III: Sec.III, 3-4; *Project Data*, 175-8.
49. "Project History," 1979: Sec. I, 8-9; Sec. III, 100-101, 109, 113; U.S. Department of Interior, Bureau of Reclamation, *Statistical Compilation of Engineering Features on Bureau of Reclamation Projects*, (Denver: U.S. Government Printing Office, 1990), 201; Carlson, J. Wendel, "Sugar Pine Dam Construction Geology Report," Prepared for the United States Department of Interior, Bureau of Reclamation, Mid-Pacific Region, Sacramento, California, (November 1989), 6; Reed, Kurt, District Manager, Foresthill Public Utility District, Telephone interview by author, 14 October 1994.

13 s/f.[50]

Post Construction History

Since its completion, no other unit in California has been more effective as a flood control unit than the Folsom Unit. Following the floods of 1955, when it prevented $20,000,000 in damage, Folsom Dam, working in combination with Nimbus Dam downstream, continued to prove its worth. In 1963 and 1964, Folsom and Nimbus tamed six day flows of 630,000 ac/ft and 990,000 ac/ft respectively, preventing an estimated total of $90,000,000 in damage. But the toughest test came in the winter of 1986. During the six day period beginning February 14, 1986, Folsom and Nimbus held in check inflows of greater than 1,140,000 ac/ft, well above the design limit of 978,000 ac/ft for a six day flood. At the peak of the storm, inflows into Folsom Lake reached 170,000 s/f with the maximum discharge at Nimbus reaching 130,000 s/f. At 130,000 s/f, the levee system protecting Sacramento was pushed beyond its design limit of 115,000 s/f, but through careful planning and operation of Folsom and Nimbus Dams, major damage was avoided. Water storage behind Folsom Dam reached 1,028,000 ac/ft, 18,000 ac/ft greater than the design capacity. The total amount of damage prevented by Folsom and Nimbus Dams and the levee system protecting Sacramento during the 1986 flood exceeded $4,500,000,000. By 1994, the Folsom/Nimbus combination had prevented an estimated total of more than $4,830,000,000 in flood damage.[51]

Folsom Dam has been in operation since the mid 1950s without any significant operational problems or modifications. In 1988, a study was conducted to reanalyze the performance of the main dam, auxiliary dam, and earthfill dikes under the most current seismic event model. The tests showed that the main dam and earthfill dikes would perform satisfactorily should the design quake occur. It was revealed that the Mormon Island Auxiliary Dam had a potential to fail. Modifications to correct the deficiencies were completed in 1994.[52]

A safety evaluation of Nimbus Dam was completed in March 1992, showed the facility to

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50. *Project Data,* 178; *Statistical Compilation of Engineering Features on Bureau of Reclamation Projects,* 29, 201.

51. Department of the Army, US Army Corps of Engineers, *Water Resources Development in California 1993,* (US Army Corps of Engineers, South Pacific Division), 98; United States Department of Interior, Bureau of Reclamation, *Preventing a Crisis: The Operation of Folsom Dam During the 1986 Flood,* (May 1986), 1, 5-6, 16.

52. *Water Resources Development in California 1993,* 98.

be in excellent condition with no major problems or deficiencies. It was determined that the design of the dam would operate without failure under both the maximum probable seismic event and maximum probable flood.[53]

Since its completion in 1955, Sly Park Dam as been operated with only minor difficulties. In July 1958, cracking and settling in the crest, similar to that which appeared in 1955, was reported. In addition to the settlement, several areas of seepage were discovered downstream from the dam. Since these condition were first noted, there have been no significant changes in the condition of the dam. Monitoring of the dam has shown that the embankment has stabilized, and the amount of seepage has remained constant. A safety of dams inspection conducted in 1983 showed no significant structural or operational deficiencies and determined the dam to be capable of surviving the expected maximum flood and seismic events.[54]

Sugar Pine Dam and Reservoir were transferred to the Foresthill Public Utility District for operation and maintenance (O&M) in 1984. Since its completion and transfer to O&M, the unit has performed without any significant difficulties. During the drought years from 1987 to 1992, Sugar Pine Dam was one of the shining stars of the Central Valley Project. During each year of the drought but one, the reservoir filled and spilled, and was able to meet and exceed all obligations to its water users. Since its completion, recreational activities at Sugar Pine Dam have steadily grown in popularity. Recreational activities are administered by the U.S. Forest Service and include boating, fishing, hiking, and camping.[55]

Settlement of Project Lands

The effects of the construction of units of the American River Division on the settlement in the region is difficult to assess. The population of the area has risen significantly since the first units were begun, but it seems unlikely that development of the American River Division is responsible for the increase. Within the American River Division, there are no agricultural lands that are irrigated solely with project water. All water supplied for agricultural use in the

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53. U.S. Department of Interior, Bureau of Reclamation, "Safety of Existing Dams Analysis Summary, Nimbus Dam," (March 20, 1992), 6-7.
54. "SEED Report on Sly Park Dam, Central Valley Project, California, Mid-Pacific Region," Management Summary: 3-5.
55. Reed, Kurt, District Manager, Foresthill Public Utility District.

American River Division is used for supplemental irrigation, so increased settlement due to the increased supply of irrigation water has been minimal.

But development of the American River Division is partially responsible for increased growth in other ways. The flood control benefits provided by Folsom and Nimbus Dams have allowed for increased development downstream in areas that would otherwise be subject to frequent flooding. In addition to the growth allowed by greater flood control, Folsom, Nimbus, and other units of the American River Division have stimulated growth by providing secure and reliable sources of water for municipal and industrial uses. In 1970, units of the American River Division delivered a total of 36,576 ac/ft of water. Of that amount, 20,899 ac/ft was delivered for supplemental irrigation of just over 12,000 acres with the remainder of the water, about 24,000 ac/ft, going to municipal and industrial users. In 1980, following completion of portions of the Auburn-Folsom South Unit, a total of 58,247 ac/ft was delivered with 20,170 ac/ft delivered for supplemental irrigation of 9,038 acres, and 38,012 ac/ft delivered for municipal and industrial uses. By 1991, the number of acres irrigated had dropped further with 7,026 acres receiving a total of 3,723 ac/ft of supplemental irrigation water, while over 51,000 ac/ft was delivered for municipal and industrial activities. In 1991, water from units of the American River Division served 971,104 people. Of that total, 828,448 were non-agricultural users.[56]

While it is certain that the development of the American River Division is responsible for a portion of the increased settlement in the region, the increase was, and continues to be, non-agricultural in nature.

Uses of Project Water

The uses of water from the American River Division varies greatly, from flood control to recreation and fisheries enhancement. First and foremost on the list of water use priorities is flood control. The primary flood control feature of the American River Division is Folsom Dam and Reservoir. Many times since it was placed in service, the dam has demonstrated its ability to harness and control potentially devastating floods of the American River. As a recreational

56. U.S. Department of Interior, Bureau of Reclamation, *Summary Statistics: Water, Land and Related Data,* (Denver: U.S. Government Printing Office), 1970: 239; 1980, 282; 1991, 51.

facility, Folsom is second to none, having the highest number of visitor days per year of any recreation area operated by the California Department of Parks and Recreation. In addition to recreation and flood control, Folsom Dam provides 500,000 ac/ft of water for irrigation, and municipal and industrial uses. Downstream from Folsom, Nimbus Dam and Lake Natoma combine to regulate the often fluctuating releases from Folsom, maintaining a consistent flow down river and providing a reliable water supply for the Folsom South Canal and Nimbus Fish Hatchery. Lake Natoma is a popular recreation area with fishing, boating and camping facilities provided by the California Department of Parks and Recreation.[57]

Folsom Dam also plays an important role in fisheries enhancement and water quality improvement. Due to recent changes in operation of Shasta Dam to enhance the salmon run on the Sacramento River, water releases from Folsom have been used to fulfill water delivery obligations and downstream water quality standards that would normally be met by releases from Shasta.[58]

Sly Park Dam and Jenkinson Lake are operated independently from other units of the Central Valley Project. Water from Jenkinson Lake and Camp Creek is supplied to the cities of Placerville and Camino for municipal and industrial uses, and to the El Dorado Irrigation District for agricultural use. Recreational facilities at Jenkinson Lake include facilities for boating, swimming, and camping, and are operated by the El Dorado Irrigation District in cooperation with the Bureau of Reclamation. The primary agricultural products grown with water supplied by the Sly Park Unit are apples and pasture hay, with the rest of the water divided among other orchard crops and nursery plants.[59]

Sugar Pine Dam and Reservoir, in the Auburn-Folsom South Unit, provides water for municipal and industrial use in the Foresthill Divide area. Recreational opportunities at Sugar Pine Reservoir include fishing, swimming, and camping. The partially completed Folsom South Canal supplies water for irrigation and municipal and industrial use in Sacramento and San

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57. *Project Data*, 185-187; "Central Valley Project: American River Division," Map No. 353-208-138; *Water Resources Development in California 1993*, 98.

58. "Shasta Dam and the Winter Salmon Run," *Western Water*, (November/December 1990), 9.

59. *Project Data*, 187-188; *Summary Statistics: Water, Land and Related Data*, 34.

Joaquin Counties. Water from the canal is also used by the Rancho Seco Nuclear Powerplant. The right-of-way for the canal has been developed to provide trails for horseback riding, bicycling, and hiking. In the Auburn-Folsom South Unit, the primary agricultural uses are for irrigated pasture and forage crops. Grapes, orchard crops, rice, sugar beets, and tomatoes share the remaining irrigated acreage. When completed, the additional water from the Folsom South Canal is expected to be used to raise forage and various field crops.[60]

Auburn Dam was to provide water for flood control, irrigation, recreation, municipal and industrial uses, water quality improvement, power generation, and fisheries enhancement. Among the debates currently involving the Auburn Dam is the debate over construction of a small, flood control-only dam rather than a large, multipurpose dam. County Line Dam and Reservoir was to supply water for municipal, industrial, and other local uses to the Folsom-Malby area.[61]

In 1991, the total number of acres in the American River Division irrigated with project water was more than 7,000 acres, with a total crop value of more than $12,000,000. By far the greatest user of water supplied by units of the American River Division are municipal and industrial users. In 1991, over 51,000 ac/ft of water was supplied to non-agricultural users. Of that, over 39,000 ac/ft was supplied by the Folsom Unit. Power production by the Folsom and Nimbus Powerplants in 1991 was over 264,000,000 k/w. Power generated at the Folsom and Nimbus Powerplants is marketed by the Western Area Power Administration.[62]

Conclusion

There can be little question as to the success of the American River Division of the Central Valley Project. As a flood control unit, Folsom and Nimbus Dams provide unequalled flood control, protecting Sacramento from potentially devastating floods, while providing water and power to thousands of people in the Sacramento region. Sly Park and Sugar Pine Dams have consistently met or exceeded the needs of water users in the areas they serve. The recreational

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60. *Summary Statistics*, 1991: 34, 101.
61. *Layperson's Guide to the Central Valley Project*, 11; "Central Valley Project: American River Division," Map No. 353-208-138.
62. "Central Valley Project: American River Division," Map No. 353-208-138; *Summary Statistics*, 1991, 34, 57, 121.

opportunities offered by all units of the American River Division enhance the quality of life for those who live in the area. Even the partially completed Folsom South Canal contributes to the overall success of the Division. While questions still surround the future of the Auburn and County Line projects, the continued success of the American River Division is almost certain.

After authorization by the Congress, the Sly Park Unit was transferred to the El Dorado Irrigation District by quitclaim deed dated December 23,2003. The deed was recorded February 10, 2004.[63]

About the Author

William Joe Simonds was born and raised in Colorado and has a solid understanding of the importance of water in the American West and its effect on the development of that region. He attended Colorado State University where he received a BA in History in 1992 and a Masters in Public History in 1995. He lives with his wife and two children in Fort Collins, Colorado.

63. Kristi L. Sandberg, realty specialist, e-mails to Brit Storey on January 15 and 19, 2010.

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