Orland Project

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Orland Project

Reclamation and resurrection hold two separate interpretations, but for Northern California's Orland Project, both concepts speak of a region's transformation from barrenness toward fertility. The Bureau of Reclamation's first venture into California, Orland soon was overshadowed by more ambitious federal and state endeavors responding to the state's insatiable thirst for water. The Orland Project represents a link to a lost, pastoral California of almond groves and orange trees, before highways, smog and decades of excess redirected the use of the state's natural resources. A partnership of local farmers and the federal government led the resurrection of Orland's soil, and redirected an agricultural community from financial and ecological bankruptcy to one that could support a variety of crops with the help of irrigation.

Throughout its history, Reclamation has been criticized by any number of individuals and groups for its role in adapting the environments of the West. However, the Bureau's work on the Orland Project initiated real social and ecological changes that noticeably improved the land and the lives of the people living off it. Described by one Reclamation employee in 1916, as "the project of no regrets," Orland remains the rainbow's end California once promised.[1]

Project Location

The Orland Project is in north-central California's Sacramento Valley, 103 miles north of the city of Sacramento. One of the smallest projects ever tackled by Reclamation, Orland's 20,000 acres is one percent of the Sacramento Valley's total irrigable soil. The project incorporates parts of neighboring Glenn, Tehama, and Colusa Counties. The hub of the project, the town of Orland, is in northern Glenn County. The project is irrigated by Stony Creek, a tributary of the Sacramento River. Flowing northward, the creek gathers water drained from the surrounding slopes of the Coast Range Mountains. The collected water irrigates lands on both sides of the creek near the town of Orland. The Orland Project comprises two main dams to store water (East Park and Stony Gorge), two diversion dams, almost 17 miles of canals, and 139

1. C. J. Blanchard, "Orland Project, California," in *Reclamation Record*, (October 1916): 460. Blanchard was a Reclamation statistician who spent most of the 1910s in praise of the first generation of Reclamation projects. The phrase, "The Project of No Regrets," is often found in Orland's promotional literature in the 1910s and '20s.

miles of laterals.[2]

At the turn of the century, a railroad public relations man conjured a massive amount of hyperbole to encourage Easterners to come to the Sacramento Valley, a place in his words where "Italy is not more genial; France not more fruitful; Spain not more sunny; Egypt not watered by a more enriching river." For once, corporately-fueled braggadocio reflected reality, as the valley is home to a variety of climatic and natural features from the different corners of the globe. Orland's growing season lingers over 262 days from March to November. January is the coldest month with an average of 45 F, and July is the warmest at an average of 80 F. Average rainfall is 17.99 inches, most of which is measured between the first of November and the first of April. With hardly any snow, winter runoff occurs almost immediately after precipitation. The project has an average annual runoff of 410,000 acre feet.[3]

More than the seasons and its soil, Orland is best known for a climatic peculiarity. Protected by mountain ranges to the east, north and west, Orland, and the Sacramento Valley, is warmed by a thermal belt. The belt's moderate breezes mean white frosts are rare, and Orland has fewer frosts than other citrus growing zones in the state. Deadly frosts in 1913, 1922 and 1924 destroyed much of the citrus groves of southern California, but left untouched Orland's crops. Additionally, the thermal belt allows Orland's oranges to mature four to six weeks earlier than those in Southern California. The race from tree to table was important in the days of shipping by rail. Orland's citrus often commanded "the high prices of the holiday trade," when oranges were a special treat for Christmas.[4]

The project's soil is a variety of sandy, gravelly, silt and clay loams with no hardpan or

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2. U.S., Department of Interior, Bureau of Reclamation, *Annual Project History, Orland Project*, Vol. 1, 1905-12, 1913-7, 1; U.S., Department of Interior, Bureau of Reclamation, *Development of Irrigation on Stony Creek, Sacramento River Basin*, June 1, 1922, 1; "The Orland Project," in *The Irrigation Age*, (May 1908): 203. The memorandum, *Development of Irrigation on Stony Creek*, was written by Reclamation irrigation engineer A. N. Burch.

3. Andrew Jackson Wells, *The Sacramento Valley of California*, (San Francisco: Southern Pacific, 1906), 1; U.S., Department of Interior, Bureau of Reclamation, *Use of Water on Federal Irrigation Projects: Region 2 Orland Project 1927-1948*, (June 1951), 2; U.S., Department of Interior, Bureau of Reclamation, *Project Data*, (United States Government Printing Office: Denver, 1981), 725, 727.

4. U.S., Department of Interior, Bureau of Reclamation, *Orland Project, California*, General Correspondence, Record Group 115 (Hereafter RG 115), Box 1020, File 246, May 23, 1924; "The Orland Project," *Standard Oil Bulletin*, (April 1928): 15; U.S., Department of Interior, Bureau of Reclamation, *Annual Project History, Orland Project*, 1978-9, Vol. 52, ii.

alkali, and is considered some of the richest and most productive in the country, despite damage caused by dry-land farming during the late nineteenth century. The opportunity for Reclamation to revive the land to again match the splendid surrounding climate came after decades of reckless abuse by a coterie of dryland farmers.[5]

Historic Setting

The struggle of two classes locked in a land reform battle is usually associated with the French and Mexican Revolutions. But during the nineteenth century, a similar scenario festered in the Sacramento Valley. A change came about, not by bloodshed, but peacefully through irrigation.

Argonauts, as gold seekers were called in the 1850s, passed through the western half of the valley, but a select few newcomers soon made their fortunes with ox and plow rather than pick and pan. In the early days of American occupation, a few men made quick fortunes as wheat or cattle barons.

In the mid-nineteenth century, wheat symbolized California to the rest of the nation, in the same way oranges and grapes would a century later. First planted in the 1860s, large grain producing "factories" soon dominated the socio-economic life of the Sacramento Valley. Wheat was easy to grow and required little continuing investment. The most commanding of these early growers was Dr. Hugh J. Glenn. A Missouri dentist, Glenn joined the gold rush to California in 1849. In the early 1860s, Glenn began planting wheat, and by the end of the decade, he held 55,000 acres of land, of which 45,000 were in wheat. His acreage produced nearly a million bushels of wheat in a single season. Nicknamed the "The Wheat King," Glenn earned the title as the leading grain farmer in the entire United States from 1874 until his death nine years later.[6]

After Glenn's death, low prices and poor crops meant the subdivision of his ranch. When

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5. *Development of Irrigation on Stony Creek*, 1, 3.
6. Donald J. Pisani, *From the Family Farm to Agribusiness: The Irrigation Crusade in California and the West, 1850-1931*, (Berkeley, California: University of California Press, 1984), 6-7. The name of the town of Orland was drawn from a hat during a meeting of settlers in 1875. Orland is taken from an English village that was home to one of the immigrants. The village can not be found on any modern map.

the northern end of Colusa County split off in 1891, it was named Glenn County in honor of him. During the late 1890s, as the wheat yield decreased across the farming communities of northern California, grain farming shifted its emphasis from feeding humans to feeding livestock, and cattle ranching increasingly dominated the local economy.[7]

Along Stony Creek, isolated individual attempts at irrigated farming began prior to 1880. In 1887, the first local irrigation district in the area formed under the California District Act. Like other organizations of the time, the irrigation district was abandoned due to financial difficulties. After failure of the initial attempt, the Stony Creek Irrigation Company incorporated to irrigate lands on the south side of the creek. Soon after, the Lemon Home Water Company formed for colonization and irrigation of a land tract north of Stony Creek. These two companies built 15 miles of ditches and irrigated almost 500 acres of land. On Stony Creek and its tributaries above Orland, 40 to 50 separate water diversions were built during this period.[8]

At the turn of the century, the first indecisive steps taken to upgrade the town of Orland and the surrounding area could not break the area's cycle of economic and social depression. The mood of the town's 400 citizens was reflected in a "collection of more or less dilapidated wooden stores which, leaning against one another for support, expressed the discouragement felt by the people."[9]

There was no financial or emotional comfort found in the pastureland away from town. Where "yellow burned-up native vegetation held full sway," nine landowners monopolized almost 9,000 acres, shutting out small farmers and the federal government. A consulting engineer to the United States Reclamation Service (USRS), H.T. Cory, later recalled the situation before Reclamation's arrival. Then the entire Sacramento Valley consisted of great farms of "perhaps 10,000 to 20,000 acres owned by one person. . . "farmed by a drifting population employed only during the planting and harvesting season." The migrant farmers

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7. H. T. Cory, *Irrigation in California*, (San Francisco, no date), 6-7. In his career, Cory was also an associate engineer for Reclamation and a college professor. His report, *Irrigation in California*, is located in the Bureau of Reclamation library in Denver.
8. *Development of Irrigation on Stony Creek*, 2-3.
9. *Orland Project History*, Vol. 1, 15.

working the valley had "no interest in the welfare of the county except in obtaining a few weeks' wages, which may or may not be spent in the neighboring towns." Cory added that the only vegetables available in Glenn and Colusa Counties were "purchased from the Chinese vegetable vender (sic), who makes regular trips through the country."[10]

In this atmosphere, the U.S. Geological Survey identified several reservoir sites along Stony Creek and its tributaries. Unfortunately, most locals were "too poor, too skeptical and too discouraged," to seek and support a large scale irrigation project. Undaunted, a few Orland residents used the Sacramento Valley Development Association to open contacts with the federal government to request construction of an irrigation project under the Reclamation Act.[11]

At the close of the nineteenth century, a series of destructive frosts hit Southern California's citrus crop. The combination of the "thermal belt," and exhaustion of the soil due to dry-land farming convinced growers to transforming Orland from a bread basket to a center of citrus production.

Project Authorization

Immediately after the creation of the Reclamation Service in 1902, its managers looked to northern California to create a national reputation in the country's most economically vibrant state. As one of the West's most dynamic rivers, taming the Sacramento was the subject of much discussion among USRS staffers. In its first year of operation, the USRS investigated three sites in the Sacramento Valley. A year later, the USRS decided to develop 40,000 to 50,000 acres located on Stony Creek near the town of Orland.

In February 1906, a water users' association formed and petitioned the Secretary of the Interior, Ethan A. Hitchcock. Their request extolled the fertility of the soil, the climate, and the advantages for future settlers. The appeal was well-received in Washington, D.C., because many within USRS saw Orland as a springboard to other, greater ventures in California. Superintendent Engineer of the USRS, J. B. Lippincott, wrote to Reclamation Director Frederick

10. H. T. Cory, *Irrigation in California,* 8-9; Pisani, *From the Family Farm to Agribusiness*, 329; *Annual Project History, Orland Project*, Vol. 1, 16.
11. *Annual Project History, Orland Project*, Vol.1, 2.

H. Newell, "The Sacramento Valley offers the greatest opportunity for irrigation development at the least cost, and with the least complications of anything I am familiar with in the State."[12]

The soil's "fitness for a diversity of products" excited "the enthusiasms of the experts of the Reclamation Service." Those experts "freely prophesy that when this land has been devoted to its highest use, but few farms will be of more than ten acres in extent." The USRS's "motive actuating it in all its reclamation work is not the sale of its land, nor is it the irrigation of so many acres, but it is the establishment of self-sustaining homes." In its earliest stages, Orland was both a public relations project and stimulus to community growth as much as a working irrigation design.[13]

In July 1906, USRS fielded a survey party and a diamond drill outfit along Stony Creek for four months. Simultaneously, the service appointed an engineering board to produce a detailed feasibility report. In November, the board recommended construction of a dam at East Park, a site 33 miles southwest of the town of Orland in northern Colusa County. The proposed dam would be 115 feet high and capable of holding 26,000 acre-feet of water. Hitchcock apportioned $650,000 for Orland on the conditions that landowners: pledge their lands to insure repayment to the United States under the terms of the Reclamation Act; and subdivide and dispose of their lands in tracts of 40 acres or less. Orlanders agreed to Hitchcock's terms, and Secretary of the Interior James R. Garfield authorized the project on October 5, 1907.[14]

Construction History

Representing the first generation of Reclamation dam design, both Arizona's Salt River Project's Theodore Roosevelt Dam and Orland's East Park Dam are curved, thick-arch structures. They symbolize the most elegant dam designs attempted by the Bureau. However, the similarities in age and design end upon closer examination. The chiseled rubble-masonry face of Roosevelt is twice the size of the smooth grey concrete facade of East Park. Not as imposing as the 280 foot high Roosevelt, the curve of East Park Dam is a reminder of the craftsmanship

12. *From the Family Farm to Agribusiness*, 329.
13. "Merits of the Orland Project," in *The Irrigation Age*, (June 1908): 235.
14. Marshall Young, "Orland's New Look," in *The Reclamation Era*, (December 1950): 236; *Annual Project History, Orland Project*, Vol. 1, 2-3; "The Orland Project," in *The Irrigation Age*, 203.

engineers and laborers practiced in Reclamation's first projects.

In August 1908, USRS opened 16 bids for construction of the East Park Dam, spillway, and dikes at the Orland Project office. On October 5, 1908, Reclamation announced the winning bid of $79,881.65 presented by the Stanley Contracting Company of San Francisco. The dam site is 33 miles southwest of the town of Orland. Most of the East Park's construction and lateral and canal excavation came under the administration of Project Engineer W. W. Schlecht from March 1909 to October 1910.

In the spring of 1909, Stanley assembled men, machinery, and materials at East Park Dam and work began on June 11. Materials reached the site over 18 miles of winding mountain road. The contractor's force counted 38 men, including eight teamsters and 20 teams. The engineering and inspection force totaled four men. When summer dryness reduced the creek's flow and allowed excavation, Stanley's men pushed work hard, and in September hit bedrock fifty feet below the bed of the stream. On other fronts that year, spillway excavations began on August 16, and the dam's first concrete poured two weeks later.[15]

Heavy rainfall unleashed floods slowing progress on the dam. Between December 4 to 9, floodwater suspended work, washed out the cofferdam's sheet piling for the cofferdam and carried the contractors' pile driver a mile downstream. Floods overtopping the incomplete dam interrupted work twice that winter, on January 24, 1910 and between March 19 and 22. In spite of those vindictive acts of nature, work progressed promptly as "the concrete men followed the contractors closely" after each storm.[16]

The completed thick arch-gravity East Park Dam is 250 feet long at its crest as its wedge shape squeezes into a gorge of conglomerate. East Park is ten feet thick at the top and 86 feet thick at the bottom. It is 139 feet high above the foundation, boasts a radius of 275 feet, and contains 12,200 cubic yards of concrete. Twenty feet above the riverbed is a circular conduit which constitutes the main outlet, controlled by two 4 X 5 foot sluice gates seven feet apart. The

15. *Ibid*., 5-6, 12-3; *Reclamation Record*, (October 1908), 90; F. H. Tillinghast, "East Park Dam," in *Engineering Record*, (June 24, 1911): 704. Tillinghast was Resident Engineer on the project.
16. U.S., Department of Interior, Bureau of Reclamation, *SEED Report on East Park Dam*, (Denver: 1986), Section C-1, 3; *Orland Project, Annual Project History, Vol. 1*, 10.

outlet works are made up of a pagoda shaped control house, gate tower, four slide gates and a 24-inch-diameter cast iron sluice pipe. The spillway is about 2,000 feet away from the dam in a natural saddle and holds 1,090 cubic yards of concrete. The structure features nine vertical, semi-circular arches and has an effective length of 414 feet, with a capacity of 10,000 cubic feet. The completed dam cost $155,000. Construction conditions were among the safest of Reclamation's early dams, as no one was killed and only three workers were reported injured from 1908 to 1910.[17]

East Park Dam stores water at the similarly named East Park Reservoir. Water discharged from the reservoir flows in the beds of Little Stony and Stony Creeks to Miller Buttes, 41 miles away. There the water is diverted to a point where the Stony Creek breaks through the foothills and flows to the southeast through the valley to the Sacramento River.[18]

Although work on many the dam's secondary systems had yet to begin, the first project water flowed in the spring of 1910. Reclamation furnished water to 500 acres of land in and around the town of Orland. Those first to use East Park Dam previously received water from the company ditches dug 25 years earlier. The dam's completion in June could not forestall a drought. Stony Creek usually dissipated by July, and a month later, the persistent dry summer determined that no stored water would be available for distribution for the rest of the year.[19]

After two dry seasons, water users asked Reclamation to find a means of augmenting the water supply on the Project. Five miles northwest of Orland, Reclamation completed the Northside Diversion Dam to divert water into the North Canal to supply lands north of Stony Creek in the vicinity of Orland. The North Canal runs for a third of a mile along the Creek and went into service in 1913. Northside is a concrete gravity dam is 15 feet high with a crest length of 375 feet, and its final cost was $5,146.

The North's sister structure, the South Canal (also known as the South Main Canal) was

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17. *Annual Project History, Orland Project*, Vol. 1, 6; George Wharton James, *Reclaiming the Arid West: The Story of the United States Reclamation Service*, (New York: Dodd, Mead and Co., 1917), 109; *Reclamation Record*, (April 1910): 28; (June 1911): 196-7; *SEED Report on East Park Dam*, Section A, 1.
18. *Annual Project History, Orland Project*, Vol. 1, 4-5.
19. *Reclaiming the Arid West*, 110-1.

purchased from the Stony Creek Irrigation Company. The canal travels 9.6 miles along Stony Creek southeast to Orland. The system delivers water directly to every 40-acre unit through 139 miles of canals and laterals and approximately 2,000 concrete control structures of various kinds. The waterway had to be rebuilt after engineers determined the old canal produced too much velocity for the amount of water necessary to irrigate the project. A major improvement to the canal involved the installation of an inverted siphon under Hambright Creek, five miles northwest of the town of Orland, and another siphon under the Southern Pacific tracks near Orland. Construction of South Canal concluded in 1916.[20]

Two dry summers were also responsible for the creation of the East Park Feed Canal. In 1911 and 1912, run-off into the reservoir measured from a third to a fourth of its normal flow. Work started in 1913 on the East Park Feed Canal and concluded two years later. High spring run-off from Stony Creek travels seven miles down the feed canal and into the East Park Reservoir. Concurrent to the canal's completion, the spillway was raised three feet higher. Workers moved on to the diversion structure for the feed canal, the Rainbow Diversion Dam. Located three miles west of the town of Stonyford, the concrete arch weir is 44 feet high and has an upgraded crest length of 271 feet. Completed in 1914, the rock-fill, concrete on wood piling dam cost $37,060 to build. The additional flow increased the East Park's storage capacity from 46,000 to 51,000 acre feet. In order to fully use the additional storage, about 6,000 acres were added to the project, bringing its total acreage up to 20,500 by the mid-1990s. The laterals system encompassing the additional acreage was completed in 1915.[21]

After USRS signed a separate agreement with the water users, the last phase of project development was the lining of the canal system. Reclamation placed 1.5-inch unreinforced concrete lining in various segments throughout the project's canals from 1918 to the summer of 1924. The distribution system contains 16.9 miles of canals with a capacity from 50 to 300 cubic feet per second (cfs), and 139 miles of laterals with a capacity of less than 50 cfs. The total cost of canals, laterals and other structures was $276,000. Since 1924, ongoing lining reduced costs

20. *Annual Project History, Orland Project*, Vol. 1, 7-9; *Development of Irrigation on Stony Creek*, 5.
21. *Ibid*., 6-7.

and water losses in areas of heavy transit and maintenance. The sum of all work on the Orland Project from 1908 to 1915 totaled $1.2 million.[22]

One additional ceremony awaits the East Park Dam. Architects and Historians realized the faded allure of the concrete slab, with a touch of Buddhist inspiration straddling its top, was worthy of preservation. In the mid-1980s, East Park Dam was determined eligible for placement on the National Register of Historic Places, administered by the National Park Service.

The hand of a benevolent Uncle Sam scooping a ditch toward the waters of Stony Creek and East Park Dam, nurturing orange groves in his wake, was not just an artist's fantasy to promote the Orland Project in the 1920s. Many prospered soon after Reclamation's arrival. In 1930, an Orlander of long-standing, A. E. Lindstrom, recalled that at the time of the completion of East Park Dam, the town's dirt streets held "ruts deep enough to bury a calf. . . no lights, no water except out of individual wells," and, "an irrigation ditch running through the principal business street." No one involved with the project could have guessed how radically the town, its economy, and surroundings would change over the next decade.[23]

Post-Construction History

As work continued on East Park, another large facility would soon be needed to capture any remaining run-off carried by Stony Creek. In 1909, USRS began a preliminary survey at a location later named Stony Gorge, 18 miles downstream from East Park, and approximately 18 miles southwest of the town of Orland. In a narrow constriction of Stony Creek, water flows west through a hogback composed of sandstone and hard pebble and boulder conglomerate. Almost a decade would pass until, three dry years, 1918, 1920 and 1924, convinced project water users to finance Stony Gorge's construction in 1924.[24]

An April 1926 geological examination of the damsite and reservoir basin uncovered some unsettling news. Carlton D. Hulin, a geologist at the University of California, found a fault

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22. *Project Data*, 728.
23. "The Orland of the Future," in *New Reclamation Era*, (May 1930): 93.
24. James, *Reclaiming the Arid West*, 109; *Annual Project History, Orland Project*, Vol. 1, 8; J. L. Savage and H. J. Gault, "Stony Gorge Dam," in *Western Construction News*, (August 10, 1928): 490; U.S., Department of Interior, Bureau of Reclamation, *SEED Report on Stony Gorge Dam*, (Denver: 1982), 6.

line running parallel to the creek. In Hulin's words, the presence of the fault was a "comparatively minor affair." However, he recommended designers should pay attention to the north side of the fault as the dam settled. The dam's settling, even by an inch, might touch off a disaster. Hulin would not speculate if that slight movement would spell the dam's total collapse.[25]

Six different preliminary designs and estimates were received on August 18, 1926. Bearing in the mind the possibility of movement along the main fault, Reclamation weighed the merits of each dam style. The proposals for concrete face, rock fill, earth fill with concrete corewall, and earth and rock fill were rejected because of cost and fear of failure. The multiple arch design, while less expensive, would quickly crumble if the fault moved. The concrete gravity section dam was eliminated as cost prohibitive. That left one untried design for Reclamation to ponder.[26]

After reviewing the six designs, Reclamation engineers A. J. Wiley and John L. Savage, recommended an Ambursen-type, concrete and buttress dam. In October 1926, the government entered into a contract with Ambursen Dam Co. of New York City. Wiley and Savage reported the Ambursen design of contraction joints between all face slabs and buttresses would be flexible enough to withstand lateral movement along the fault line or foundation settlement. The final specifications of the dam placed the spillway to the south of the fault line, the outlet works to the north. Although sizable seismic activity would result in "extensive" flooding, engineers hoped the design would resist complete failure. A fault movement of several feet might result in the destruction of one or two bays in the structure, but since each bay is independent of the adjoining bays for lateral stability, any damage would not extend beyond the immediate area. The main fault passes beneath buttress 34, and secondary fault lines branch diagonally under buttresses 28 through 33.[27]

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25. Carlton D. Hulin, *Report on the Geology of Stony Gorge Reservoir and Dam Site*, (Berkeley, California: May 15, 1926), 8-10.
26. "Stony Gorge Dam," 492-3.
27. U.S., Department of Interior, Bureau of Reclamation, *Final Report on Construction of Stony Gorge Dam*, (November 1928), 68-9; "Stony Gorge Dam," 493; Eric B. Kollgaard and Wallace L. Chadwick, (eds.), *Development of Dam Engineering in the United States*, (Elmsford, New York: Pergamon Press, 1988), 574-5. The *Final Report*

(continued...)

In the process of reviewing bids, the government realized they would have to pay a royalty to Ambursen, if their design was used by another firm. A royalty would not be necessary if Reclamation accepted the Ambursen proposal. After adjusting the offers by including the amount of the royalty in the other bids, Ambursen's submission of $518,904 was judged the lowest. Reclamation made the commitment to build the first Ambursen design in its history.[28]

Since Ambursen's forte was dam design, they sublet the camp operation to H.S. Anderson of San Francisco, and the hauling, backfill, excavation and production of sand and concrete to A. Haidlen Co., also of San Francisco. The concrete's raw materials came from sand and gravel pits three-and-a-half miles below the damsite. Other materials traveled five miles west from the rail station at Fruto. The work force on Stony Gorge's construction ranged between 150 and 175 men. Top money of 75 to 80 cents an hour went to hoist engineers, and lowest wages of 50 cents an hour were paid to common laborers. Charges for bed and board at the campsite were $1.50 a day. Contractors reported no difficulty in finding men to work at night to complete excavation, placing forms, and reinforcing steel in concrete. The only major delay in two years of construction was six days of rain in February 1927.[29]

Work progressed through the winter of 1926 into the early spring of 1927, as workers hauled lumber to the camp and began building a cofferdam to divert Stony Creek. Excavation started on December 6, 1926. The digging on steep slopes was done by hand and on flatter slopes by horse-drawn scrapers. Due to the fault, contractors took extra care to blast the narrow trenches needed for buttress foundations. The surface of the rockwalls were left rough to bond with the dam's concrete. Power shovels, trucks and dump push carts removed the debris. One hundred-sixty holes, drilled and pressure filled with grout ensured a solid foundation.[30]

Anticipation among project irrigators was so great they could not wait for the dam's

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27. (...continued)
was prepared by Reclamation Construction Engineer, H. J. Gault.
28. *Final Report on Construction of Stony Gorge Dam*, 7-8; "Stony Gorge Dam," 493.
29. *Final Report on Construction of Stony Gorge Dam*, 13, 34-5; "Stony Gorge Dam," 495-6; U.S., Department of Interior, United States Reclamation Service, *Orland Project, Stony Gorge Reservoir, Preliminary Estimate*, (June 27, 1919), 3. During the process of construction, Haidlen Co. ran into financial difficulties and the remaining hauling and concrete production was assumed by Ambursen on behalf of Haidlen's bondsmen.
30. Kollgaard and Chadwick, *Development of Dam Engineering in the United States*, 574-5.

completion. A ceremony was organized for the pouring of the first yard of concrete. On May 3, 1927, an estimated 1,200 to 1,500 "visitors from the Land of Orland," watched as Reclamation Commissioner Elwood Mead and the Orland Chamber of Commerce set a plaque with the inscription "Non Nobis Solum" (Not for self alone) into wet concrete for later placement at the top of the completed dam.[31]

Stony Gorge's crest is 868 feet long and 46 bays of slab-and-buttresses creates its face. Approximately 1.5 million pounds of round deformed steel bars went into the slabs and buttresses. The weight of the water impounded above the dam increases its stability. The outlet works are at the base of the dam between buttresses 35 and 37. The outlet is designed to pass a little over 1,000 cfs through 50-inch diameter steel pipes.[32]

The spillway can discharge up to 30,000 cfs controlled by three 30 by 30 feet gates mounted on the upstream face of the dam. These overflow gates are operated by stems connected by electric hoists located in the spillway gate house on top of the dam. Situated between buttresses 26 to 32, the spillway misses the main fault line and passes partially over the secondary faults.

The Stony Gorge Reservoir has a storage capacity of 50,200 acre-feet and a surface area of 1,280 acres. It extends upstream from the dam for five-and-a-half miles and stores the run-off from a drainage area of 275 square miles. Releases from the reservoir travel 22 miles down Stony Creek delivering to each 40 acre unit on the project. On October 25, 1928, Reclamation declared Stony Gorge Dam and Reservoir complete at a total cost of $1,069,310.[33]

In the 1930s and 40s, project structures began to show their age. Money was not available during the depression, and during World War II, shortages of labor and materials kept maintenance on the back burner. A rehabilitation and betterment program in the late 1940s replaced rotting timbers on diversion structures, opened corroded spillway gates on Stony Gorge

31. "Stony Gorge Dam Dedicated With Appropriate Ceremonies," in *New Reclamation Era*, (June 1927): 84-5. The description of dedication was taken from an account in the May 6, 1927 *Orland Register* newspaper.
32. Byrum W. Steele, "Stony Gorge Dam, Orland Project, California," in *New Reclamation Era*, (April 1927): 52; *Development of Dam Engineering in the United States*, 574.
33. *Development of Dam Engineering in the United States*, 573; U.S., Department of Interior, Bureau of Reclamation, *Dams and Control Works*, (3rd ed.), (Washington, D.C.: U.S. Government Printing Office, 1954), 97-101.

Dam, and restored lining on the North and South Main Canals. The three year job was completed in 1951 at a cost to water users of $250,000.[34]

On the afternoon of April 19, 1954, the Northside Diversion Dam failed. The occurrence was not a complete surprise as over a number of years, the creek's right bank moved shifted until the south 160 feet of the dam was covered with sand, gravel and silt. According to an eyewitness, the dam began "disappearing" from its north end, while the concrete weir overturned and broke into several pieces. The failure immediately curtailed water delivery to 6,000 acres of project lands north of Stony Creek. Dump Trucks and bulldozers helped form an earthen dike across the stream and excavated a temporary spillway to permit excess natural stream flow to proceed downstream. A permanent replacement diversion dam went into place the following winter. That same year on October 1, the Orland Unit Water Users' Association took over operation and maintenance of the project concluding a 46 year partnership between Reclamation and the people of Orland.[35]

The Corps of Engineers completed an additional storage facility, the Black Butte Dam and Reservoir, in 1963. The Corps operates and maintains the reservoir, and diverts, measures and delivers water into the South Canal for lands south of Stony Creek. The reservoir can hold 59,000 acre-feet of water for irrigation.[36]

Engineers and contractors suffered a wave of anxiety during construction, as a tremor shook the top of the 139-foot high dam. After work progressed on several of the tallest buttresses, vertical shrinkage cracks appeared. Engineers countered with additional horizontal reinforcement in all buttresses. In project history, only three measurable quakes have been recorded near Stony Creek. An earthquake with an epicenter 10 miles from the dam and measuring 5.3 on the Richter scale in the early 1960s did not damage the structure. Two other

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34. Young, "Orland's New Look," 236-9.
35. U.S., Department of Interior, Bureau of Reclamation, *Annual Project History, Orland Project*, (Orland, California: 1958), no page number; U.S., Department of Interior, Bureau of Reclamation, *Report on Failure of North Diversion Dam and Restoration of Irrigation Service Temporary Construction*, (Orland, California.: 1954), 2-4; *Annual Project History, Orland Project*, Vol. 52, 1978-9, ii.
36. *Orland Project History, Vol. 52, 1978-79*, ii.

earthquakes, in 1975 and 1978, did not harm either Stony Gorge or East Park Dams.[37]

Studies in the early 1980s found that after more than a half century of service, both East Park and Stony Gorge were showing their age, but still doing their jobs. Safety reports written for each project expressed concern for the structures' ability to deal with a major flood or tremor. Similar to other major man-made schemes in California, good fortune has smiled on the Orland Project so far. There is no way to predict what would happen the moment after a flash of nature's anger.[38]

Settlement of the Project

A gush of irrigated water broke the grip of the "great so-called Bonanza wheat farms" held on the Sacramento Valley. According to H.T. Cory in 1918, "The new man on the small farm cannot afford to raise grain. In order to make a living he must grow alfalfa, fruit and vegetables, and as a rule these must be irrigated." Irrigation brought this influx of new men and women and the first wave of change to Orland since its settlement in the mid-1870s. In 1912, the population of the town was 2,000, but three years later, 1,200 more came to settle. In 1910, the farm population was 128. Two years later, it skyrocketed to 645, or an increase of about 250 percent in less than three years. Land values also shot upward from $15 and $20 per acre to $125 to $150 an acre during the same time frame.[39]

In a twelve month period between 1909 and 1910, townspeople tore down decrepit wooden shacks and replaced them with $100,000 worth of reinforced concrete business buildings. More than a hundred new homes were built in the same period. These new bungalows sat on an average of 25 acres, all near a pasture or grove.[40]

Reclamation reported settlers planted 30,000 citrus trees and 20,000 deciduous and nut trees during spring 1914. Twelve months later, only 90 acres on the project were planted in nuts, 88 in deciduous fruit, and 87 in citrus fruit. This slow start belayed the reformation Orland's

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37. "Safety Measures Taken by Bureau in Constructing Irrigation Dams," in *New Reclamation Era*, (May, 1928), 72; *SEED Report on Stony Gorge Dam*, 3.
38. *SEED Report on East Park Dam*, Section C-1, 16-8; *SEED Report on Stony Gorge Dam*, 16-8.
39. U.S., Department of Interior, Reclamation Service, *Third Annual Report of Operation and Maintenance of Reclamation Projects, 1912*, (Washington, D.C.: 1913), 31; Cory, *Irrigation in California*, 10.
40. *Annual Project History, Orland Project*, Vol. 1, 16.

farming culture was slowly undergoing.[41]

Before World War I, the average crop value per acre on the project was $26.99. Value of the land grew to $71.90 an acre during the war; still lower than most federal projects. Land speculation was almost as popular as planting oranges after East Park Dam's completion. According to longtime valley resident, Charles F. Lambert, approximately 75 percent of Project landowners were involved in selling their lands. These owners favored the federally established forty-acre limitation, because large landholders could sell off smaller, more expensive parcels. Lambert believed he saw a land speculation pattern. The speculator purchased project land for $10 an acre and sold it for $40, bought it back at $75 an acre, and resold it for $125 an acre. This wheel-and-dealing might have hindered an open, mass migration, but for the first time in its history land was available and in demand along Stony Creek.[42]

Inspiring this land boom were visions of groves of fruit and nut trees co-existing with dryland and irrigated acreage. In the 1920s, oranges, lemons, grapefruit, prunes, figs, peaches, apricots, pears, grapes, olives, and watermelons all burgeoned within the space of 15,500 acres. Except for grapes, the same fruits are still marketed out of Orland. In 1990, total revenue of $3.8 million from project walnuts, almonds, and other nuts narrowly outpaced the $3.7 million fruit crop and the $2 million made from hay and other forage.[43]

In spite of Orland's first exhilarating years of growth, some in the project office bemoaned the "deadly monotony of life in a small town," with its lack of diversions for residents and visitors. However, Orland created itself as the perfect illustration of sunny, rural, and prosperous California as perceived by the rest of the United States in the 1920s. The community Orlanders built boasted a respectable, sturdy atmosphere, where despite the land deals engineered by the locals, outside "Promoters, exploiters, and speculators are not wanted and will get scant courtesy." In the mid-20s, local industries included two creameries (producing over a

41. *Reclamation Record* (July-August 1914): 255; *From the Family Farm to Agribusiness: The Irrigation Crusade in California and the West, 1850-1931*, 330.
42. Charles F. Lambert, *Land Speculation and Irrigation Development in the Sacramento Valley, 1905-57*, (Berkeley, California: University of California, Regional Cultural History Project, 1957), 26. Lambert was interviewed by Willa Baum.
43. U.S., Department of Interior, Bureau of Reclamation, *1991 Summary Statistics: Water, Land and Related Data*, (Denver: 1991), 176; RG 115, General Correspondence, May 23, 1924, Box 1020, File 246.

ton of butter daily), an alfalfa mill, a packing house for oranges and almonds, paved streets, and street lights.[44]

The advantage of better-tended soil and a populace with a greater stake in their livelihoods soon made its way from the groves to the ledger books. Before irrigation, the value of project lands totaled $605,000, but at the close of 1921, the value rose to $6.1 million. In the same year, the worth of crops produced and livestock marketed was $45,000 more than the value of all project lands in 1910.[45]

Orland's prosperity continued through the '20s into the first days of the depression. Out of the overcast national economic mood in the summer of 1932, Reclamation continued to identify Orland as an afternoon of sunshine. *Reclamation Era* sang the praises of a community still busy concreting laterals, adding pipeline, constructing homes and planting orange trees. Evidence of economic hard times would come later in the decade.[46]

The ferocity of the depression blanketing in the rest of the nation finally found the Sacramento Valley in 1937. An arm of the New Deal, The Resettlement Administration, purchased a number of large holdings on the Orland Project in order to house 20 families escaping the Dust Bowl. The resettled lands were listed as underdeveloped and behind in the payment of project charges. Reclamation benefitted from payments by new tenants indebted to the government for a second chance. The more established growers kept ahead of the depression by converting their old trucks and passenger cars into tractors working their fields and avoiding the purchase of new equipment. Long time Sacramento Valley resident Charles F. Lambert later reminisced that, "The little people of Orland who have the cream check coming in every day and they have a few chickens to sell and a few fruits, nuts, olives, and vegetables, they don't know what a poor day is. Even when times were tough, in Hoover's time, they were making a living."[47]

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44. U.S., Department of Interior, Bureau of Reclamation, *Annual Project History, Orland Project*, 1919-21, Vol. 3, 6-7; Blanchard, "Orland Project, California," 461; RG 115, General Correspondence, May 23, 1924, Box 1020, File 246. Observations of Orland were made by Chief Clerk C. H. Lillingston in 1920.
45. E. A. Kirk, "Results of Reclamation at Orland, California," in *Reclamation Record*, (June 1922): 119.
46. R. C. E. Weber, "Recent Improvements at Orland, California," in *The Reclamation Era*, (August 1932): 149.
47. "New Settlers for Orland," in *The Reclamation Era*, (January 1937): 3; "Orland Farm Operations," in *The Reclamation Era*, (June 1940): 186; Lambert, *Land Speculation and Irrigation Development in the Sacramento*

(continued...)

At the close of the 1950s, those living on the Orland Project made up 44 percent of Glenn County's total population according to Lambert; a leap from 7 percent in 1907. Lambert described Orland's "Bungalow Row," as "little tracts of land with homes on them, ten and twenty acres." Those small landowners, he added, had "more investment in their homes and buildings than they have in their land. And they're doing all right."[48]

Orland's profitability is one of the better kept secrets in California and among Reclamation's endeavors. In 1991, with 19,160 acres under irrigation, the Project produced $9.7 million in crops. At the close of the nineteenth century, this vast, sparsely settled domain, now holds 869 farms housing 2,484 people. In 1910, the town of Orland held 600 citizens, but exploded to 3,500 people by 1917. Beyond the boom years of the 1920s, the town established itself through steady annual growth. Currently, Orland's population is 5,052 people, and the average Orlander is between 25 and 44 years old, owning a home valued between $50,000 and $99,000.[49]

The greater Orland area will have to fight to retain its seclusion, as it seems the rest of the world is making its way to Northern California. The growing city of Chico, 30 miles northwest of East Park Dam, has made the leap from the small city tranquility of 19,580 people in 1970, to 40,079 people in 1990 in a headlong rush toward urban confusion. Chico turned its back on its past as an agri-center of almonds, rice and fruit in exchange for a sprawling, more suburbanized way of living. The effects on the groves and fields of the project from this forced march of tract houses from the north promises to be a dilemma over the next few decades.[50]

Uses of Project Water

Irrigated water guided Orland beyond the ravages brought on by dryland over-planting. Maybe it was the scent of young fruit trees in bloom that roused one writer to rhapsodize about

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47. (...continued)
Valley, 1905-1957, 31.
48. Lambert, *Land Speculation and Irrigation Development in the Sacramento Valley*, 31; Eli Oliver Macy to R. F. Walter, April 6, 1931, RG 115, General Correspondence, Box 1020, File 246. Macy was a project grower writing to Reclamation Chief Engineer Walter.
49. *1991 Summary Statistics*, 176; *Reclaiming the Arid West*, 114; U.S., Department of Commerce, Bureau of Census, *1990 Census of Population and Housing, Pacific Division, California, Vol. 2*, (Washington, D.C.: 1991), Summary Tape File 1A.
50. *1990 Census of Population and Housing, Pacific Division, California, Vol. 2*, Summary Tape File 1A.

Orland: "Here flourish side by side the apple, the peach, the pear, the plum, the apricot, and grape, along with the orange, the lemon, the lime, and the fig. Here the oak and the pine, there the palm and the pepper tree." Almost every crop tried soon showed a profit. By the 1990s, all the aforementioned varieties of fruits and nuts, and the old standbys of alfalfa and wheat still thrive on the project. Irrigated pasture land takes up more space (10,119 acres) than any other farming or ranching venture. The value of land planted in forage is $156.16 per acre.[51]

Although acreage of alfalfa, wheat, and other grains has declined decade-by-decade, the forage is still needed as feed by the beef and poultry industries. In 1911, growing from a head of 125 "indifferent milk cows," Orland's pastures were home to more than 4,000 head by the end of the decade. By 1950, 10,100 dairy cows brought in $1.6 million for local dairy farmers. Since then, Orland's dairy and ranching industries maintained a link to the past and a important source of employment. Fowl and turkey production enjoyed a vogue among Orland farmers in the 1920s and 30s, but have not been as prominent since.[52]

For most of Orland's settled history, the "lowing of cattle and the cackling of hens" were the only sounds breaking "the erstwhile silence," across its wheat fields and irrigation ditches. Two decades into the twentieth century, new noises soon became familiar. Nuts became a major crop, and the rapid whack of a wooden pole on the branches of young almond trees, and the subsequent patter of a bunch falling onto canvas, were the most frequently. Over a 14-year period from 1909 to 1923, space for almond trees grew from 75 to 1,100 acres, an increase greater than any other crop on the project during that same period. In 1991, the value of an acre planted in almonds was a little over $3,700. The project also supports 234 acres of walnut and other varieties of nut trees.[53]

The presence of a few orange trees in the late nineteenth century provided "mute testimony" to their willingness to flourish in the Sacramento Valley. Around Orland, residents

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51. *Irrigation in California*, 10; *1991 Summary Statistics*, 176.
52. *Reclaiming the Arid West*, 114; U.S., Department of Interior, Bureau of Reclamation, *1950 Crop Summary and Related Data, Federal Reclamation Projects*, (Washington, D.C.: 1951), 30a-31a.
53. *Orland Project, Project History, Vol. 1*, 16; "The Almond Industry on the Orland Project," in *Reclamation Record*, (January, 1924), 10.

made small experimental plantings until 1921. That year, oranges grew on 156 acres. Capitalizing on the blessings brought by the thermal belt, the Orland Orange Growers' Association constructed an orange packing house in time for the 1927 crop. The average price for oranges in the mid-1920s hovered around $2.00 per box with much of the crop shipped to Oregon, Washington, and other points in California. The heyday of orange cultivation reached its zenith in the early 1930s, as 400 acres of existing trees were supplemented by approximately 500 additional acres on contiguous lands. In recent years, oranges have been eclipsed by olives, prunes and plums as Orland's most profitable crops and in acres planted. The 1991 orange crop brought in $506,760 from 164 acres.[54]

A late starter, olives quickly shot to preeminence on the project lands. As late as 1921, only three acres of bearing olive trees were listed in the annual crop census report, and those were planted mainly for windbreaks along farm boundaries. Seven years later, there were 173 acres, growing by 1991, 1,324 acres of olives produced a crop worth $2.3 million. An acre can produce 3,000 to 4,000 pounds of olives. Lack of pests and sturdy longevity has made trees bearing Mission, Manzanillo, and Sevillano olives the most popular on the project. Orland's olive marketing was enhanced by construction of an olive-oil processing plant in town in 1939. As of 1994, almost all the crop is grown for table use and only a single percent is processed for oil.[55]

Observations made by a Reclamation commentator in 1915 are still valid nearly a century later. Irrigation outfitted the transformation of Orland from the near fatal state of "one big wheat field with ramshackle dwellings far apart and a dead community" to a rebirth as "one of the show projects of the Reclamation Service."[56]

Conclusion

Orland's dry-land gluttons are long gone, and the initial triumph over imprudent

54. U.S., Department of Interior, Bureau of Reclamation, *Annual Project History, Orland Project*, Vol.5, 1926-9, 46-7; *1991 Summary Statistics*, 176; E. A. Kirk, "The Orland Orange Show," in *The Reclamation Era*, (July, 1932): 133.
55. R. C. E. Weber, "Growing Olives on the Orland Project, California," in *New Reclamation Era*, (August 1929): 120; *Reclamation Era*, (October 1939): 278; *1991 Summary Statistics*, 176.
56. *Reclamation Record*, (April, 1915): 154.

agricultural practices has just passed living memory. Unlike many situations in the Reclamation saga, no one infamous or glorious stands above the Orland story. However, Orland is atypical, because it is a tale of extraordinary collective effort. The nation of small farmers Thomas Jefferson once aspired to, found an existence in the ten and twenty acre lots of the west Sacramento Valley. The soil and climate were already in place. All it took was water and a sense of stewardship to bring man and the land into an alliance.

About the Author

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