

The Crooked River Project

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The Crooked River Project

Irrigation efforts in the west often followed a rather predictable pattern. A farmer would divert water from the local stream to water his crops or livestock. Eventually, a collection of individual diversions either became too much for the stream to handle, or a farmer required more water, or he needed a late season water supply that the stream could not accommodate. In any case, individuals had to join forces with other individuals in the same predicament to solve their collective problems. As a group – sometimes organized into a formal irrigation district – farmers determined the best way to provide water on a year-round basis; oftentimes this determination carried with it a recommendation for construction of irrigation facilities, including dams and diversion structures.

In an ideal situation, from this point on, the farmers lived happily ever after. They had the funding to construct all their necessary irrigation works. They had the engineering expertise to construct them correctly. They all got the water they needed, when they needed it, and harmony reigned.

Unfortunately, water issues in the west are about as far from happily ever after as you can get. Generally, farmers lacked money and expertise. Very often the collaborative efforts failed, and harmony very seldom reigned. When money ran out or structures failed, farmers turned to state and federal entities to help them rehabilitate, reconstruct, or augment their existing irrigation facilities. Sometimes these efforts worked and farmers received the needed intervention and the project succeeded – other times, not; the outcome often depended on the nature of the project to begin with. Fortuitously for the farmers in the area, the Crooked River Project – formerly the Ochoco Project – a prime example of irrigation patterns in the west, is one such project that ultimately succeeded.

Project Location

Located in Crook County, Oregon, Arthur R. Bowman Dam (formerly Prineville)¹ spans the Crooked River just south and west of the town of Prineville; the Crooked River is a tributary of the Deschutes and Columbia Rivers. The remainder of the Crooked River Project features – Ochoco Dam, Lytle Creek Diversion Dam, pumping plants, and the canal and lateral system – extend north and east of the dam. The project itself extends throughout the Ochoco Valley in central Oregon.

Historic Setting

Prehistoric Setting

The archeological record places various native dwellers in the Great Basin, specifically the Crooked River area, approximately 12,000 years ago. The Great Basin region – eastern Oregon, southern Idaho, Nevada, Utah, and portions of California, Wyoming, and Colorado – provided homes for many different, mostly nomadic inhabitants. The culture of these residents remained relatively contiguous and largely free of outside influence. Eventually, perhaps thousands of years later, these nomadic groups settled into particular areas and established distinct cultures and bands. Over time these early cultures gradually adopted similar languages, allowing them to communicate with each other but yet retain their individual lifestyles. Despite their unique cultures archaeologists classify these linguistically connected bands together as a single tribe, the Northern Paiute.²

Historic Setting

The Northern Paiute settled throughout eastern Oregon and western Nevada about one-

1. Arthur R. Bowman dam was originally named Prineville, after the nearby town; the name was changed in 1973. The two names are used interchangeably within this history. Generally, the structure is noted by its historic name throughout the construction history and the present name when dealing with current issues.

2. William C. Sturtevant, ed, *Handbook of North American Indians*, Vol. 11, *Great Basin*, Warren L. D'Azevedo, ed, (Washington, D.C.: Smithsonian Institution, 1986), 121, 124.

thousand years ago. At the time of European contact the Paiute consisted of several culturally and politically distinct cultures bound linguistically, all speaking the Northern Paiute language. These early tribes were semi-nomadic and traversed the region in small bands hunting, gathering, and fishing.

Life changed rather dramatically for portions of the Northern Paiute, principally those living in eastern Oregon, during the late eighteenth century when the horse, originally brought to the Americas by Spanish conquistadors and readily taken up by the Plains tribes, made its way to the northern reaches of the Great Basin. The acceptance of the horse by the Plains tribes accelerated the horse's migration throughout the west. The first group of Northern Paiute to adopt the horse radically altered their culture in response; after traveling with their Northern Shoshone neighbors for many years this portion of the tribe became known as the Bannocks.

Not all the Northern Paiute adopted the horse as readily as the Bannocks. Peter Skene Ogden of the Hudson's Bay Company documented in detail his travel throughout the region as a trapper, including descriptions of the various inhabitants he encountered. Ogden's 1826 account included a description of a group of Northern Paiute living in north central Oregon near the Deschutes River. This particular band of Northern Paiute that Ogden encountered either used few horses or none at all. Instead the majority of the Northern Paiute continued their traditional means of subsistence: fishing, gathering, and hunting. Many of the trappers and explorers documented the existence of horses throughout the Great Basin and the apparent choice by the Northern Paiute not to integrate the animal into their established cultures.

As the Euro-American presence in the west increased through migration and settlement so did the outside influences on the native inhabitants. Not surprisingly local acceptance and use of the horse coincided with the marked increase in traffic west through the Northern Paiute

country during the late 1840s and 1850s. With the arrival of the horse many Paiute hunters consolidated into mounted raiding groups targeting the migrating settlers which escalated already hostile relations between the two entities.

Anglo migration west devastated the Paiute culture. The California Trail passed through the center of Paiute territory disrupting traditional Paiute subsistence patterns. Many Paiute responded to the invasion of their native lands by moving further north into Oregon; the Oregon Trail touched only a small part of Paiute territory in the far north. Others chose to capitalize on the situation and found new means for subsistence in the wagons and stock traveling west to California in search of gold.³

The California gold rush did more to Oregon than just devastate the native landscape and inhabitants. Overland westward migration also brought settlement to the Oregon territory, then comprising most of Oregon and Washington as well as part of Idaho; Oregon officially became a territory in August of 1848. Previous attempts to settle the region, primarily missionary endeavors, made little overall impact on the region, however the massive western migration undertaken after 1848 provided the impetus needed to actually settle parts of the region. Many of these early settlement logically occurred on the western side of the Cascade Mountains, the east retaining its distinction of being part of the “Great American Desert.”

Beginning about 1859, sheep and cattle ranching moved into eastern Oregon due to the overwhelming influence and dominance of wheat farmers in the western region. Cattle and sheep ranching originally began on the western side of the Cascades, however the profitability and ease of wheat farming in the region eventually drove the ranchers east where land remained plentiful. The wheat farmers also moved east when they determined that the high bench lands

3. Sturtevant, 126, 435, 436, 455, 456.

above the Columbia provided an excellent location for growing wheat.⁴

The same year, 1859, that settlement of the Oregon territory began in earnest, prospectors discovered gold and silver and in Northern Paiute territory; the Virginia Range in western Nevada and the Owyhee basin in Oregon and Idaho. The promise of mineral wealth brought prospectors and businessmen to the region, joining the farmers and missionaries already there. The Northern Paiute, for the most part mounted by this point, responded to this new influx of settlers with hostility. In an attempt to forestall any further damage to their native lands the Paiute chose to attack various encampments throughout the region. In the vicinity of the Deschutes River these attacks lasted nearly ten years, prompting military intervention and ultimately led to the establishment of reservations. The Federal government designated several reservation areas, primarily in Nevada, as early as 1859.⁵

Settlement patterns in Oregon changed somewhat dramatically after the conclusion of the Civil War. Previously settlement of the region centered primarily on the west side of the Cascade Mountains. One such settlement in Ochoco Valley – albeit rough – began in 1867, in the vicinity of the present day project. The following year, the first dwelling was erected on the present day site of the town of Prineville. Soon after, a road south from The Dalles and passing through Prineville, was established; this road later became the link for all commercial freight in the region.

By the early 1880s, much of the usable western Oregon farmland was inhabited, forcing new settlers to look for new areas to homestead and farm. Initially, new settlers on the eastern side of the Cascades caused problems for the existing cattle ranchers and farmers; the farmers

4. Gordon B. Dodds, *Oregon: A Bicentennial History*, (New York: W. W. Norton, 1977), 82-3, 95.

5. Sturtevant, 456-7.

eventually prevailed and the cattlemen moved on, most of them choosing to settle in Idaho.⁶

Not surprisingly the advent of farming in eastern Oregon brought a new set of problems to residents. Access to water and timber proved highly challenging, as neither one occurred in abundance east of the Cascades. Later residents found access to these vital natural resources even more difficult. To address the need for water local farmers banded together creating irrigation districts. The irrigation districts then developed plans for long term water usage, including provisions for storage if necessary. In many cases, due to lack of financial resources, irrigation districts often lobbied either state or federal interests for aid in constructing necessary irrigation facilities in their region.

The pattern of individual water diversions segueing into organized efforts played out throughout eastern Oregon, including in the Ochoco Valley. The earliest recognized diversion of water in the Valley dates back to 1866, when the first water was diverted from the South Fork of the Crooked River. Other individual water diversions followed, until the early 1900s, when plans were made to irrigate a large acreage in the Ochoco Valley. A lack of financing prevented these plans from materializing.

Also near the turn of the twentieth century, the Geological Survey issued a bulletin on the geology and water resources in central Oregon. Several years later, in 1913, Reclamation and the State of Oregon entered into a cooperative agreement to investigate potential irrigation sites in the same area. A 1915 report detailed several irrigation plans, including portions of the Crooked River Project. Not long after, private interests in the valley, in cooperation with the State of Oregon, constructed the Ochoco Project as part of the Veterans' Farm Settlement

6. Denver Colorado, National Archives and Records Administration: Rocky Mountain Region, Records of the Bureau of Reclamation, Record Group 115, "Annual Project History, Crooked River Project, Prineville, Oregon," Volume I, 1957-8, 1-2; Dodds, 115, 131, 135.

Program. To facilitate construction of the project local settlers organized the Ochoco Irrigation District (OID) in 1916. The original intention was to construct Ochoco Dam and related works to irrigate 22,000 acres. With passage of a local bond measure, sufficient funds were raised to construct the features as designed – Ochoco Dam was privately constructed between 1918 and 1921.

In 1933, a shortage of water and dwindling financial reserves forced OID to apply to the Reconstruction Finance Corporation for a loan to retire its outstanding debt. Based on an appraisal, and under terms of the loan, the irrigable acreage on the project was reduced to 8,500 acres. By 1948, the dam had deteriorated to the extent that it required rehabilitation. Work on the dam was undertaken under the auspices of the Ochoco Project, and is presently in full operation.

Reclamation conducted additional investigations in the Ochoco Valley in 1936, 1940, and 1944. Investigations into the present day Crooked River Project began in 1940, under the Wheeler Case Act. The intentions were to increase the amount of land under cultivation, and ensure supplemental water to the lands already being cultivated. The following year the scope of the investigation widened to include the entire basin. However, due to wartime shortages of materials – specifically critical materials for the pumping facilities – construction was never initiated.

After conducting another set of studies on the project, Reclamation determined that the original damsite chosen for the project was infeasible. As a result, attention turned to a site in the vicinity of Prineville and investigations began. The new damsite offered opportunities for a larger reservoir, and essentially complete regulation of the Crooked River and its tributaries. A complete feasibility report on the project, including the new damsite, was submitted to the

Commissioner in February of 1953. This report later became the basis for the authorizing legislation.⁷

Project Authorization

Congress authorized the reconstruction of Ochoco Dam – the Ochoco Project – in the Interior Department Appropriation Act of June 29, 1948. The entire Crooked River Project was authorized by Congress on August 6, 1956. The Ochoco Project was incorporated into the Crooked River Project as part of the authorization. The Crooked River Extension was authorized September 18, 1964. Rehabilitation and betterment of the lateral and drainage system was carried out under the authority of the Rehabilitation and Betterment Act of 1949.⁸

Construction History

The Ochoco Project

The reconstruction of Ochoco Dam was carried out under the direction of the construction engineer of the Deschutes Project. Bids for the repairs were opened May 3, 1949. Dragline Rentals was the low bidder, and Reclamation awarded them the contract. The contractor received notice to proceed on June 27, 1949; work had actually begun about two weeks earlier, on June 13, 1949. The majority of the work on the contract was completed during the remainder of 1949. All work was completed and accepted on March 21, 1950, well ahead of the November completion date.⁹

Ochoco Dam originally included a semi-circular concrete-lined tunnel through the right abutment. This tunnel, in conjunction with a slide gate on the upstream face of the dam, was used for irrigation releases. Over time, the concrete conduit settled. To help alleviate the

7. “Annual Project History, Crooked River Project, Prineville, Oregon,” Volume I, 1957-8, 1-2.

8. United States Department of Interior, Water and Power Resources Service, *Project Data*, (Denver: U.S. Government Printing Office, 1981), 404.

9. “Annual Project History, Consolidated Project History – 1950-1960, Ochoco Irrigation District, Crooked River Project, Prineville, Oregon,” 4, 5, 7.

settling, a new forty-four foot steel conduit, with a high-pressure slide gate, was installed for irrigation releases at the outlet end of the tunnel in 1949. Unfortunately, the new steel conduit did not prevent further deterioration of the concrete. In December of 1957, the irrigation district employed a operator and grout machine to rectify the problem; the same operator had been employed by Reclamation in construction of Haystack Dam on the Deschutes Project. Though this did not fall under the jurisdiction of the project, Reclamation forces laid out the grout plan and generally aided the district with the work.¹⁰

The Crooked River Project

On November 4, 1957, even before the official start of construction activities, Reclamation established the Crooked River Project Office. The office provided field engineering, inspection, and administrative services in connection with the final design of Prineville Dam and related irrigation facilities. Later, the office assumed responsibility for construction of Prineville Dam, Reservoir, and other related facilities.

Reclamation awarded the contract for construction of Prineville Dam to the low bidder – Keystone Construction Company, Inc. – on October 14, 1958. Invitations to bid had originally been issued in April. Problems related to the relocation of the existing state secondary highway through the damsite, and labor difficulties in the state, delayed actual opening of the contract for bid until late August.

Work on the dam began soon after Reclamation let the contract, on October 27, 1958. The contractor initially focused his attentions on clearing brush and trees from the right-of-way on the right abutment, and the outlet tunnel. Work continued on the right abutment through the

10. “Annual Project History, Crooked River Project, Prineville, Oregon,” Volume I, 1957-8, 8.

following March, when work moved to the diversion dam site fourteen miles downstream.¹¹

Keystone Construction Company, Inc. subcontracted work on the tunnel, access shaft, and all the concrete work to Mountain States Construction Company of Golden, Colorado. The subcontractor began excavating the tunnel on November 10, 1958. In mid-January, attentions turned to the open cut excavation of the spillway, which was completed in mid-February; the remainder of the spillway excavation was completed in May of 1959. Excavation of the tunnel resumed in late-February, and was completed March 16, 1959. Just before the tunnel was holed through, the subcontractor began placing concrete. Concrete placement in the tunnel continued for another six-months and was completed in September of 1959. To assure complete filling between the arch rock and the concrete in the tunnel, the area between them was backfilled with sand cement grout; this work was accomplished by Boyles Brothers Drilling Company, and began in mid-July. Pressure grouting of the remainder of the tunnel occurred between late August and mid-October.

On September 13, 1959, the contractor began placing zone one material in the bottom of the old river bed. This marked the official start of work on the dam structure itself. On October 3, the river was diverted along the left abutment across the dam embankment. The contractor suspended placing operations on the dam on October 16, for ten days, until the river could be diverted through the diversion tunnel. Work continued from the end of October until mid-December, when freezing weather forced the contractor to suspend operations until the following spring.

At the very end of March of 1960, work resumed on the embankment. The contractor completed the embankment portion of the dam in December. All remaining concrete work –

11. “Annual Project History, Crooked River Project, Prineville, Oregon,” Volume I, 1957-8, 4, 8, 12, 13.

including the spillway and access shafts – had been finished in April and May. On December 13, 1960, Keystone Construction Company installed stop logs at the inlet portal of the diversion tunnel, effectively cutting off the flow of the river through the tunnel – officially beginning water storage in the reservoir.¹²

Reclamation opened bids for the clearing of Prineville Reservoir on August 20, 1959. Bill Broderick and John Collins of Lakeview, Oregon, submitted the low bid and Reclamation awarded them the contract. Work began October 20. All work on this contract was completed in August of 1960.

In March of 1961, Reclamation signed a contract with Crook County, Oregon, for administration of the lower half of Prineville Reservoir. The State of Oregon planned to construct a State Park along the reservoir's north shoreline. Also in the spring of 1961, Reclamation began discussions with the State Fish and Game Commission to administer the upper half of the reservoir for duck hunting, early spring fishing, and a wildlife preserve. This contract was signed the following January of 1962.¹³

Also in 1959, the OID began rehabilitation of the Ochoco Main Canal and related distribution system; work also included some new construction where necessary. Work proceeded steadily throughout 1959, and was completed the following year.¹⁴

Reclamation issued invitations to bid on construction of the diversion canal on April 29, 1960. The contract was awarded to the low bidder, A&B Construction Company, Inc., of Helena, Montana, on June 30. The contractor began work in mid-July. Work under this

12. "Annual Project History, Crooked River Project, Prineville, Oregon," Volume II, 1959, 6, 7, 8, 9, 13; "Annual Project History, Crooked River Project, Prineville, Oregon," Volume III, 1960, 6, 10, 11, 22.

13. "Annual Project History, Crooked River Project, Prineville, Oregon," Volume II, 1959, 15; "Annual Project History, Crooked River Project, Prineville, Oregon," Volume III, 1960, 22; "Annual Project History, Crooked River Project, Prineville, Oregon," Volume IV, 1961, 1962, 1963, 54, 108.

14. "Annual Project History, Crooked River Project, Prineville, Oregon," Volume II, 1959, 16.

contract included construction of Dry Creek and Ochoco Creek Siphons. The Ochoco Siphon was completed early in 1961. Work began on the Dry Creek Siphon soon after, and it was completed in early June. The fish screen structure was the last thing to be finished in June. Reclamation accepted the entire contract as complete on June 27, 1961, roughly two months ahead of schedule.¹⁵

On June 9, 1960, Reclamation opened bids for construction of the Ochoco Relift and Barnes Butte Pumping Plants and discharge lines. Because of irregularities in the low bid, Reclamation awarded the contract to the second low bidder, Syblon-Reid Construction Company of Warden, Washington, on July 11.

The contractor began work on the Ochoco Relift Pumping Plant on July 26. Excavation proceeded throughout the summer and the first concrete was placed in the base slab on September 15. Concrete placement continued until December 14, when work ceased for the remainder of the year. Work resumed the following January of 1961.

Excavation of the Barnes Butte Pumping Plant began January 20, 1961. Concrete placement started March 13, and the last concrete was placed June 6. In the meantime, the pumps and motors – for both pumping plants – were shipped from Genoa, Italy, on March 6, 1961, on the S.S. President Monroe; fabrication of the pumps and motors had been subcontracted to A. Pellizzari and Fegli. The pumps and motors were received on the project, in good condition, April 20, and 21, 1961. The contractor installed the pumps after the last concrete was placed in June. Testing of the pumps and electrical system began in September and ended on October 27, 1961. The pumps operated satisfactorily; and final testing and acceptance

15. “Annual Project History, Crooked River Project, Prineville, Oregon,” Volume III, 1960, 15-17; “Annual Project History, Crooked River Project, Prineville, Oregon,” Volume IV, 1961, 1962, 1963, 24-5.

of the contract was accomplished the following spring.¹⁶

Reclamation awarded the contract for construction of drains on the project to Kenneth E. Beck of Moses Lake, Washington, on May 15, 1961; bids were opened May 4. The contractor began on the first of the drains May 31, and had completed the majority of the work under the contract by the end of the summer. Final cleanup and acceptance of the contract occurred the following January of 1962.¹⁷ The last feature of the project to be constructed, Lytle Creek Diversion Dam, was also finished in 1962.

Dedication of the Crooked River Project occurred at Prineville Dam on October 20, 1962. The festivities included boat races on the lake and a dedicatory address by Reclamation Commissioner Floyd Dominy. Prior to the dedication of the project, Reclamation transferred all project features to the Ochoco Irrigation District for care, operation, and maintenance, on September 17, 1962.¹⁸

The Crooked River Project consists of the Arthur R. Bowman Dam and Prineville Reservoir, the Ochoco Dam and Reservoir, the Barnes Butte and Ochoco Relift Pumping Plants, and related distribution works. Arthur R. Bowman Dam, an earthfill structure with a crest length of 800 feet, spans the Crooked River about twenty miles upstream from Prineville, Oregon. The structure itself stands 245 feet high and contains 1,424,000 cubic yards of material. An uncontrolled-crest inlet structure spillway extends from the right abutment; the outlet works intake structure is located upstream from the gate chamber. The outlet works has a capacity of 3,300 cubic feet per second. The resulting Prineville Reservoir has a total capacity of 154,700

16. "Annual Project History, Crooked River Project, Prineville, Oregon," Volume III, 1960, 17-9; "Annual Project History, Crooked River Project, Prineville, Oregon," Volume IV, 1961, 1962, 1963, 30, 37-9.

17. "Annual Project History, Crooked River Project, Prineville, Oregon," Volume IV, 1961, 1962, 1963, 40, 45.

18. "Annual Project History, Crooked River Project, Prineville, Oregon," Volume IV, 1961, 1962, 1963, 111, 145; Leo Busch, email to the author, March 19, 2001.

acre-feet and an active capacity of 152,800 acre-feet.

As rehabilitated, Ochoco Dam, a hydraulic-fill structure with a crest length of 1,350 feet, spans Ochoco Creek about six miles east of Prineville. The dam has a structural height of 125 feet, with a maximum base width of 700 feet and a top width of thirty-feet, and contains 750,000 cubic yards of material. An open concrete chute spillway extends from the left abutment of the dam. An outlet works through the dam conveys water directly to the Ochoco Canal with a wasteway into Ochoco Creek for additional and excess flows. Ochoco Reservoir has an active capacity of 46,500 acre-feet.

Lytle Creek Diversion Dam, a rockfill structure with a timber cutoff and embankment wing, spans Lytle Creek near Prineville. With a streambed height of four-feet and a crest length of 200 feet, the structure can divert seventy-two cubic feet of water per second. The headworks consist of three slide gates, and allow for the release of water into Rye Grass Ditch.

Located just under a mile from the city of Prineville, Barnes Butte Pumping Plant contains six pumping units with a combined total of 1,800 horsepower. Together, the pumps lift a maximum of 147 cubic feet of water per second from the end of the diversion canal to the head of the distribution canal.

The Ochoco Relift Pumping Plant contains five units with a combined total of 1,300 horsepower. Together the pumps lift a maximum of eighty cubic feet of water per second from the distribution canal to the Ochoco Main Canal for irrigation of lands west of McKay Creek.

The distribution canal serves all the Ochoco Irrigation District lands west of Barnes Butte. The canal carries water lifted by the Ochoco Relift Pumping Plant to Ochoco Main Canal near McKay Creek. With an initial capacity of 102 cubic feet per second, the distribution canal carries water almost sixteen miles in a northerly direction.

Six small pumping plants, as well as the necessary distribution works, were added to the project in the mid-1960s to serve an additional 3,450 acres of land. These features, and the land they serve, lie to the east and north of the original project area.

Water released from Ochoco Reservoir flows into the Ochoco Main Canal. This canal serves project lands east and north of Prineville. The Ochoco Relift Pumping Plant replenishes flows in the Ochoco Main Canal to serve lands west of McKay Creek.

Water released from Prineville Reservoir flows into Crooked River. From the river, water is diverted to project lands through a diversion canal six miles above Prineville. From the point of diversion, the diversion canal runs 8.3 miles north, serving lands along its course. After crossing Ochoco Creek, the canal ends at the Barnes Butte Pumping Plant. Barnes Butte Pumping Plant then lifts water into a 15.8-mile-long distribution canal running through the center of OID lands. Lytle Creek Diversion Dam and Wasteway capture the return flows from project lands in the Lytle Creek area. From the Diversion Dam, water is diverted into the Rye Grass Ditch.¹⁹

Post-Construction History

The Crooked River Extension

The Crooked River Extension was designed in the late 1950s, to provide adequate water to an additional 2,890 acres of land lying adjacent to the Crooked River Project. Congress authorized the extension in 1959. The Definite Plan Report was approved on April 22, 1966. The majority of the work involved construction of six additional small pumping plants – Combs Flat, Grimes Flat, Hudspeth, Johnson Creek, McKay, and Tunnel – and the related distribution system.

19. *Project Data*, 401, 403, 404; United States Department of the Interior, Bureau of Reclamation, *Standard Operating Procedure: Ochoco Dam*, Pacific Northwest Regional Office: April 2002, 2-1.

To facilitate construction of the extension, the Crooked River Construction Field Division project office was established at Prineville, Oregon, under the Baker Project Office. Reclamation opened bids for construction of the six additional pumping plants June 29, 1966. Bickle Company of Portland, Oregon, the low bidder, was awarded the contract a month later at the end of July. The contractor began excavating for the first of the pumping plants in October. Work continued steadily until 1970, when Reclamation accepted the contract as complete.²⁰

On November 18, 1969, Reclamation awarded a contract for modification of the Ochoco Relift and Barnes Butte Pumping Plants to Mann Construction Company, Inc. of Redmond, Oregon; the contract called for the addition of a second pump in both plants. The contractor began work on November 25, 1969. Work progressed without delay and Reclamation accepted the contract as essentially complete on May 22, 1970.²¹

On April 26, 1973, the name of Prineville Dam was changed to Arthur R. Bowman Dam; in honor of Judge Arthur R. Bowman. Judge Bowman actively promoted the construction of the Crooked River Project for irrigation and flood control, and was instrumental in its authorization.²²

The Ochoco Dam Safety of Dams Project, in 1991, reduced or eliminated safety of dams concerns to acceptable levels, and subsequently eliminated or reduced the safety hazards to downstream residents and property. Sinkhole areas were underlaid with needle-punched, non-woven geotextile. In addition, a high density polyethylene was installed on the upper right abutment to reduce water loss through the abutment.

Beginning in 1994, Reclamation undertook additional Safety of Dams modifications of

20. "Annual Project History, Crooked River Project, Prineville, Oregon," Volume VI, 1966-7, 176, 179, 197, 223; *Project Data*, 404.

21. "Annual Project History, Crooked River Project, Prineville, Oregon," Volume VIII, 1970-1, 7, 10.

22. Leo Busch, email to the author, March 19, 2001.

Ochoco Dam. Repairs included modification of the spillways, including constructing a roller compacted concrete stilling basin and plunge pool; raising the spillway walls; repairing concrete in the spillway floor; modifying the spillway crest structure and chute to improve flow characteristics; and constructing a channel return to Ochoco Creek. These repairs were completed in 1997. Also, in 1997, Ochoco Reservoir filled completely for the first time. Completion of the remainder of the modifications began in the fall of 1997. Work included installation and rehabilitation of drains, repairs to the gate tower, spillway sealing; low-flow bypass, and pasture restoration. All work had been completed by 1998.

A sinkhole area was discovered in the upstream embankment slope in May of 1995. Red volcanic cinders, zone 3 gravel drain material, and multi-colored aquarium rock material were used to backfill the sinkhole. The colored rock material was intended to mark the seepage path. A new intake was added to the front of the existing tower and the outlet works extension was eliminated.

In 1996, to address hydrologic issues the spillway was modified. Work included raising walls, partially rehabilitating the ogee crest and the existing chute, and adding a stilling basin and return channel. In 1997, modification work included partially repairing right abutment drains, placing a downstream filter blanket, restoring the downstream pasture area, and replacing the right abutment drain outfall. In 1998, work included modification of the entire East Drain and replacement of the West Drain. A transfer letter dated December 18, 1998, effectively transferred the Ochoco Dam Modification from construction status to O&M status.

In 1997, Reclamation began studying the reallocation of reservoir storage at Prineville Reservoir. Of the total active storage capacity of 152,800 acre-feet, Congress allocated 92,800 acre-feet for exclusive irrigation use; the additional 60,000 acre-feet was allocated to joint

irrigation and flood control use. Irrigators had contracted for 70,282 acre-feet of storage, leaving 82,518 acre-feet available. Reclamation manages the un-contracted acre-feet for instream flow, in-reservoir use, and supplemental irrigation in dry years. In addition, Congress allocated ten cubic-feet-per-second (cfs) to instream flow; by administrative decision, Reclamation increased that amount to seventy-five cfs. Though it is a major use, no water is currently allocated to recreation. The increasing popularity of Prineville Reservoir for recreation uses, requests for sale of the un-contracted water, and a desire to benefit the downstream fishery and Wild and Scenic River values, prompted the reallocation study. Still in progress, this effort involves other agencies and entities with natural resources management responsibilities in the area.

Reclamation is also in the process of studying safety concerns at Arthur R. Bowman Dam – specifically how to best protect the structure and downstream interests from any potential overtopping.²³

In the spring of 2001, Reclamation replaced the Crooked River Diversion fish screen. Located just downstream of the headworks, the new screen is a vertical flat plate screen and bypass pipe. The old screen was a rotary drum screen located in the canal just under two miles downstream from the headworks, and did not meet current fisheries standards. The screen placement had resulted in the stranding of hundreds of fish in the canal every year when the canal was shut down. At the same time, a low profile sheet pile weir was built across the river, just downstream from the headworks, to maintain appropriate water surface elevations for the diversion and proper operation of the new fish screen and bypass.²⁴

Settlement of the Project

23. Leo Busch, email to the author, March 19, 2001; *Standard Operating Procedure: Ochoco Dam*, 2-1, 2-2; *Prineville Reservoir Reallocation Study*, www.pn.usbr.gov/reg/ore/PrineH20.html, 1.

24. R. Dennis Hudson, email to the author, September 26, 2002.

The project was essentially an extension and addition to the existing irrigation works of the Ochoco Irrigation District. It provides full and supplemental water supplies to between 13,000 and 19,000 acres of land previously under cultivation. Additional lands were brought into cultivation after the construction of the Crooked River Project features, however most of these lands fell under the scope of the original Ochoco Project and were already owned by private entities. As such, there were no new project lands associated with this project.²⁵

Uses of Project Water

The primary use of project water is for irrigation of farmlands of the Ochoco Irrigation District. Principal crops grown include grain, hay and other forage crops, potatoes, and mint. A portion of the farmland on the project is also used as pasture for livestock.

The project also provides a much needed flood control benefit for the city of Prineville, Oregon. Based on forecast predictions, and guidelines set by the U.S. Army Corps of Engineers, flood control space is held in Ochoco Reservoir. This flood control space allows Reclamation to control Ochoco Creek below the dam to a flow of no more than 500 cubic feet per second. Similarly, flood control space in Prineville Reservoir allows Reclamation to control the flow of Crooked River to no more than 3,000 cubic feet per second below the dam.

Both Ochoco and Prineville Reservoirs provide recreation opportunities, and number among the most heavily used state parks in Oregon. In 1992, the two reservoirs had a combined number of visitor days just under 175,000. Ochoco Reservoir has eight miles of shoreline and twenty acres of public lands within the reservoir area. The recreation amenities include areas for camping, swimming, picnicking, and boat mooring and launching facilities. In addition, the

25. "Annual Project History, Crooked River Project, Prineville, Oregon," Volume I, 1957-8, 2-3; *Project Data*, 405-6; United States Department of the Interior, Bureau of Reclamation. *1992 Summary Statistics*. Denver, [1995], 154.

reservoir is stocked annually with rainbow trout, making for excellent fishing opportunities.

Prineville Reservoir has forty-three miles of shoreline and the reservoir area encompasses over 8,700 acres of public land. Recreation facilities include camping, picnicking, swimming, lodging, dining, and boat launching and mooring facilities; these facilities were constructed, and are maintained, by Crook County's park system, the State of Oregon, and a concessionaire. The reservoir also offers excellent warm- and cold-water fishing opportunities, at the same time, a trout fishery has developed in the river below the dam. The upper portion of the reservoir area was designated a wildlife management area – about 3,800 acres of land provide habitat to a variety of wildlife including mule deer and waterfowl.²⁶

Conclusion

The Crooked River Project epitomizes the general patterns of irrigation development in the west. A small group of irrigators banded together to build irrigation works: the Ochoco Project. The lack of expertise and money nearly bankrupted the project before the Bureau of Reclamation stepped in – at the request of the irrigators. With the aid of federal funds and Reclamation, the Ochoco Project was successfully rehabilitated and extended into the present day Crooked River Project; assuring the success and prosperity of local residents.

About the Author

Toni Rae Linenberger, a Colorado native, received her B.A. in History from The Colorado College in Colorado Springs, Colorado in 1996. In 1998, she earned a M.S. in Western American History from Utah State University in Logan, Utah. Ms. Linenberger's final paper, a case study entitled *A Dam for All Seasons: Hollywood, the Bureau of Reclamation, and Construction of Parker Dam*, explored the relationship between the growth of a small town in California and the development of the Colorado River.

26. *Project Data*, 405; *Summary Statistics*, 115.

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