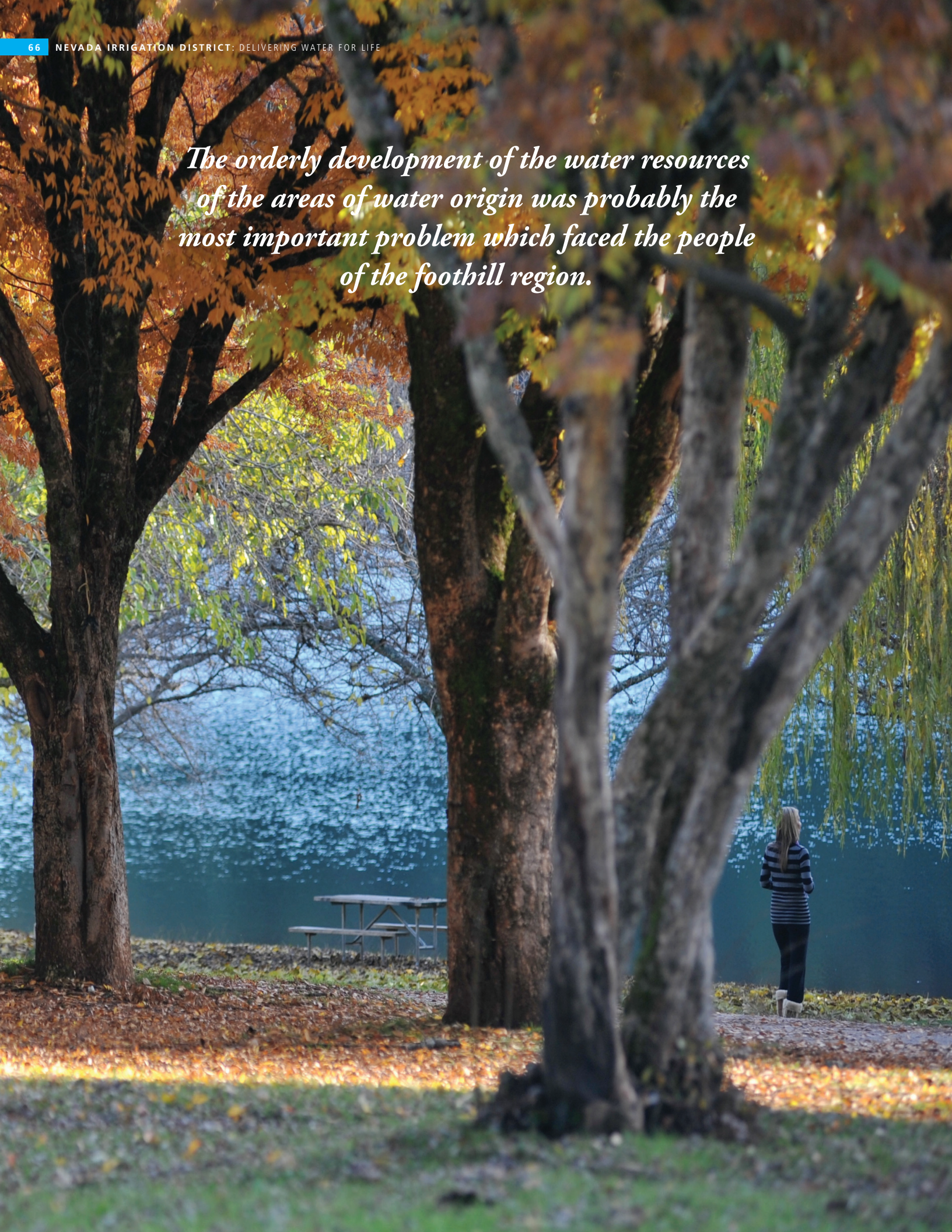


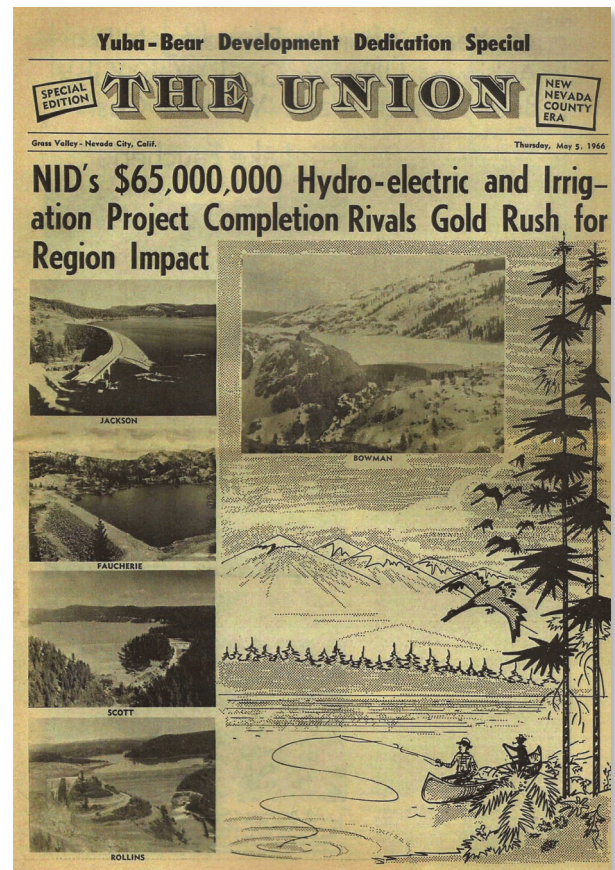
The orderly development of the water resources of the areas of water origin was probably the most important problem which faced the people of the foothill region.



CHAPTER 10

The Yuba-Bear Hydroelectric Project

NID develops its own water and
power resources



On Thursday, May 5, 1966, the front page in the Grass Valley Union newspaper blazoned the headline, "NID's \$65,000,000 Hydro-electric and Irrigation Project Completion Rivals Gold Rush for Region Impact."

General Manager Edwin Koster took pen to paper in the lead story, boldly declaring "45 years after its founding NID achieves ultimate goal with Yuba-Bear Hydroelectric Project water without cost." The manager wrote, "To tell about the Yuba-Bear River development on the Yuba and Bear Rivers is a sizable and complex order when full consideration is given to the importance and magnitude of the project. What the Nevada Irrigation District has accomplished without government aid provides an additional 162,000 acre-feet of water storage for the irrigation and domestic needs of the District. Water stored in the District distribution reservoirs of Scotts Flat and Rollins are without cost to the water user."

The lead-up to the announcement began years before, with the recruitment of Koster. In a later interview, he recalled he took the managerial position at NID in July 1957: "So my job was to do something about getting something moving and the first thing I did was to talk to the Rotary Club. I made a little speech there, to the Rotarians, but I wasn't really talking to them, I was talking to Norm Sutherland, the President of Pacific Gas & Electric Company. I said, 'I outlined the way I thought we had to go. If that doesn't work, there are other routes that we could take.' Then I had a call from Mr. Sutherland and made an appointment to see him. He said to me, 'Ed, what do you think needs to be done?' I said, 'Norm, I really don't know. My friends, some of them, tell me that Jackson Meadows is a great place to build something. Obviously I've been there. It's a good dam site. It's rock from top to bottom; that's why there's water there that I know of. We might replace the old facility at Faucherie because there used to be a dam there on the Canyon Creek.' Then I said, 'I want to move away from what the other engineers have wanted to build, a reservoir at Parker. That's not the place to put it. The place to put it is at Rollins at the head of the Bear River Canal. At least it will do us some good, and I think it'll do you some good. That's where the diversion needs to be. We'll have some regulation on the Bear River, where your Bear River Canal is.'"

That conversation got the ball rolling. By 1958, NID and PG&E were involved in detailed planning for what would become the Yuba-Bear Hydroelectric Project, which would be built from 1963 to 1966 for \$64 million, and remains the most significant project in District history.

Koster and the District Directors held the firm belief that hydroelectric energy production was the key to improving and increasing the efficiency and reliability of regional water supply, using the energy of falling water as it traveled to customers several thousand vertical feet down the mountains. The success of local hydroelectric production was already being proven by PG&E, in partnership with NID, and now it was time for the District to take its own place in the local power production network.

As a backdrop, by 1960, NID faced three major challenges. The first was in developing the hydroelectric energy potential of its mountain water systems. As part of this, the District needed to increase water availability to customers at a time when local reservoirs were running dry following peak usage periods. At the same time, the District needed to upgrade its domestic water systems that were coming under increasing scrutiny from state public health regulators who were calling for safer and more modern water treatment. The development of the hydropower system would help provide funding for a modern water treatment system to support the District's growing population.

The water and power project was studied for six years and included a detailed plan produced in 1958-1960 by Ebasco Engineering Services, Inc., a widely respected engineering and design firm formed by General Electric in 1905. In 1959 the initial engineering analyses were completed and the vision was about to become a reality.

The plan included eight reservoirs; 12 dams and diversions; four hydroelectric power plants; canals, tunnels and flumes; power transmission lines and roads; and recreation facilities that spanned a 400-square-mile area in Nevada, Placer and Sierra counties.

To finance the huge undertaking, NID proposed a \$65 million (about \$550 million in 2021 dollars) bond issue for construction. Under Koster's tireless leadership and promotion, community support mounted. In an August 7, 1962, election, NID voters overwhelmingly passed the bond issue by an overwhelming 97 percent support (2,225 to 59 votes) for construction of the project, perhaps the strongest show of support ever in a local election. Sweetening the deal, power generated by the project would be sold to PG&E, which would, in turn, repay the bonds issued to build it.

Importantly, the Yuba-Bear Project doubled the water storage available to NID customers, creating more than an additional 145,000 acre-feet of water storage as water supply and flood protection for the local community. The dry

reservoirs of late summer and fall would be only memories of the past. The water made available has helped make possible the lifestyle and economic success enjoyed today by the residents and businesses in Nevada and Placer counties.

Rollins Reservoir is a key component

The Yuba-Bear Project was, and still is, the largest single financial undertaking within the District to develop its own water and power resources. The construction of the 260-foot-tall gravel and rock-fill Rollins Dam and reservoir that could store 66,000 acre-feet of water was a major accomplishment. Located on the Bear River between Colfax and Grass Valley, the facility was designed to deliver water downstream for both irrigation and power use.

On August 24, 1963, 200 spectators gathered on the banks of the Bear River for a Yuba-Bear Project groundbreaking ceremony. The focus was on the demolition of the 196-foot high Nevada County Narrow Gauge Railroad trestle that crossed the Bear River Canyon at the site of today's Rollins Reservoir. However, despite all the planning and the explosive efforts of a demolition crew, the sturdy 810-foot-long trestle did not come down.

The Union newspaper reported, "The roar of two blasts resounded and clouds of thick dust rose and billowed. The bridge seemed to stretch, yawn a little, and then settle down to its original position. When the atmosphere cleared, the bridge appeared to be a little tired, but standing just as tall as its height allowed."

The ceremony proceeded, and the following day crews returned and brought the trestle down, using cables, tractors and burning torches.

Following the water

The Federal Energy Regulatory Commission (FERC) officially termed it Project No. 2266: "The Yuba-Bear Hydroelectric Project is located on the Middle and South Yuba River, and the Bear River in the Sierra Nevada Mountain Range. The Project involves the transfer of water from the Middle and South Yuba River to the Bear River basin."



Specifically, the Yuba-Bear Project plans identified the main water sources as the Middle Yuba River and Canyon Creek, which is a tributary of the South Yuba River. Jackson Meadows Dam, which stored water from the Middle Yuba River, diverts flows through the Milton-Bowman Diversion Conduit into Bowman Lake, an impoundment of Canyon Creek. In addition to Jackson Meadows and Bowman reservoirs, the Yuba-Bear Project planned to use water from 14 smaller high elevation Sierra reservoirs. The project proposed using flows that passed through the Bowman Powerhouse through the Bowman-Spaulding conduit to Lake Spaulding, an impoundment of the South Yuba River that was part of the interconnected Drum-Spaulding Hydroelectric Project owned by PG&E. Lake Spaulding was, and still is, an important hub of the system.

Below Lake Spaulding, water would pass through the Drum-Spaulding canals through Emigrant Gap into the upper Bear River, where it would power hydroelectric power plants on its long descent to Rollins Reservoir. Two of the hydroelectric power plants would be located at Dutch Flat No. 2 and Chicago Park.

The scheme was incredibly large; in fact, FERC deemed the Yuba-Bear Project and Drum-Spaulding Hydroelectric Project to be "the most physically and operationally complex hydroelectric projects in the United States."

The group participating in the signing of the paperwork to begin the ambitious Yuba-Bear Project included NID General Manager Ed Koster (back far right), Board Secretary Georgia Scoble (front left), and Directors Mel Brown and Vernon Vineyard (back far left).

Yuba-Bear Project: principal features

The construction work necessary for the Yuba-Bear Project was daunting, and focused on eight principal features:

Jackson Meadows Dam and Reservoir

A new rock-fill, earth-core dam was constructed at the headwaters of the Middle Yuba River

Milton-Bowman conduit improvements

The 1928 wood-stave pipe conduit was replaced with 3,300 feet of 7-foot-diameter steel-reinforced concrete. The Milton-Bowman tunnel was also repaired.

Faucherie Lake Dam

A new 40-foot-high rock-fill, asphalt faced dam was constructed on Canyon Creek.

Bowman-Spaulding conduit improvements

An existing metal flume portion of the conduit extending from Bowman Lake was replaced with a reinforced concrete flume and by 10,100 feet of tunnels. In addition, other portions of the conduit were improved.

Dutch Flat No. 2 Power Plant

A new outdoor power plant was constructed on the right bank of the Bear River with a generating capacity of 23,400 kilowatts. The five-mile long Dutch Flat Canal, which was to service this plant, was built primarily of reinforced concrete.

Dutch Flat Afterbay Dam

A new 175-foot-tall gravel-fill dam was constructed on the Bear River below the Dutch Flat Power Plant to impound 1,500 acre-feet of water.

Chicago Park Power Plant

A new outdoor power plant was constructed on the right side of the Bear River with a generating capacity of 37,350 kilowatts. A new four-mile-long Chicago Park Canal supplied water to the plant.

Rollins Dam

A new 260-foot-high gravel and rock-fill dam was constructed on the Bear River between Colfax and Grass Valley to create a new 825 acre-foot reservoir to impound 66,000 acre-feet of water. This was the lowermost structure to be built and served as a regulating reservoir to deliver water downstream for both irrigation and power use.

Construction of the Project begins

In 1963, NID and PG&E received new power licenses from FERC and entered into a 50-year contract through which NID would develop the project and market its energy production to PG&E. That same year project contractor Paul Hardeman, Inc. began work to construct the project.

“Without this contract with PG&E for the sale of power generated on this project, we could not have financed our bonds. As a result, additional water will be available without cost to the landowners of the District,” Koster said in a later interview.

During construction, the project employed crews ranging from 300 to 1,000 people, who worked up and down the project, which stretched nearly 50 miles from its headwaters above Jackson Meadows near the Sierra crest to Scotts Flat and Rollins reservoirs in the Sierra foothills. While the Scotts Flat Dam was not part of the Yuba-Bear Project, it was enlarged at the same time as the Yuba-Bear facilities were being constructed.

The October 1963 edition of Engineers News, published monthly by Local Union No. 3 of the International Union of Operating Engineers in San Francisco, summarized: “The Yuba-Bear River Project is off to a good start. The Paul Hardeman Inc. and Bedford Construction Co. Ltd., have numerous phases of this project under operation such as Jackson Meadows, Faucherie, Bowman Tunnel, Milton Tunnel, etc. The Ponderosa Contractors have the clearing well underway at Scotts Flat and Rollins Reservoir area, and John Tirey in the Jackson Meadows and Faucherie area. Gates and Fox moving right along on the diversion tunnels and have holed three at Jackson Meadows and are not lining same and meanwhile have gone underground at the Rollins site. Orville Constructors moving along on the roads into the Dutch Flat areas. The Granite Construction Co., who subbed the Scotts Flat & Rollins Dams, have a spread of pulls working one shift at present on the Scotts Flat Dam.”

Ebasco Services, the engineers and construction managers, issued quarterly reports to NID throughout the project. After the first year of

construction, the September 30, 1963 report by Ebasco's Engineer in Charge Cecil Pearce noted, "substantial progress during the period ending September 30 was made on the Yuba-Bear River Development."

Significantly, the report noted that the Scotts Flat development was the farthest along of all the projects. The work focused on efforts to double the water storage capacity of the existing reservoir. "The main embankment of the enlarged dam was raised to its final elevation, and during the past three months all effort has been placed on raising the spillway dam to its crest. A bridge is being constructed over the spillway dam making year-round passage possible for the first time."

The report also detailed the progress of various projects. For example, "Beginning in April, crews returned to work on the 7,000-foot Bowman Tunnel No. 2, and have now driven to within 100 feet of the outlet portal. The 1,600-foot bench which will carry the 84-inch concrete pipe connecting the tunnel to the flume is being excavated."

"In May the raising of the diversion dam and flume intake and the construction of the flume crossing at Fall Creek was completed. Excavating and shaping of the canals was started from Clear Creek downstream, followed closely by the gunite crews. During this same period cleanout and repair was started on the existing Texas Creek, Clear Creek, Fall Creek, Rucker Creek and Zion Hill Tunnels and the replacement of the redwood siphon at Jordan Creek. During June, this work was completed as was the raising of the diversion dam and intake canal wall at Bowman Lake."

In addition, the report noted the Dutch Flat power production facility, which was to extend five miles along the Bear River from the intake tunnel at Drum Afterbay to a point opposite the town of Dutch Flat, was about one-quarter complete.

Four miles downstream from Dutch Flat was the site of Chicago Park, the second and larger of the District's power developments. From the Dutch Flat Afterbay, water would flow via an 18-by-10-foot rectangular flume to the powerhouse:

During the ground-breaking ceremony, despite the best efforts, the Nevada County Narrow Gauge Railroad trestle that crossed the Bear River would not fall.



"The flume bench has been excavated, the bridges are substantially complete and the crew was placing the concrete flume in 400-foot sections. The small reservoir in the flume line at Little York Diggins is complete. The forebay on the ridge above the powerhouse site is being excavated and the penstock intake structure and all the penstock foundation blocks have been concreted. Excavation for the powerhouse has been completed and concrete for the substructure is being placed."

The proposed Rollins Reservoir, the lowest elevation feature of the project, was designed to collect and store water previously used to generate

NID Manager Edwin Koster inspects the work of Scotts Flat Dam on October 15, 1963.

In 1964, construction of Rollins Reservoir was making progress.



power at the upstream plants for irrigation and domestic use. "With completion of the diversion tunnel and intake structure the Bear River was diverted from its normal channel at the site of Rollins Dam. The upstream and downstream cofferdams were then constructed allowing work to proceed on excavating the core trench and beginning the placement of rock in the upstream shell zone. ... Excavation is also continuing on the spillway approach, ogee section and spillway chute on the right abutment."

The report noted Scotts Flat development was the farthest along in the efforts to double the water storage capacity of the existing reservoir that served the northwestern section of the District's distribution system. The main embankment of the enlarged dam was raised to its final elevation, "and during the past three months all effort has been placed on raising the spillway dam to its crest. ... A bridge is being constructed over the spillway dam making year-round passage possible for the first time."

Yuba-Bear Project gains momentum

At the close of the second year of the Yuba-Bear Project, construction in the Mountain Division was nearing completion. The Ebasco report noted, "Water storage requirements under the contract with Pacific Gas and Electric Co. have been assured in the new and existing District reservoirs at the 5,000-foot level and above. This

will guarantee adequate water to operate the District's power plants scheduled for completion at the end of the year. Other improvements as well as repairs to older existing facilities were also completed during the period in time to permit the District to meet the normal demand for water during the summer throughout its service area."

The report detailed that the Dutch Flat development included placement of the walls of a flume, which would be 14 feet wide and 7.5 feet high. The side spillway at the entrance to the Dutch Flat Forebay was complete, and the gates, guides and hoist at the penstock intake were complete. Construction of the Dutch Flat Powerhouse was about 80 percent complete. The forms had been constructed and concrete placed for the generator pedestal, and "the turbine and pressure regulator was installed and the generator is being assembled. Installation of accessory mechanical and electrical components is underway in the powerhouse and the oil circuit breaker and transformer have been placed on their foundations in the switchyard."

At the Bowman-Spaulding conduit project, 1,600 feet of 7-foot-diameter concrete pipe downstream of Tunnel No. 2 was completed. "Backfilling was carried on as the pipe was installed and the whole unit tied in to the system on June 26th. Downstream the water is carried in canals then through the completed Texas Creek tunnels and again by canal to the Jordan Creek Siphon.



NID workers inspect a segment of the old Bowman-Spaulding wood flume in 1964.

Guniting of the remaining canals was also completed during the final week of June.” The report noted summer water deliveries from the upper division reservoirs were scheduled to start in July: “During the last week of the quarter all facilities received a final checkout and water was moving through the new and renovated sections of the Bowman-Spaulding Conduit on June 30th timed to reach the point of delivery at midnight.”

In the final report, issued on September 30, 1965, Ebasco noted, “Twenty-seven months of construction progress have brought the Nevada Irrigation District Yuba-Bear River Development to 95% complete. Six of the major features of the project have been completed. Remaining are the powerhouses at Dutch Flat and Chicago Park, already past the 90% complete mark and scheduled for full operation on December 31, 1965. All Mountain Division units, dams, storage reservoirs and conduits, are already in operation. Starting in October water will be released through the Lower Division system to enable the testing and trial operation procedures to begin at the powerplants.”

On May 5, 1966, when the Yuba-Bear Project was officially completed within the \$65 million budget, General Manager Koster remarked, “What the Nevada Irrigation District has accomplished without government aid provides an additional 162,000 acre-feet of water storage for the irrigation and domestic needs of the District.”

The new infrastructure signaled the start of NID’s leading role in the state as a hydroelectric producer. Beginning in 1966 the Chicago Park and Dutch Flat powerhouses came online (with the Rollins powerhouse added in 1980). The addition of hydroelectric meant increased revenue. The 50-year bonds NID issued to build the project were fully repaid in 2012, while the project revenues continued to flow to the District for maintenance and upkeep of its complete power and water systems.

A two-day dedication ceremony of the Yuba-Bear Project was held on Friday, May 6, 1966, at the Grass Valley Veterans Memorial Building and on Saturday, May 7, 1966, at the Rollins Reservoir Overlook. The events were festive, celebrating the momentous accomplishment. From a water storage perspective, the project doubled the water storage available to NID customers. It also introduced organized recreation to NID’s portfolio through a 1966 state Davis-Grunsky grant of \$3.66 million for recreational improvements.

Recreation facilities open around reservoirs

The establishment of organized recreation at NID facilities, which was another component of the Yuba-Bear Project, was welcomed with open arms by the community. The Union newspaper on May 5, 1966, proclaimed, “Nevada County has always had a lot to boast about – such things

Frank Clendenen (middle) inspects steel framework to hold flume side forms to place concrete walls. Others pictured are Rex Reed (left) and Jim Brady.



In 1967, a family loads up the camping gear and boats, and heads to Scotts Flat.

as climate, varied elevation levels, four seasons, fishing and hunting spots, etc., but now that the Yuba-Bear River Development is completed, there's more reason than ever for being proud. The development is not only a credit to the county, but to the state as well."

The article detailed the work: "An additional recreation facility program, when completed, will provide the county with a total of 312 picnic sites and 472 family camping units. The sites of Rollins Dam, Scotts Flat, Lake Faucherie and Jackson Meadows Reservoir, will be the location centers for the picnic and camping areas. Rollins Dam will have two double lane and two single lane boat ramps with parking provided for 25 cars and boat trailers each lane of ramp, 80 family picnic units and 86 family camping units,

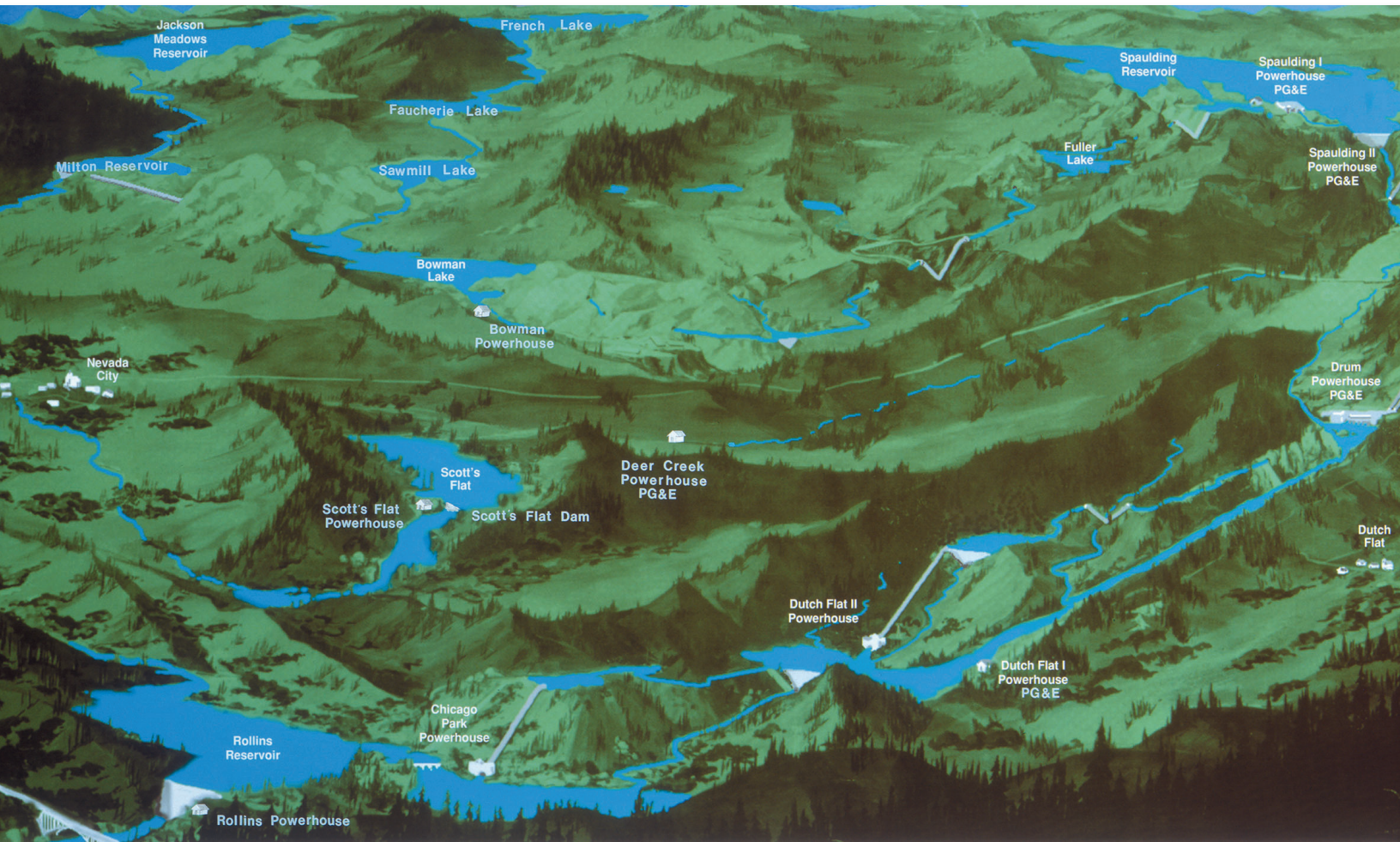
plus a swimming beach. Scotts Flat will have four lanes of ramp, 50 family picnic sites, 86 family camping units and two swimming beaches. Lake Faucherie will have five family sites and 20 family camping units. Jackson Meadow Reservoir will have one single lane and one double lane boat ramps, vehicle parking spaces, and 30 family picnic sites. Construction of benches, tables, and water facilities are now in progress. The completion date for the first start of the recreation planning is December 31, 1966."

In the same edition of *The Union*, Koster wrote: "The orderly development of the water resources of the areas of water origin was probably the most important problem which faced the people of the foothill region. The acuteness of the problem was aggravated by the fact that the people of California, during the past several years, have become conscious of the importance of water to their economy, and have been looking to all sources of water to support their economy.

"The Yuba-Bear River Water and Hydroelectric Project is solely owned and operated by the District. All physical features are unencumbered. It has added to the District's capital assets by more than \$50 million, without NID customers assuming any economic risk in the repayment of bonds either in interest or principal. The Yuba-Bear River Development is the largest single financial undertaking within the District to develop its own water and power resources. The only other single event which may surpass this development was the accidental discovery of gold in the Mother Lode in 1849. The decision will be judged by historians in the years to come, but certainly the District's Yuba-Bear River project is the largest undertaking since 1900.

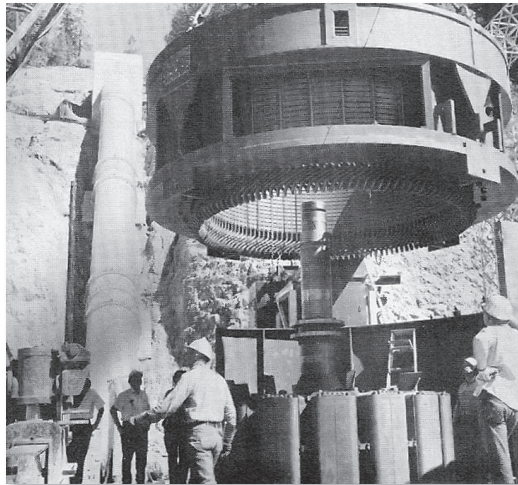
"There was no magic formula used to develop the Yuba-Bear River Project. The general ingredients consist of many years of study, planned engineering, clearing hurdles, and exercising faith and perseverance, which are the prelude to such developments as the Yuba-Bear River Project."

Koster left NID in 1968, moving from Penn Valley to Weimar in Placer County. He went on to serve for another 15 years on the Placer County Board



of Supervisors' Water Advisory Board and Placer County Water Agency Board of Directors. In all, Koster spent more than 40 years in water and power development. On a side note, he also was a noted ballroom dancer who enjoyed dancing well into his retirement years. He died in 1995 at age 90 at his Weimar home.

Succeeding him as general manager was Frank Clendenen, who served in the top post from May 1968 to July 1971. Clendenen first appeared before the District's Board of Directors in 1966, representing James M. Montgomery Consulting Engineers of Lafayette to discuss a status report summarizing the District's accomplishments and financial structure. He served as a consultant until appointed General Manager on April 24, 1968 with a unanimous vote by Directors. His salary was \$1,350 per month. ■



Dutch Flat No. 2 Powerhouse