Civil Works

Chapter One
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"Completion of the Bonneville second powerhouse is a major milestone in the effort begun half a century ago to fully and wisely utilize the Columbia River. The newest hydroelectric project on the Columbia reaffirms the principle firmly established by the original Bonneville Project – renewable energy resources are our region's most effective energy resources."
U.S. Senator Mark O. Hatfield, 1983

"Historically, the only questions we've asked is where and whether to build dams. And those questions are out of date."
Jim Bida, Oregon Natural Resources Council, 1994

"We realize these lakes are prime summer recreation spots. It's frustrating for us to not be able to meet the needs of all our customers all the time... we are dependent on Mother Nature."
Colonel Randall J. Butler, District Engineer, 2000

Bonneville second powerhouse

Lake recreation

Wetland restoration

Multipurpose Dams

When most people think of the Corps of Engineers they think of large dams. Yet the Portland District's work has been diverse, beginning in the 19th century with extensive hydrographic surveys and navigation improvements on the Columbia and Willamette rivers and along the coast. For the most part, the era of large dam-building lasted four decades in the Columbia Basin, spanning the 1930s through the 1970s. By 1980, this era had ended in the Pacific Northwest. After that time, the Corps became involved in restoring wetlands, expanding fish-passage facilities, and providing additional recreation facilities. Even so, as the Flood of 1996 and the power emergency of the early 21st century demonstrated, flood control and the generation of hydropower – made possible by large multipurpose dams – remained significant missions during the late 20th century.

The federal government funded construction of large multipurpose dams in the West, as individuals and private companies were unable to finance them. During the late 1920s, Congress authorized the Corps to compile information on stream flows, hydrography, topography, irrigable lands, and flood-prone areas, producing a comprehensive plan for developing the nation's water resources. The engineers began the plan for the Columbia River Basin in 1927, under the authority of that year's Rivers and Harbors Act, with the Seattle District surveying the Columbia River above the Snake and the Portland District studying the lower Columbia. The proposed large multipurpose projects provided hydropower, along with flood control, improvements in navigation, and irrigation.[1]

The District's large multipurpose dams represent a significant development in the Pacific Northwest. Few 20th-century projects brought greater economic benefits to the region than the dams along the Columbia River. Bonneville Dam, completed in 1938, ranked as "one of the major engineering and construction achievements of the century."[2] Located approximately 40 miles east of Portland, Bonneville was the first in a series of large multipurpose projects on the Columbia River. It

was followed by construction of The Dalles Dam, completed in 1957, and John Day Dam, completed in 1968. This system of dams provided inexpensive power to thousands of people, while also attracting industries to the region. Historically, the Pacific Northwest had depended on logging, mining, farming, and fishing – and the availability of affordable electricity diversified and expanded the region's economy, encouraging, for example, the location of aluminum industries in the area. Without the large multipurpose dams along the Columbia River, many residents would not live in Portland and Seattle today.[3]

The development of a system of dams along the Columbia River was in keeping with the ideals of the Progressive conservation movement, which emerged during the late 19th and early 20th centuries. Support for irrigation projects had been firmly rooted in the West since the early 20th century, with the passage of the Newlands Act in 1902 and the establishment of a Reclamation Service, which some early conservationists promoted. They were concerned that the nation's resources be used wisely and efficiently. Rivers, they believed, should be controlled to produce the maximum benefit to humans. Progressives in the early 20th century focused on eliminating waste, not on protecting habitat – and water that flowed down a river without being utilized to benefit humans was considered to be a wasted resource. By the 1920s and 1930s, this support had extended to generation of hydropower, and conservationists viewed the generation of electricity as an efficient use of water resources.[4] The environmental movement of the 1960s and 1970s brought new values and concerns that prompted many Americans to regard dams in a different light [See Chapter Four]. While this development discouraged new construction during the period 1980-2000 – affecting projects such as Elk Creek Dam – the District nevertheless continued to operate, maintain, and upgrade the large multipurpose projects built before this time.

Constructing a Second Powerhouse at Bonneville Lock and Dam

During the late 20th century, the populations of Oregon and Washington increased considerably. The number of people in Oregon expanded from approximately two million in 1970, to almost three-and-a-half million in 2000.[5] In Washington, the population surged from more than three million in 1970, to nearly six million in 2000.[6] With the growing population came increasing energy demands. On the Columbia River newly built dams in Canada and Montana were increasing the amount of flow. The existing system at Bonneville, however, could not utilize this additional flow, and much of the water was simply spilled. Recognizing this loss of potential hydropower, the Bonneville Power Administration in 1965 requested that the Corps begin planning work for a second powerhouse.[7]

In 1933 President Roosevelt had approved the Bonneville Project, and Congress authorized it in the Rivers and Harbors Act of August 30, 1935 (409 Stat 1028). The original Bonneville Project, completed in 1938, consisted of a spillway dam, powerhouse, and navigation lock. Authorization for completion, maintenance, and operation of Bonneville Dam was provided in Public Law 329, 75th Congress (50 Stat. 731, Approved August 20, 1937, 16 U.S.C. 832). The Bonneville Project Act authorized the construction of additional power facilities as requested by the Bonneville Power Administration.[8]

Before beginning construction, the Corps studied 11 potential sites for the new structure. Two were on the Oregon shore, one was on Bradford Island, and eight were on the Washington shore. Based on an analysis of the benefits and costs, and the requirement not to preempt a site for a future navigation lock, the Corps recommended the construction of a 558.2-megawatt powerhouse on the Washington shore of the Columbia River in 1971. In deciding on the plant's maximum capacity, the agency had to consider the presence of important anadromous fish runs and the heavy recreational use of the river [See Chapter Four].[9]

The site chosen for the new powerhouse presented a number of challenges. The area selected was located on the toe of an 800-year old landslide, the Cascade slide. This slide, which measures approximately three miles by five miles, originated on the Washington side of the Columbia River, forcing the river to the Oregon side of the gorge. Beginning in 1974, construction workers had to move sections of this slide, a possible source for the Native American legend of the "Bridge of the Gods," in order to build the powerhouse. Engineers also had to create a "dry" hole in which to construct the powerhouse. They built a two-foot-wide, 200-

Site of the new Bonneville Second Powerhouse showing the town of North Bonneville.

Concrete cut-off wall and the 40-acre excavation nicknamed the "bath tub"

Relocated highway bridge and railroad underpass

Archaeological excavation site of an Indian settlement

foot-deep, 5,360-foot-long, concrete cut-off wall around the powerhouse excavation. The cut-off wall was built to elevation 80 on three sides to protect up to the Bonneville pool elevation. On the tailrace side it reached elevation 30. This massive area, which extended over 40 acres and required the excavation of six million cubic yards, became nicknamed the "bath tub." [10]

During this time, archaeologists conducted their own excavations and unearthed a relatively undisturbed centuries-old Indian settlement that was first noted in the journals of explorers Lewis and Clark. Through their work, archeologists uncovered thousands of artifacts, and the site was nominated to the National Register of Historic Places. The work, which was completed in 1979, cost $1.2 million [See Chapter Three].[11]

Other physical challenges also awaited the contractors. The project required the relocation of three miles of Burlington Northern's main line railroad and four miles of Washington State Highway 14. Moving the rail line required contractors to construct a 22-foot-wide by 36-foot high, 1,400-foot-long tunnel through the Cascade slide debris. Relocation of the highway required moving three bridges and one underpass beneath the railroad. Costs for these relocation efforts totaled approximately $32 million.[12]

The largest controversy concerned the resettlement of the town of North Bonneville, which was located at the powerhouse site itself, to a location approximately two miles downstream. After several years of negotiations among town officials, citizens, and the Corps, the Corps agreed to fund and create a new community at a place to be selected by the residents. The relocation was largely completed by 1978.[13]

Despite both natural and social obstacles, the Corps carried on its work. In April 1978, the prime contract for the second powerhouse was awarded to a joint venture of S.J. Groves and Sons, Peter Kiewit and Sons, and Granite Construction. This contract, which was for more than $246 million, was the largest ever awarded to that time by the Corps for a water resource project – and various design changes during construction over the next four years would bring the cost to over $300 million. In the process of construction, workers excavated 23 million cubic yards of earth. This material was used to fill and contour the new North Bonneville townsite as well as Hamilton Island, which was adjacent to the new town. At the peak of the project, nearly 1,500 workers were employed. Furthermore, due to concerns about the pressing need for energy, the contract called for completion of the project in 54 months, instead of the eight years a project of this scope would have normally taken.

Relocation of the town of North Bonneville, downstream of the powerhouse construction.

To complete the powerhouse in 54 months it took round-the-clock construction. Workers started at both ends and worked toward the center

To speed construction, workers on the powerhouse started from both ends and moved toward the middle, working three shifts a day, seven days a week, for three years.[14]

Commercial operation of the first unit began in May 1981. On May 26, 1981, at a dedication ceremony, Lieutenant General J.K. Bratton, Chief of Engineers, called the project a "magnificent achievement." At the ceremony General Bratton also commented that he was "looking forward to its completion in the fall of 1982 and another full-power ceremony." The final unit was set in place in June 1982. Once completed, the second powerhouse measured 985 feet long, 221 feet wide, and 210 feet deep. The eight generators and two smaller fish water generators added 558,000 kilowatts of generating capacity, which more than doubled the project's previous capacity.[15] In 1983, the total cost of the project was estimated at $640 million.[16] A formal dedication ceremony was held on June 1, 1983 to celebrate the Bonneville second powerhouse, which was "probably the last dam of its type to be built on the mighty Columbia River." [17]

Although the powerhouse was essentially completed in 1983, several aspects of the project continued over the next two decades. Workers added finishing touches on landscaping and design work, for example, in the 1990s. In addition, the District enhanced amenities for visitors. These extensive facilities included a fish viewing building that allowed visitors to observe migrating salmon and steelhead and other species through viewing windows. The project also featured active displays explaining the geology and history of the area, as well as the workings of modern hydropower plant.[18]

The powerhouse also contained numerous fish facilities. While some of these dated to the project's original construction, many features were updated and modified. Migrating adult and juvenile salmon and steelhead traveled upstream and downstream of Bonneville Dam. Shad, lamprey, and other species also passed the project. The project featured fish ladders, a collection facility for tagging and monitoring adult fish, and a downstream fingerling bypass system [See Chapter Four].[19]

Corps officials also addressed mitigation issues for the second powerhouse. The construction of the structure altered the physical landscape considerably. According to a report by the Washington Department of Game, in the process of building the facility, approximately 1,000 acres of fish and wildlife habitat were destroyed. The bottomland affected by the powerhouse was once an area of abundant wildlife populations. As the Corps noted in its "Washington Environmental Atlas," this was "critical wildlife habitat." As a result of the construction of the second powerhouse, 45 acres of wetlands were filled or drained, large areas of Columbia River floodplain were covered with excavated materials, and elevations of lowland areas were changed.[20]

A U.S. Fish and Wildlife Service (USFWS) report detailed more specifically the ecological communities lost as a result of the powerhouse. The vegetation of the site before the project's construction consisted of a diverse mix of riparian areas, pasture, shrub, deciduous and coniferous forest, and wetland communities. The upland area around Bass and Greenleaf lakes was used by black-tailed deer, elk, bobcat, black bear, great horned owl, ruffed grouse, band-tailed pigeon, coyote, deer mouse, long-tailed vole, Beechy ground squirrel, Townsend mole, and other animals. Riparian areas in the project site provided habitat for waterfowl, furbearers, and many small birds and mammals. Several species of resident and anadromous fish made their home in the project's creeks and lakes.[21]

Second Powerhouse Visitor Center fish viewing and exhibits

Adult fish counting and tagging facility

The Washington Department of Game's report offered several recommendations to mitigate the loss of this habitat. One proposal included the development of Hamilton Island, situated downstream of Bonneville, for Canada geese and songbirds and refilling Bass Lake to replace fish losses. The USFWS also recommended several habitat improvement measures, which were primarily directed at Franz, Arthur, and Bass lakes – located along the Columbia River in Skamania County, Washington – and Hamilton Island.[22]

One of the wildlife mitigation projects that the Corps undertook was located at Cascade Island, Washington, which was formed during the construction of the second powerhouse. Following the powerhouse's completion, the engineers developed the island into a winter foraging area for geese. In 1992, they installed a permanent irrigation system on the island to make the area easier to maintain. New topsoil also was added along with reseeding. "This is a valuable gosling habitat," project manager Gail Lovell explained. "We'll continue to maintain the area as needs become more apparent." Unfortunately, the efforts to create new vegetation at Cascade Island were not very successful. While there are geese on the island, there has not been much new growth.[23]

The Steigerwald Lake wetlands became a prominent component of this mitigation. Located on a 1,500-acre floodplain along the Columbia River, the Steigerwald Lake wetland area sits adjacent to the city of Washougal, Washington. Throughout the 1980s, conservationists and various state and federal agencies discussed the future of the wetland. The debates focused on the price of the property, who would manage it, and how it would be restored. The Corps purchased the tract and transferred management of it to the USFWS, which incorporated it into the Steigerwald Lake National Wildlife Refuge. The refuge includes remnant and human-made wetlands, riparian community blocks, developed pastures, a remnant stand of white oak, and Gibbons Creek, which supports small remaining runs of coho salmon and steelhead as well as a variety of native, resident fish.[24]

The Bonneville second powerhouse was a major construction effort that considerably transformed the physical landscape. Built to ensure a steady supply of power to Pacific Northwest residents and industries, the structure symbolized the region's continued dependence on hydropower. As U.S. Senator Mark O. Hatfield observed at the plant's dedication, "Completion of the Bonneville second powerhouse is a major milestone in the effort begun half a century ago to fully and wisely utilize the Columbia River. The newest hydroelectric project on the Columbia reaffirms the principle firmly established by the original Bonneville Project – renewable energy resources are our region's most effective energy resources."[25]

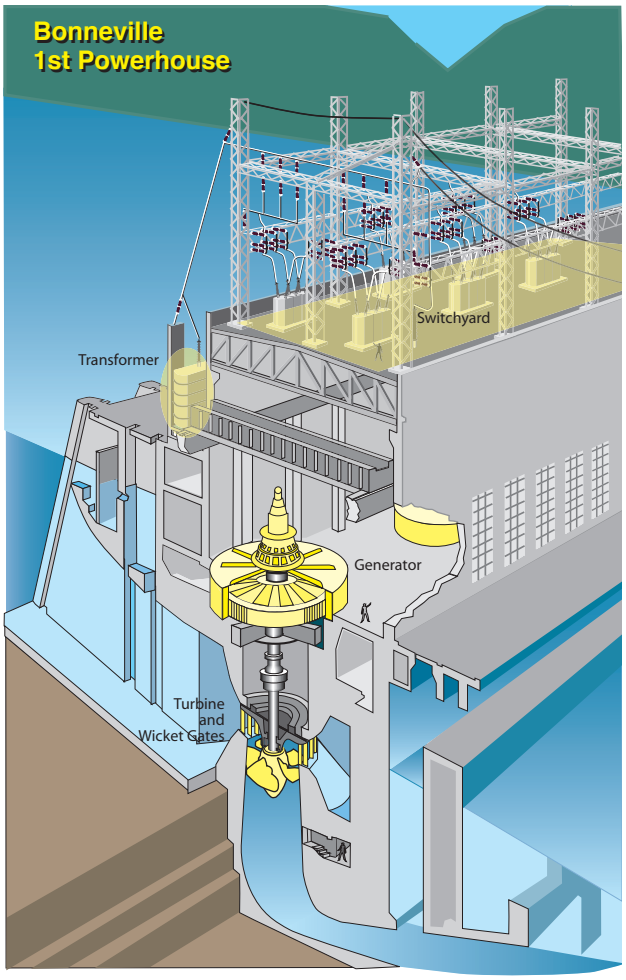
Rehabilitating the Original Powerhouse at Bonneville Lock and Dam

While constructing the second powerhouse was an important part of ensuring an adequate power supply in the Pacific Northwest, it was not enough to meet energy demands in the region. During the late 20th century, the original powerhouse at Bonneville, which had been in operation for over 50 years, showed signs of deterioration and declining reliability. Other Corps projects were also in need of rehabilitation during this period. Both John Day and The Dalles, for example, were updated and repaired, with work on The Dalles continuing into the 21st century. Some of the specific tasks included rewinding generators, refurbishing turbines, and replacing exciters.

At Bonneville, the Corps embarked on a major rehabilitation program for the powerhouse to ensure that the project would be capable of meeting power needs in the region. The rehabilitation of the original powerhouse, which began in 1993, included two phases. Phase I addressed issues concerning the powerhouse's transformers and switchyard. Phase II involved work on the turbines and generators. While work on phase II did not depend on completion of phase I, space limitations made it impossible to conduct the two phases simultaneously.[26] The goal of phase I was to replace the transformers and rehabilitate the switchyard. There were 21 main transformers at the powerhouse, 15 of which were installed between 1939 and 1941. Three additional transformers were added in 1945 and again in 1956. The transformers were an integral part of the powerhouse. They were the first link in connecting powerhouse generators to the Northwest power grid and converted the 13,800-volt output of the generators to the 115,00 and 230,000-volt levels used for cross-country transmission lines.[27]

Problems with the transformers appeared in the late 1980s. By the early 1990s, two of the original transformers had failed, and engineers suspected that the other ones were probably also nearing the end of their useful life. Furthermore, the original transformers employed an oil and water-cooling system that was worn out and also susceptible to breakdowns from internal leaks that allowed the water to contaminate the oil. This contamination would eventually lead to the failure of the transformer. In addition, the high-voltage connecting bushings on some of the original transformers contained insulation that had high concentrations of toxic Polychlorinated Biphenyls (PCBs). PCBs were commonly used in electrical insulation prior to the 1970s, because of the excellent fire-resistance.[28] These bushings measured 18 inches in diameter and six feet in length, and there was concern over potential PCB releases in the event of equipment failure. Finally, the original transformers posed maintenance difficulties. The transformers had five different manufacturers and vintages, making it hard to interchange spare parts and reducing the plant's versatility in the event of a failure.[29]

To address these issues, the Corps initiated a plan to replace the 21 original transformers with 15 larger ones. These new transformers would provide the same power capacity with renewed life expectancy, reduced maintenance requirements, greater operating flexibility, and no PCB hazards.



Phase I began in 1993 and was completed in the late 1990s. Asea Brown and Boveri of Hayward, California received the $27.1 million contract for the transformer work.[30]

The second component of phase I was to rehabilitate the 115 kV switchyard. The high-voltage switchyard at Bonneville carried huge amounts of electrical energy and contained the busses and switches that connected the main transformers to the transmission lines leaving Bonneville. It also housed the high voltage circuit breakers, which interrupted the full flow of transmission line power in an emergency.[31]

The aging switchyard at Bonneville increased fire, safety, and environmental dangers. The original circuit breakers, for example, were filled with large quantities of flammable insulating oil that frequently had to be transferred into the powerhouse for purification.

Work on the turbines in the First Powerouse

Leaks and contamination rendered unusable the piping system designed to deliver oil to the switchyard breakers, compelling Bonneville employees to transfer the oil using tanker trucks and hoses, which increased the risk of oil spills and fires. The presence of PCBs posed an additional hazard. The high-voltage bushings on the circuit breakers contained high concentrations of PCBs – some of which were more than 2,000 times over EPA standards. Corps officials worried that PCBs would be released if there were a catastrophic failure – and experience demonstrated that there was reason for concern. Between 1987 and 1993, two bushings exploded, damaging adjacent equipment and scattering PCB-contaminated insulating compound over a wide area. Agency officials worried that another explosion could expose workers or the public to PCB or that PCB-contaminated material would reach the Columbia River. In addition to safety concerns, maintenance of the 50-year-old breakers had become difficult due to the unavailability of parts. Custom made replacements were costly and caused long delays.[32]

The rehabilitation plan for the aging switchyard called for replacing the oil-filled circuit breakers with a newer design that allowed fewer breakers to be used, lowering the cost of rehabilitation. The updated breakers also used a non-flammable insulating material that allowed a less-expensive fire control system to be installed. Additionally, the new breakers were free of PCBs. By installing modern equipment, the Corps also ensured that spare parts for maintenance needs would be readily available, and, by installing uniform breakers, they reduced the costs of training and parts inventories. The Corps awarded a $1.72 million contract for this rehabilitation effort to Lamb Engineering and Construction Company of Salt Lake City, Utah.[33]

Phase II of the project, which continued into the early 21st century, improved the reliability of the powerhouse's 10 turbine-generator units. The turbines, which resembled enormous five-bladed fans, swept through a circle 23.5 feet in diameter, and each blade weighed nearly 13 tons. As water poured down over the blades it caused them to rotate, producing up to 74,000 HP per turbine. The power from the turning blades was then transferred to electrical generators through shafts more than three feet in diameter and over 50 feet long.[34]

Problems with this system emerged in the 1980s, when extensive fatigue cracks began to appear in the turbine blades of all powerhouse-generating units. Sections of the blades broke off, causing significant increases in total system power production costs. The

value of the lost power revenue from a 1984 turbine failure, for example, cost approximately $1.4 million. In addition to the problem of cracking blades, the total amount of energy that the powerhouse produced gradually declined. Surface erosion and repeated blade repairs caused a loss in efficiency of about 4.5 percent. Finally, there was evidence that deterioration in turbines might also result in significantly increased mortality in juvenile fish that passed through them.[35]

Phase II also addressed the generators at Bonneville's original powerhouse. The 10 synchronous generators converted rotating mechanical energy from the turbines into electrical energy. Each generator included a rotating field winding (rotor) and a stationary armature winding (stator). Over the years numerous stator coils suffered insulation failures that forced generators to be shut down. Heat, vibration, and expansion and contraction from thermal cycling and age all contributed to the insulation's breakdown. Some failed windings were repaired, while others required complete replacement. Without rehabilitation, however, stator reliability would have continued to deteriorate, causing more outages and unplanned repairs.[36]

To combat the decay, the Corps planned to replace the turbine hubs and blades in all 10 turbines. Replacing the turbine parts with modern fatigue-resistant designs and materials was the only long-term solution to the breakage problem. Newer turbine blades would also restore lost efficiency and add an additional one percent more power potential over the original capability. There was evidence to indicate that better efficiency would also positively impact fish passing through the dam. The Corps also intended to rewind the five generator stators that were in the worst condition.[37]

Phase II of the rehabilitation project was estimated to cost $89.1 million and would not be completed until 2010.[38] Voith Hydro Incorporated of York, Pennsylvania was awarded a $39.1 million contract to begin this phase of the project. The company's contract covered the design and supply of replacement parts and services for the powerhouse, including work on turbines and generators. The rehabilitation was expected to increase the output capacity of the 10 units by five percent, or 20,000 megawatt hours annually, each.[39] The Corps hoped that once the powerhouse was completely rehabilitated it would continue Bonneville's service in providing "stability to the power grid and reliable, economical hydropower to the western United States for decades to come."[40]

Building a New Navigation Lock

The new navigation lock at the Bonneville Lock and Dam was the District's last large-scale civil works project. While the original lock was still operable, after more than 50 years of service, it was clear to both river users and the Corps that a new lock was needed on the Columbia River. Construction on the new lock began in 1987, and by the spring of 1993, the lock opened to commercial traffic.

The Columbia and Snake rivers have long served as a vital transportation network for the Northwest. Together these rivers formed a water highway that ran 465 miles from the Pacific Ocean to Lewiston, Idaho. Keeping river traffic flowing smoothly and safely was of vital importance to the regional economy. It was crucial, therefore, that each of the locks on this river highway functioned appropriately. The original lock at Bonneville, completed in 1938, was the first of eight locks that stretched across the Columbia-Snake Inland Waterway. When first completed, it was the largest single lift lock in the world.[41] The farthest downstream, Bonneville handled the largest volume of commercial tonnage of all eight locks in the system. It was also, however, the smallest. Measuring 76 feet wide and 500 feet long, it had a water depth over the sill of 24 feet and a 66-foot maximum lift. To pass through this structure, tows with three or more standard-sized barges (42 feet by 220 feet) had to be separated and passed through the locks in smaller units and then recombined to continue their journey. As the years passed, the ability of the Bonneville lock to handle the growing amount of river traffic declined. Congestion delays were increasing, and the river's capacity as a transportation corridor was being constrained as the waterborne commerce through the lock neared its capacity.[42]

The project moved ahead when Congress authorized construction of a new navigation lock in the fiscal year 1985 Supplemental Appropriations Act, PL 99-88. Unlike many of the Corps' previous projects on the Columbia River, the

Site of the new navigation lock at Bonneville

Progress on the excavation site for the navigation lock. The Union Pacific railroad tracks were relocated and the "stealth wall" built.

Inland Waterway Trust Fund shared 50 percent of the project cost, in accordance with the Water Resources Development Act of 1986 (WRDA-86). A fuel tax on commercial vessels replenished the Inland Waterway Trust Fund.[43]

The new navigation lock was a major engineering project for the District, and its construction involved numerous contractors. The agency awarded the main lock construction contract in March 1990 to the joint venture of Kiewit Pacific Company of Vancouver, Washington and Al Johnson Construction Company of Minneapolis, Minnesota. This contract included construction of the upstream and downstream approach channels and the entire navigation lock. At $140.2 million, the contract was among the largest dollar bid offerings in the history of the District. The Corps also awarded a $34 million contract to the S.J. Groves Company (now Torno-America, Inc.) from El Dorado, California, for the construction of an upstream diaphragm wall. Other contracts were let for work on a guide wall, pontoons, water wells, and restoration of historic structures.[44]

Difficult site conditions challenged engineers and contractors throughout the project. Perhaps the biggest challenge was the fact that the site of the new lock was located in an area of historic landslide activity and variable underground geology. During the construction process, engineers checked plumbness and strictly controlled deflection to avoid starting landslides. An on-going program of instrument monitoring utilizing an Automatic Data Acquisition System (ADAS) continued to provide assurance that the ground was stable.[45]

The unique site conditions called for many innovative design solutions. Engineers had to plan, for example, a guard wall for site stabilization along the south bank of the upstream approach channel. The wall, completed in February 1991, required the relocation of roughly half a mile of the Union Pacific Railroad mainline. At 1,200 feet long, 135 feet high and 36 to 42 inches thick, it was a massive structure. Contractors built it using a slurry trench method because of the extremely limited workspace between the Columbia River and the railroad line on the Oregon shore. This method involved digging the trench for the wall, putting in reinforcing steel, and filling the trench with concrete. The wall was constructed entirely underground, and, as project manager David Brown joked, "It was called the 'Stealth Wall' during construction because it cost a lot, but you couldn't see it."[46]

Other creative engineering ideas were used in the construction of the guide walls. A unique floating guide wall was built at the upstream approach to assist traffic entering and leaving the lock. The guide wall included slots that allowed juvenile fish migrating downstream to pass through the wall and travel toward the fish bypass system.

Using RCC application on the downstream guide wall decreased the construction time on the navigation lock. These photos show working on the tunnels for filling and emptying conduits and designing the concrete swing bridge.

The downstream guide wall and wing wall were constructed of roller compacted concrete (RCC). When the wall was built it was the first application of RCC for a lock wall and was possibly the first soil foundation RCC wall. By permitting rapid construction, RCC decreased the length of the construction period and minimized the time required to have an open excavation at the toe of an ancient landslide.

In addition to the guard walls and guide walls, engineers incorporated other significant design features at the new navigation lock. Several drainage systems in and around the lock, for example, kept hydrostatic forces within design limits. The Corps developed a unique system beneath the lock floor using "popcorn" concrete that provided both the required foundation strength and eliminated the need for tiedown anchors to overcome uplift pressures. The lock chamber was formed within rock and used thin anchored concrete walls and tunnels for filling and emptying conduits – an economically efficient approach. Finally, the project included a concrete swing bridge at the downstream end of the lock. The bridge, which was mounted on a pedestal and swung out of the way to allow traffic through the lock, was only the third one of its kind in the world. Its unusual design included post tensioned, cast in place, concrete box girder construction. Unlike conventional swing bridges, which are made of steel, this one would not rust and required little maintenance.[47]

Designers of the new navigation lock relied extensively on modeling experiments conducted at the Corps' Waterways Experiment Station at Vicksburg, Mississippi. The station featured a large scale Columbia River model that enabled engineers to test numerous designs. Agency personnel used the model to design and locate the groins, which control currents. Columbia River towboat captains also traveled to Vicksburg to test concepts for approaches to the lock, using radio-controlled models.[48]

In the process of constructing the new lock, contractors excavated approximately 5.5 million cubic yards, enough rock and dirt to fill 687,500 standard-sized dump trucks. "Lined up end to end, these trucks would stretch 3,255 miles or clear across the United States!" noted a Corps public affairs publication.[49] So massive was this material that where to place it became an issue. At the request of several port authorities on the Bonneville pool, congressional action directed the Corps to provide excavated material, without cost, to upstream ports for use as fill material. Two Washington ports elected to receive the fill to make local municipal improvements; the Corps gave a combined total of 730,000 cubic yards of rock and dirt to the Ports of Klickitat and Skamania.[50] In addition to sending excavated material to various ports

in the area, the Corps also used it to create Canada goose habitat, some of which was destroyed during the project's construction. To mitigate the loss of nesting and brooding areas, the Corps constructed new habitat for the geese. The agency eliminated Bradford Island flat, for example, replacing it with a constructed island upstream of Eagle Creek.[51]

One of the biggest innovations of the project was the Corps' use of a management technique called "partnering." The new navigation lock was the District's first large project to use the partnering concept. This system employed a cooperative approach to contracting that, according to the Corps, was "an innovative, powerful management tool for transforming often negative, adversarial litigious construction relationships into positive cooperative morale- and profit-building experiences." After the award of a contract but before work began, the Corps and the contractor worked together to define long-term goals and objectives based on a commitment to a quality project, safety, timeliness, and cost-efficiency.[52]

Partnering played an important part in the construction of the new lock. It was used in the construction of the $34 million diaphragm wall, the replacement of fish hatchery wells, and the construction of the main lock.[53] The benefits of partnering on the navigation lock were immense. First, partnering dramatically reduced costs. According to David Brown, "With the project almost completed, through partnering, we have value engineered savings of $3.6 million." This amount of savings was unheard-of for a project this size. Second, partnering helped with safety concerns. "Since we started partnering with the contractors, we are not seeing the accidents like we have in the past," noted Chuck Galloway, resident engineer. "When we have an unsafe condition, we correct it together." Finally, partnering reduced the possibility of litigation on the project. "In the past, paperwork was done to support possible future claims and potential litigation," explained David Johnson, senior counsel for the Corps. "So far, we have not had any unresolved disputes."[54]

Tower, gates and navigation lock nearing completion. Earth removal opened the downstream to the Columbia River.

The benefits of partnering were a major theme of the various dedication speeches celebrating the new navigation lock. Lieutenant General Arthur Williams, Chief of Engineers, was especially appreciative of the role of partnering in the project. In his remarks on July 10, 1993, he thanked all the participants for taking a risk in trying a new approach. "I want to acknowledge all the individuals for their courage in undertaking this new style of working. None had done it before, nor had many others. There wasn't a track record they could point to. But it sounded like there might be a lot to gain, and there was." Later he added that, "Partnering on the new Bonneville lock is a success story not just for the team that built it, but for the Corps, the taxpayers, the construction industry, the users of the waterway, and the people of the Pacific Northwest. Everyone wins."[55]

In addition to highlighting the benefits of partnering, the new navigation lock also accomplished its goal of relieving the traffic bottleneck at Bonneville. On March 30, 1993, the lock, which cost approximately $331 million, opened to commercial traffic. Measuring 86 feet wide and 675 feet long, with

A double barge passes through the new navigation lock during the dedication ceremony. Completed lock with swing bridge and upstream floating guide wall. General Ernest Harrell, North Pacific Commander, dedicated the lock to the people of the United States of America.

an annual commercial shipping capacity of 30 million tons, the new lock corresponded to the seven locks upriver. The first upstream-bound commercial vessel through the lock was the tug *Clarkston*, operated by Brix Maritime of Portland, Oregon, with a tow of five barges. Heading downstream was the tug *Dauby*, operated by the SD & S Lumber Company of Bingen, Washington. Seventeen tows traveled through the new lock during the first 24 hours of operation. To pass the same number of tows through the original lock would have taken five 24-hour days. Furthermore, the new lock reduced the total amount of water use. Although it required 38 million gallons of water to fill, as compared to 17 million for the old lock, fewer trips through actually decreased the amount of water diverted for lock use. Major General Ernest J. Harrell, Commander of the North Pacific Division, spoke at the lock's dedication in 1993. "We in the Army Corps of Engineers are proud of this new navigation lock and the part we played ... in its construction," he remarked. "But make no mistake. This project doesn't belong to the Army Corps of Engineers. It belongs to all of us, the people of the United States of America. We pray it serves us well."[56]

The Battle for Elk Creek Dam

Elk Creek Dam marks a turning point in the District's history. While Bonneville represents an earlier era of big-dam construction, Elk Creek Dam signifies a shift in values and priorities in the Pacific Northwest. First proposed in the 1930s, this project has been embroiled in controversy since the 1980s. The debate over whether to build the structure reflected many of the new issues facing the Corps during the late 20th century. Located 1.7 miles above the confluence of Elk Creek and the Rogue River in Jackson County, Oregon, the dam is situated in the midst of critical salmon and trout habitat. Construction of the dam began in the mid-1980s, but was quickly halted by a federal injunction issued in response to environmentalists' concerns about its impact on the region's fish populations. Later, the debate shifted, focusing on whether the dam should be notched to allow fish passage. During the early 21st century, the partially completed structure stood as a monument to shifting environmental attitudes and values, reflecting the Corps' changing role in the 21st century.

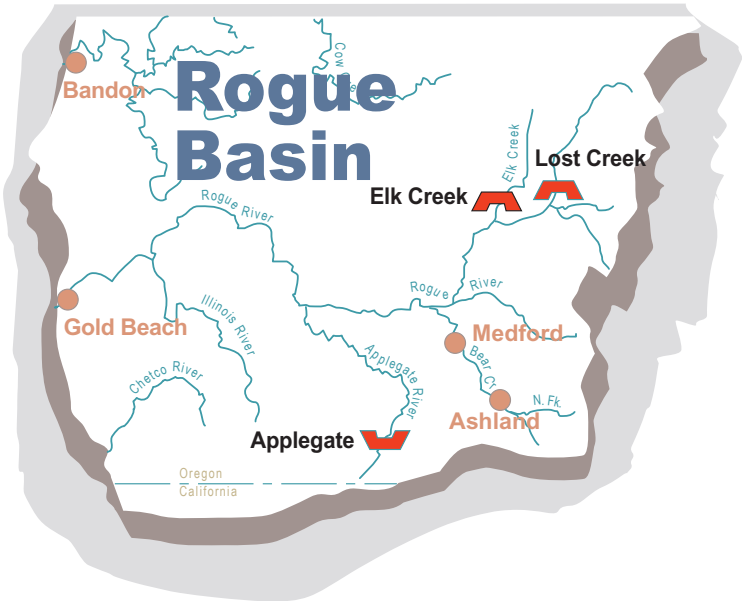
The Corps began planning for the Rogue River Basin in the 1930s in response to recurring floods in the basin. Sizable floods occurred in 1861, 1890, 1907, 1910, 1912, 1924, and 1927, washing away houses and barns, smashing bridges, and turning farm lands into enormous gravel beds. While these events created a widespread acceptance of the need for flood control measures, conservationists and anglers, who wanted to maintain the river's free running waters and healthy fish populations, resisted building dams or other flood control structures on the Rogue. Then in 1955 another flood wreaked havoc in the basin, causing an estimated four million dollars in damages and reigniting the movement toward flood control.[57]

Responding to pressure from local residents, Congress appropriated funds for flood control studies in fiscal year 1957. The challenge, however, was to provide flood control without destroying the Rogue's fisheries, and the solution came when the Corps included fish enhancements in the proposed project. Specifically, the Corps'

Rogue River Basin Project, which was authorized in 1962, included three multi purpose dams designed to operate as a system. The agency planned dams for Elk Creek, Lost Creek, and the Applegate River. In addition to its primary purpose of flood control, the dam at Elk Creek was also authorized to provide irrigation, a water supply for the area, recreation, fish and wildlife enhancement, and water quality control. By 1976 Lost Creek Dam was completed, and in 1980 Applegate Dam was completed.[58]

Both Lost Creek and Applegate dams presented numerous problems during their planning and construction phases – problems that also would plague Elk Creek. One issue was the economic viability of the projects. Critics questioned the benefit-to-cost ratio of the dams, accusing the Corps of using outdated interest rates in its calculations. When Congress authorized Lost Creek in 1962, for example, interest rates were three-and-one-eighth percent. But by the 1970s, when the Corps was conducting studies to build the dam, the rate had increased to five-and-one-eighth percent, and by 1972 the rate had reached seven percent. The District continued, though, to use the original, lower interest rate in its studies, admitting that the higher rate would diminish the benefit-to-cost ratio and make the project economically unjustifiable.

Another issue that arose was the Corps' preference for evaluating the projects using a systems approach. This meant that the agency measured the benefits of each individual project with total benefits divided among the projects. This method was called into question when the General Accounting Office (GAO) discovered on another project that while it was economically justified using a systems approach, it wasn't when evaluated on an incremental basis. Using an incremental approach meant that each individual component of a multi-system dam must be economically defensible without carry-over benefits from other projects. When the GAO asked the District to reevaluate Lost Creek on an incremental basis, the Corps refused.[59]



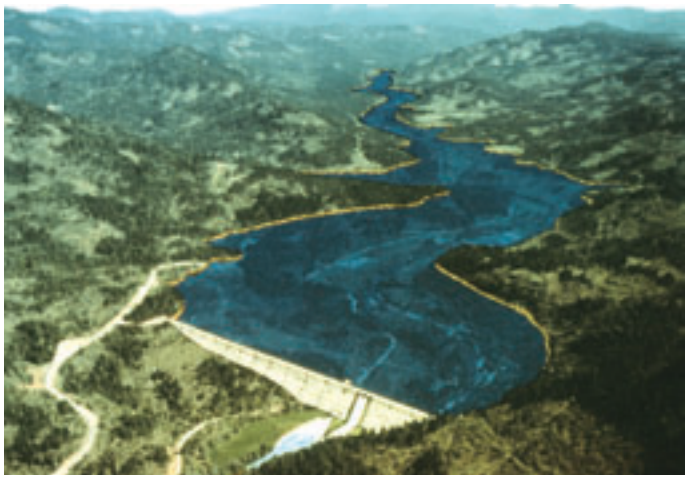
Elk Creek Dam site

In addition to economic considerations, environmental issues also haunted the Rogue River dams. In particular, opponents of the dams were concerned about increased turbidity, which threatened fish and other aquatic life. Many also feared the dams' impacts on wild fish runs. At one public meeting, an irate resident stated, "The concept that a magnificent species such as the steelhead can be replaced by pellet-fed, artificial trout that can be caught in Minnie's Trout Farm… is, I think, an idea that is grotesque to even the most casual observer."[60]

The debates over Elk Creek reflected many of the same concerns. In 1971, the District began construction of Elk Creek Dam by

Elk Creek Dam proposed site

Artist's concept of completed dam



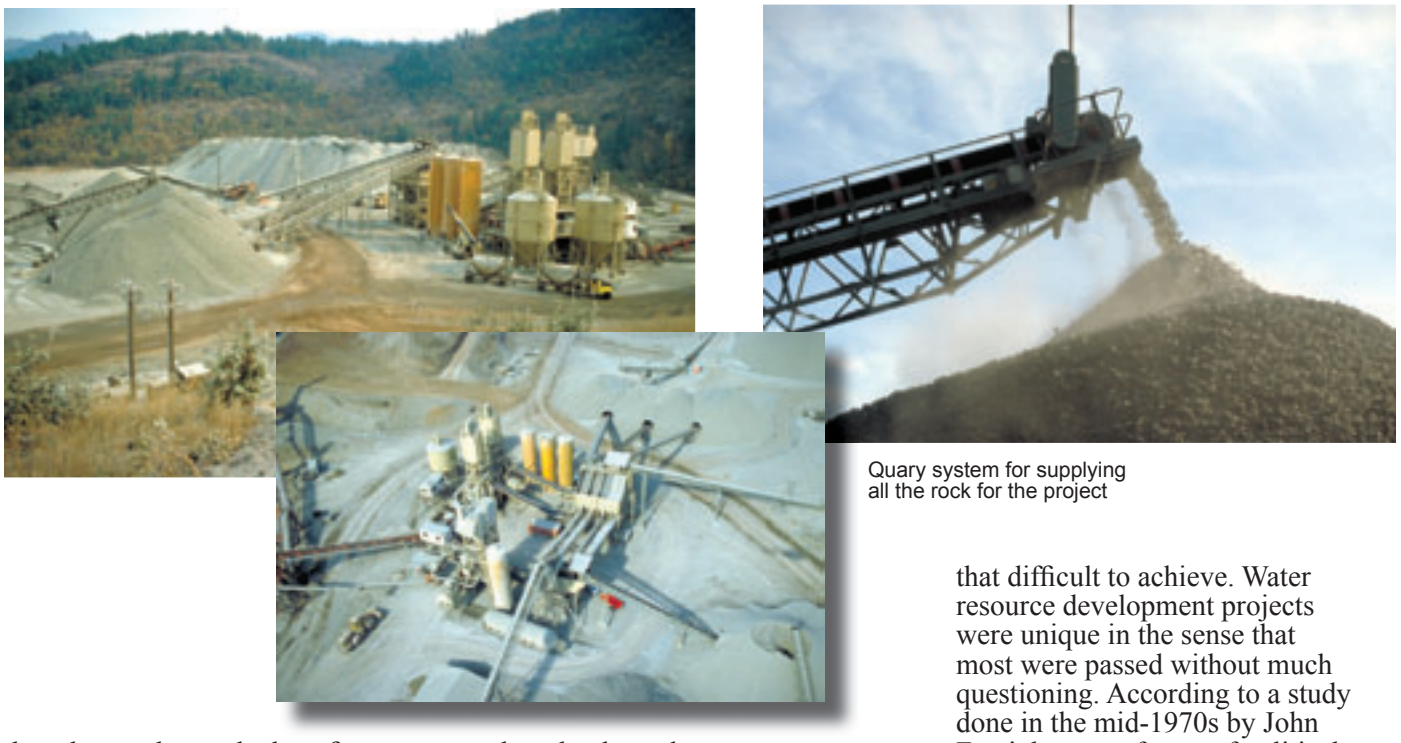
Early construction progress on the site of Elk Creek Dam

acquiring land, relocating residents, and moving various roads and utilities. The agency's plans called for a structure measuring 249-feet high and 2,580-feet wide, with three gated spillways to be built at an estimated cost of $77 million.[61] Over the next decade, however, the project did not progress much beyond this initial work due to environmental considerations. The biggest issue at the project was turbidity. The Corps outlined provisions to combat turbidity during construction, but did not believe it would be a problem after the project was completed. In July 1974, the District released its Rogue River Basin Water Temperature and Turbidity report, initiating a series of debates. The conflict over turbidity continued over the next year, culminating in the decision of the Oregon Water Policy Review Board to withdraw support of the project. The Board based its decision on several findings, primarily that the release of turbid water from the Elk Creek Reservoir would reduce the benefits of Lost Creek Dam and violate state water quality standards.[62]

Despite this strong blow against it, the project continued. The Corps announced that, while it could not meet the standards for a state discharge permit, it was still willing to work with the state to improve the situation. Oregon's two senators – Mark Hatfield and Bob Packwood – continued to support the dam, if turbidity could be controlled. The District began work on additional studies, and in 1979 it released Elk Creek Lake Water Quality Update Study. Like the 1974 report, this document continued to claim that turbidity would not be a problem at Elk Creek. Response to the Corps report was varied; many believed it was suspect due to the fact that studies for it had been done in 1977, a drought year. A Fish and Wildlife Service report found that turbidity levels would be much higher in normal flow years.[63]

Despite suspicions regarding the adequacy of the Corps' turbidity data, the Water Policy Review Board was convinced enough to reverse its 1975 decision, and, in April 1981, it voted to approve congressional funding. Although a final decision on the dam had not been made, in fiscal year 1982 Congress authorized $1.3 million to update and continue the project's design.[64] That same year the North Pacific Division Engineer signed a Record of Decision that read, "Decision is to proceed with construction of Elk Creek Lake Project subject to approval of funds by the U.S. Congress."[65]

Meanwhile, economic issues similar to those at Lost Creek Dam were cropping up at Elk Creek. According to the District's calculations, the project's benefits outweighed its cost. But not everyone agreed with the agency's method of analysis. U.S. Representative Jim Weaver, who had originally supported the dam, now opposed the project, questioning its economic merits. In 1980 Weaver asked the District to evaluate benefit-cost information for the dam using four different scenarios. Only when using a systems approach and a three-and-one quarter percent interest rate did the Corps find the project was economically justifiable. With



Quary system for supplying all the rock for the project

the other analyses, the benefit-to-cost ratio dropped to .80 to 1 and .32 to 1. Weaver then requested that the GAO evaluate Elk Creek on an economic basis. By March 1982, GAO had completed the study, questioning the Corps' estimates and recommending that the agency "reexamine the economic feasibility of the Elk Creek project and resolve the questions on project benefits and costs raised in our review."[66]

Given the project's shaky economic foundation and its potentially adverse environmental impacts, it is perhaps surprising that work on Elk Creek continued. In fact, by 1984 the Corps had moved to drop the project, and many in the District agreed with that decision, questioning the project's necessity.[67] "The Corps did not support it through the chain of command and all the way up," observed Tom White, a retired Corps economist. "There were a few people here and there who supported the project, but essentially the Corps' recommendation to Congress was that this was not a good idea."[68]

Yet, there were also powerful political forces at work in the Elk Creek debate that favored the project. The most prominent was Senator Hatfield, who was Governor when the three-dam system was conceived of in the early 1960s and a big champion of the project. Hatfield was not inclined to yield the project so readily. U.S. Representative Robert F. Smith, a Republican from Oregon who joined Weaver in representing the district where the dam was to be located, similarly continued to support the project. It was these two politicians – Hatfield in particular – that spearheaded the movement to kept Elk Creek Dam alive.[69]

While Elk Creek may have been unusual in terms of the controversy it generated, its intensely political nature was typical of most Corps water resource development projects, particularly during the period 1980-2000. "The Corps' mission is political," explained White. "Its priorities rise and fall with the political climate."[70] The process began with local interests seeking project funds by petitioning their senators and representatives, who in turn sought congressional appropriations for the project. Thus the success of a project often relied on the influence of an individual congressperson and his or her ability to garner support from fellow congressional members. Support was not, however, usually that difficult to achieve. Water resource development projects were unique in the sense that most were passed without much questioning. According to a study done in the mid-1970s by John Ferejohn, a professor of political science, members of Congress rarely debated the merits of water projects, preferring to allow funding of questionable works in other districts in exchange for reciprocal support when such projects came up for authorization in their areas.[71]

In the case of Elk Creek, Senator Hatfield was adamant that the project be built, and, through his efforts, in 1985 Congress appropriated $10 million construction dollars to build Elk Creek Dam over substantial environmental protest and congressional opposition. "Elk Creek is 'pork barrel,'" said White. "It just simply got added into the appropriations budget with the direction to the Corps, 'Here is the money, Corps, build the project.'" Despite its general lack of support for the project, once the money was appropriated, the Corps began construction. "The Corps operates under the Army for a reason; it knows how to take orders," observed White. "Once the Corps is given money, the Corps is reluctant to turn it down," he added. "There was a lot of pressure on units within the Corps to utilize or spend the money that they get. It's a serious sin to turn money back and say, 'Well, we didn't need this much money.'

Laying the outlet pipes and constructing the first core of the dam

Because if you didn't need it, then you don't get as much next time," said White.[72]

Further complicating the issues at Elk Creek was the relationship of Senator Hatfield to personnel in the District. "Hatfield wanted it," commented Tom Davis, the division's Chief of Planning, "and if Hatfield wanted it, Deb Olson, wanted it." According to Davis and White, Senator Hatfield managed to keep the project alive within the Division, despite opposition from the District and Corps Headquarters.[73]

Although Hatfield and certain individuals within the District supported the Elk Creek Dam, many other interests remained opposed to it, including Weaver. In the mid-1980s, this congressman made several attempts to stop the project. Opposing a development project in his own district, Weaver deviated from the typical "pork barrel" stereotype. In July 1985, for example, as the House considered H.R. 2959, an energy and water development appropriations bill, Weaver introduced an amendment to delete four million dollars that was slated for road construction at Elk Creek Dam. Elk Creek was "a $120 million dam that has no purpose," he stated. "It is a monument to nothing." In his arguments Weaver touched on a number of themes, including the fact that the Corps did not believe it a worthwhile project, finding it economically unsound. To support this claim he quoted a letter from Assistant Secretary of the Army William Gianelli. "Since the Elk project does not show current economic feasibility," Gianelli wrote, "the administration does not support inclusion of the project in the construction program." Weaver also stressed that Boise Cascade, a logging company and powerful economic force in the project area, opposed the dam because of restrictions on turbidity that would impact its ability to build roads and harvest timber. In a plea to fellow members of the house, Weaver argued that the dam was "a mind-boggling boondoggle" and reminded them that they could "kill it now with no ill effects." Smith, however, argued against the amendment, citing economic calculations that put the project in a favorable light and emphasizing that this road was "an economic necessity for logging in the Elk Creek Dam area…."[74] Perhaps due to fears about their own projects being questioned, members of the House rejected Weaver's amendment. Weaver attempted to stop the project on several other occasions, none of which were successful.[75]

Environmentalists also attempted to halt construction of Elk Creek. Following Congress' appropriations, several environmental organizations filed a lawsuit to stop the building of the dam, citing violations of the National Environmental Policy Act (NEPA). An initial court hearing on the lawsuit took place in the U.S. District Court for the District of Oregon, with Judge James M. Burns presiding. After hearing the case in March 1986, Judge Burns ruled to allow the Corps to proceed with work on the dam. Environmental groups, led by the Oregon Natural Resources Council (ONRC), appealed the court's decision and were granted a hearing before the Ninth Circuit Court of Appeals in San Francisco. In their appeal the ONRC cited concerns that increased turbidity and water temperatures would harm the Rogue's fishery. The Corps and dam proponents maintained that adequate measures had been taken to protect fish populations.[76]

After reviewing the case, the Ninth Circuit Court directed the Third District Court to issue an injunction to stop construction, and injunctive orders were issued

in September 1987. The court's decision was based upon their finding that the Corps' NEPA documentation was inadequate. The judge did allow work to continue until the dam reached one-third of its projected 249-foot height, which was attained early in 1988. The Ninth Circuit Court also directed the Corps to prepare a supplement to its Environmental Impact Statement (EIS). The court's decision to halt the dam was based on four major concerns. The first issue involved wildlife mitigation – opponents of the dam charged that the Corps' EIS failed to include a detailed analysis of wildlife mitigation measures or an explanation of the effectiveness of those measures. The second issue revolved around what was referred to as a "worst case" analysis. The court ruled that the Corps had failed to prepare a "worst case" analysis on the effects of Elk Creek Dam on Rogue River turbidity during high, average and normal-low rainwater run-off years. The third item raised by the court dealt with the "new information" issue. The court declared that the Corps had failed to analyze new information on the possible effects of turbidity and water warming on salmon and steelhead that came in after the District's EIS was completed. The court's fourth and final concern was that the Corps failed to consider the cumulative environmental impacts of all three Rogue Basin Projects – Elk Creek, Lost Creek, and Applegate dams.[77]

Following the Ninth Circuit Court's ruling, the District requested a rehearing, which was denied. They then requested a writ of certiorari (CERT), which essentially meant a Supreme Court review of a lower court's decision. That request was granted on June 27, 1988. In their hearing before the Supreme Court, which occurred on January 9, 1989, the District addressed the concerns raised by the Ninth Circuit Court. The first three issues were considered by the Supreme Court, but the fourth – cumulative impacts – was not reviewed. The Supreme Court reversed the Court of Appeals on all issues presented in the appeal, and the District commenced work on the supplemental EIS ordered by the Circuit Court.[78]

Over the next two years, the District conducted a series of environmental studies of Elk Creek Dam for the supplemental EIS. In their draft EIS, which was completed by November 1990, the Corps considered several operational options. They included the following: interim operation with a full pool, minimum flood control pool, and no conservation pool. Each of these interim alternatives would include flood control. A "no action" alternative was also examined. The District identified operation without a conservation pool – the "no pool" option as their preferred interim-operating alternative due to the lack

Roller compacted concrete (RCC) used on the surface of the structure

Aerial photo of Elk Creek Dam construction site as it reached the one-third height level. It would stay this way until the present day.

of demand for conservation storage. The cover letter to the supplement explained:

> The preferred interim-operating alternative is to initially operate the project without a conservation pool. Under this alternative there would be no conservation storage at the Elk Creek Lake project during the interim period: the reservoir would store water only during flood control operations. This alternative would minimize the impacts on fish and wildlife during the interim period until the need for conservation storage develops. This would have the least effect on flows, temperatures and turbidity levels in the Rogue River downstream of the project.

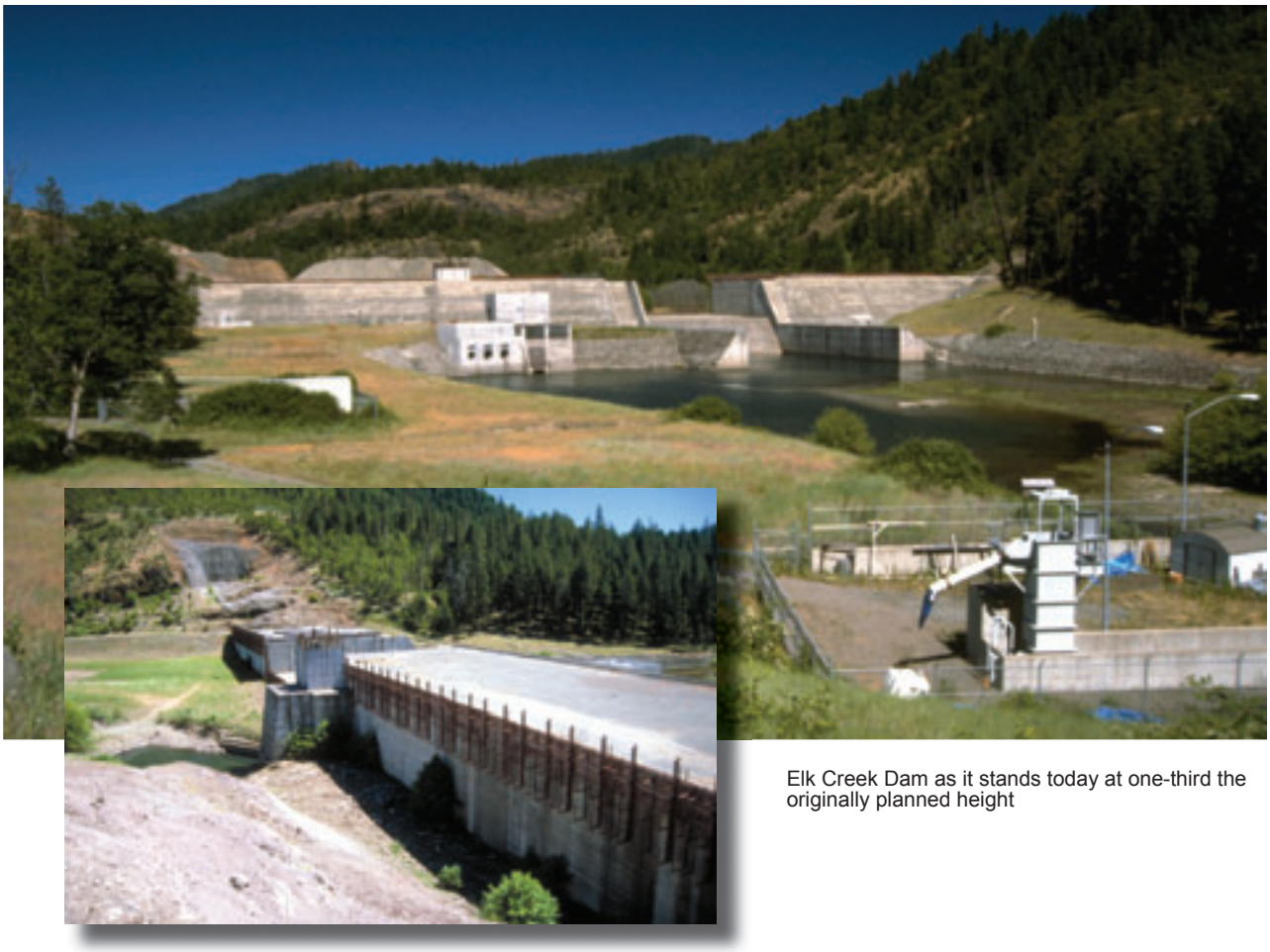
During the time that the EIS supplement was drafted, a Medford television station conducted an informal poll on the project. They found that 70 percent of respondents favored finishing the dam. Opinion split, however, when the issue of whether to operate it with or without a full reservoir was raised. Proponents of the full reservoir argued that it would increase recreational opportunities and would combat drought conditions.[79]

During the preparation of the draft EIS supplement, a confidential Corps' document was leaked regarding the future of the Elk Creek Dam. The document, which was written by Major General Pat M. Stevens, North Pacific Division Engineer, included a note about whether the dam should be terminated. It read, "Were that decision to be required today, I suspect I would recommend not resumption but termination in a mothball state." When contacted about the note, Stevens argued that the note was not a recommendation and was not binding.[80]

Despite this leak, work continued on the EIS and a final report was released in May 1991. During the review period the Corps received comments from federal, state, and local government agencies, as well as private citizens. One petition with 128 signatures and 755 letters were received during the review. None of the responses resulted in significant changes, however, to the agency's preferred alternative: construction and operation of the Elk Creek Project with no conservation storage. The Corps' selection of the "no pool" option did not rule out the possibility of conservation storage. As one report noted, "Ultimately the project could be operated using full conservation storage capacity to meet all authorized project purposes." The preferred alternative was to complete Elk Creek Dam, operating it for flood control only, with no conservation storage, until demand for conservation storage developed.[81]

Following the updated EIS, in 1993 the Elk Creek Dam project returned to the courts. Judge James M. Burns, U.S. District Court, District of Oregon, heard three motions related to the dam. The first was a July 1992 Corps motion to dissolve the 1987 injunction that stopped construction of the dam. The second motion studied by Judge Burns was a December 1992 ONRC motion to modify that 1987 injunction. The third motion, seeking to bar construction of the dam, was filed in January 1993 by the ONRC and other plaintiffs.[82]

During this period several stories about the dam appeared on the local television news. These detailed the history of the project and raised questions about the project's costs to taxpayers as well as its environmental impact. According to these stories, taxpayers had thus far spent $102 million on the dam. If the dam were completed it would cost an additional $70 million. Removing the dam and restoring Elk Creek to its natural state would cost approximately $10 million. At least six federal agencies lined up against the completion



Elk Creek Dam as it stands today at one-third the originally planned height

of the dam. The USFWS said that "removal of Elk Creek Dam" was the only way to save fish runs. Oregon Governor Barbara Roberts warned that the dam was a waste of money: "It's environmentally unsound, it's economically unsound. There is no way you can propose that dam today in 1993." Environmentalists also joined the debate, arguing that in addition to damaging fish populations, the flood control benefits of the project were overstated. "You can either spend $78 million to finish it and have this fish killer that has no need, or you can spend seven million to remove and restore," stated Andy Kerr of the ONRC. In another story he added that, "If the Congress of the United States continues to fund stupid projects like Elk Creek Dam, what it means is incremental continued environmental degradation. At the same time we're going deeper and deeper into debt."

The Corps, however, disagreed. "Our own internal biologists and engineers believe that we can in fact provide safe and effective passage for salmon through the project," Davis Moriuchi pointed out. Many of the residents of the town of Shady Cove, located near the dam, also wanted to see the dam completed – and they resented the intrusion of outsiders. One local woman, for example, complained at a town meeting that she was "fed up with southern Oregon being used as a scapegoat for those people sitting up in Salem telling us what we need and what we don't need before they check it out."[83]

In 1993, Judge Burns withdrew the three motions from submission, citing the Pacfish strategy endorsed by the Bureau of Land Management and the U.S. Forest Service. Burns stated that, "If adopted by the Departments of Agriculture and Interior, the Pacfish recommendations would restrict or prohibit many streamside activities..." Elements of the Pacfish plan, he said, "may have significant impact on the Elk Creek Dam project and the pending motions for injunctive relief...."[84] On February 1, 1994, the District received a decision and an order from Judge Burns. The judge dismissed the first lawsuit that had resulted in the 1987 injunction that stopped dam construction. He also withdrew the Corps' January 1992 Record of Decision, which explained that if the project was completed it would use the "no pool" alternative. Judge Burns also denied the ONRC motion to modify the 1987 injunction. Once again he ruled that the Corps could not continue with construction and directed them to consider new information on fish passage and the status of regional fisheries.[85]

The Judge's decision resonated deeply with both proponents of the dam and those who opposed it. It also left Corps officials in a

difficult situation. Bruce Bolme, Chief of Operations for the Rogue River Basin Project, explained the difficulties the agency faced in a television report on the dam. "Personally, it's quite frustrating because we haven't been given any people to maintain it and yet there's a substantial investment here already," he told reporters. "We've been told to preserve the assets. It costs about $30,000 a year to maintain the equipment and do other things that need to be done to make sure this place doesn't deteriorate. And there's no beneficial return from it."[86]

The ONRC remained equally adamant in its position on the dam. Spokesperson Jim Bida reminded the public that Elk Creek Dam "was proposed to control flooding on the Rogue River, but it was proposed with two other dams and both those dams are now complete. Flooding is controlled. So there is no real reason for Elk Creek Dam anymore. In addition to no need, the project is killing fish. And it's deteriorating the outstandingly remarkable Rogue River, which is known throughout the world for its recreation, scenic, and fishing values."[87]

Fish were at the center of many of the debates. Many dam proponents argued that the project would not injure salmon, and that, in fact, its ability to regulate the water flow would benefit fish. Opponents, however, did not agree and many congregated to protest the practice of transporting the fish in trucks around the dam. Other opponents of the dam focused on the economic aspects of the project, arguing that it represented a classic boondoggle. Bida asserted that the issues at stake went beyond just Elk Creek Dam. "It's time to start asking the question of whether or not existing dams should be allowed to remain," he explained. "Historically, the only questions we've asked is where and whether to build dams. And those questions are out of date." Even so, some local residents remained staunchly in favor of the dam. One man, clearly angered by the environmentalists' role in the process, remarked that, "You can't go by environmentalists ... why if you go by everything they say, why we wouldn't be able to do anything.

United Power Trades Organization

The United Power Trades Organization (UPTO) represents powerhouse trades and craftspeople throughout the Northwestern Division and is one of the few independent unions in the Corps. The union was formed in 1981 when a group of employees, frustrated by what they believed to be unfair wages and poor representation, decided to break away from the IBEW (International Brotherhood of Electrical Workers) and form their own union. The UPTO has 17 representatives with alternates, as well as an executive board consisting of seven members, which is elected every two years. The members of the executive board get a small stipend or salary.

As a federal employees union, the UPTO doesn't negotiate wages directly; instead they are set by wage surveys and a formula that averages the wages at the DOE (BPA) and BOR (Grand Coulee and other smaller Bureau projects in the region). Another difference between the UPTO and other unions is that the former is not technically allowed to strike. They also don't have as many benefits as some other unions. Conversely, one of the advantages of the UPTO for its members is that union dues are smaller. For this reason, the UPTO, unlike some other unions, does not give money to political candidates.

Since its establishment in 1981, the UPTO has accomplished several important tasks. In the late 1980s and early 1990s, for example, the Corps had attempted to contract out maintenance work at its powerhouses to supposedly save money. In response, the UPTO, with the help of other unions, got legislation passed through Congress, as part of the WRDA-1990, preventing this action. In 2000, the UPTO faced a similar struggle when the Corps once again tried to contract out work. This time the agency attempted a lighter version, where the work of running conduits, operating the heating and air conditioning system, and similar jobs would be contracted out. The union, however, feared that this measure would open the door to more contracting out and successfully opposed it.

According to Claud Leinbach, UPTO's Congressional Representative, the UPTO's success can be partially attributed to the backing it has received from Congress. "Congress understands the importance of our work," he said. Indeed, Corps projects supply 40 to 50 percent of the region's hydropower. Leinbach observed that another reason the UPTO has made significant achievements is because of the Division's highly skilled blue-collar workforce. These employees are dedicated to their work and place a good deal of importance on their job. "We're at the ground level," Leinbach explained. "We're the ones who do the actual work out here."

Wouldn't be able to walk in the woods even. 'Cause you might kill something crawling on the ground."[88]

In April 1995 the battle moved to the federal appeals court, where the Ninth Circuit Court ruled that the Corps' efforts were inadequate, specifically citing failure to examine water quality issues and the scarcity of wild coho salmon. The court required that the agency undertake a comprehensive review of a wide range of issues under NEPA before any further construction could occur. The Corps decided, however, not to perform the NEPA studies necessary to remove the injunction against completion of the project. This decision was based on the cost and time required to respond to the Ninth Circuit Court opinion without any certainty of success. Furthermore, the agency was facing a period of restrictive federal budgets. On November 6, 1995, the District notified the Congressional Appropriations Committee of its intention to evaluate options for long-term management of the project in its unfinished state. Congress made funds available for the Corps to manage the dam in its unfinished state in the Energy and Water Development Appropriations Act of fiscal year 1997. It also directed the Corps to take the necessary steps to provide passive (hands-off) fish passage through the project.[89]

The latter directive proved to be a formidable political challenge, and one that continued to be unresolved into the 21st century. Following Congress' request that the Corps provide passive fish passage at Elk Creek, the agency drew up plans to modify the dam and eliminate the trap-and-haul system in which fish were physically handled. This system was not designed for long-term use, nor was it meant to be used in the relatively uncontrolled flow and debris accumulating conditions that occurred with the unfinished project. One problem that arose was that adult fish were able to pass over the barrier weir at high flows (and the weir was knocked out by debris on several occasions), trapping the fish between the dam and the weir.

To provide passive fish passage, the Corps planned to remove a section of the dam. This action would include removing a portion of the dam's spillway and left abutment, realigning the stream above and below the dam, and placing features in the stream and streambank to maintain adequate flow velocities for fish passage. The cut through the dam would measure 150 feet wide at the base and 225 feet wide at the top of the dam. The size of the cut was based on the need to meet fish passage velocity criteria that were coordinated with and recommended by state and federal fishery resource agencies.

According to Elk Creek Project Manager Doug Clarke, the Corps proposal was the most cost-effective and biologically sound way to provide fish passage at the project. Furthermore, by notching the dam rather than completely removing it, the Corps was able to avoid making the decision that the dam would never be completed in the future. The Oregon Department of Fish and Wildlife (ODFW), the National Marine Fisheries Service (NMFS), and the USFWS all reviewed the plan and concurred that the trap-and-haul method should be eliminated and the dam physically modified. Furthermore, because the Corps would take steps to preserve the remaining portion of the structure, the work would not rule out completion of the project in the future. The agency had originally hoped to complete the work by the end of 1998, if funds were available. Modifying the dam was expected to cost seven million dollars.[90]

The Corps proposal to remove a portion of the dam – or notch it – was supported by numerous agencies at a series of congressional meetings held by the House of Representatives Agricultural Committee and overseen by Oregon Congressman Smith. A biologist at the ODFW explained that "Our agency supports the Corps of Engineers' proposal to do the work because it provides the most assured way to provide unobstructed fish passage within Elk Creek for migratory salmonid fishes, including coho salmon and steelhead."[91] Elizabeth Gaar of the NMFS also regarded the idea of notching the dam as the best option for fish passage. As she explained, "The proposed notch, or partial removal of Elk Creek Dam, will eliminate all of these fish passage problems, as well as restore the historically productive coho and steelhead habitat in the dam and pool area."[92] Corps officials reinforced the agency's position at the meeting, stating that the goal was "to provide passive fish passage and a balanced river system that requires minimal action and funding to maintain the stream channel and passive corridor on an annual basis."[93]

Dam proponents, however, remained steadfast in their opposition to the plan to notch the structure. One speaker at the meeting pointed out that "if we want to improve wild fish production and we have eight billion dollars to spend, why don't we spend it somewhere where we don't have to start by destroying an 180 million dollar investment that the American taxpayer has already made." Many of those who favored the dam feared that if the notch was approved, the project would never be completed. One protester remarked that, "We've wasted enough money. We could have done everything. Now this opposition, if they want Elk Creek to spawn salmon, they're going to have to bury a tunnel clear to the top, pump the water up there, and let her come back down." Martin Bauer of the Rogue River Basin Association expressed concerns over the future of water needs in the valley. "I feel absolutely passionate about this," he said. "We need to look to the future, what we need for water, in this valley and in the future. It's ridiculous to tear out this dam right at the time when we're showing more and more need for it."[94]

The dam proponents proved to be a powerful lobby. Their opposition to notching the dam resulted in a five-year effort to alter the half-built structure. The Corps' effort to notch the dam was blocked at the congressional level first by Representative Smith and later by Representative Greg Walden. Senator Hatfield also continued to push for

the project until he left the Congress in 1997. The two congressmen inserted language into Corps funding bills requiring the agency to continue trapping and hauling fish around the dam site.

In February 2001, however, proponents of the notching received a boost from the NMFS. The agency reported that cutting a 150-foot section out of the concrete dam and restoring the creek's channel was the only alternative that would not jeopardize threatened coho salmon and other species using upstream spawning grounds. The NMFS report also concluded that the current program of trucking and hauling the salmon and steelhead around the dam was not a viable long-term solution, even if facilities were upgraded. Clarke noted that the Corps has "always believed that notching is better biologically and cheaper than trapping and hauling. Now, we have a scientific opinion ... that will provide added justification for it."[95]

Not everyone was pleased with the findings of the report. Jackson County Commissioner Ric Holt spoke against the biological opinion, arguing that notching the dam would ruin the half-built structure, which he believed should be used to store water, avert floods, and even provide some hydroelectric power for Rogue Valley residents. "They'll have one hell of a fight on their hands," Holt warned. "You think chaining to log trucks was in vogue back when, you ain't seen nothing yet. There's ... a lot of people out there who will stand up for that dam at almost any cost." Environmentalists, however, planned to continue their struggle to reopen Elk Creek to in-stream fish passage. "That little basin is tremendously important for recovery of salmon and steelhead in the Rogue River," observed Wendell Wood of the ONRC. "It is the classic ... boondoggle, pork-barrel-type project. Some projects are real turkeys, and they should never have been built."[96]

When the initial plans for Elk Creek Dam were developed several decades ago, few suspected that the project would become such contested territory. At the time it was authorized in the 1960s, damming for flood control purposes was still an accepted practice throughout much of the country. But when construction began in the 1980s, public attitudes were shifting, and the environmental movement had helped create an awareness of the importance of fish and wildlife in the region. Citing violations to NEPA, environmental groups throughout Oregon banded together to fight Elk Creek Dam. Their efforts were aided by an unusual coalition, including the timber industry and a maverick U.S. Representative, Jim Weaver. In addition to environmental concerns, opponents of the project also argued that it was economically unjustifiable.

With strong environmental and economic evidence mounting against the dam, the Corps began to reconsider the project, and by the mid-1980s the agency had attempted to drop Elk Creek Dam altogether. Yet there were powerful interests at work who favored the completion of the dam, most notably Senator Hatfield. The fact that the project continued in spite of the Corps' majority opinion that the dam was not worthwhile illustrated the power of congressional politics to influence water resource development projects and the direction of the Corps. While Hatfield was helped in his efforts by an alliance with a senior Corps official, the agency's deference to Congress was by no means atypical.

Despite the backing of Hatfield, however, the project continued to be attacked by environmentalists and agencies concerned with ensuring the survival of salmon populations in the Rogue. In response to this increasing pressure and the listing of several species of fish, by the 1990s the Corps had decided that it would no longer pursue a dam at Elk Creek and proposed to notch the dam to allow passive fish passage. The fact that the fight over Elk Creek continued into the 21st century illustrated that a great divide still existed between various interest groups and reflected the diversity of stakeholders in the region. Less obvious to the casual observer, it also exposed the intricate connections between water resource projects and congressional politics. At stake was more than simply flood control and salmon, for Elk Creek had come to symbolize the tensions over how humans could coexist with a rapidly changing natural environment in the Pacific Northwest.

Recreation

During the mid-20th century, Congress expanded the Corps' missions to include recreation. While historically the agency focused on flood control, hydropower, and navigation needs, many of the Corps' water resource projects also offered recreational opportunities, such as boating, fishing, hiking, and camping. So prominent did these activities become that by the late 20th century they represented the Corps' most visible work to a large segment of the public. The increasing number of people using the District's facilities for recreational purposes brought new challenges, including funding cutbacks, conflicts among different user groups, and competing needs for recreation and fisheries. In response to these challenges, the agency identified creative solutions, including changes in funding, management, and construction. Some of these issues, however, did not present an easy solution. While not everyone was satisfied with these changes or the Corps' management of its facilities, recreation continued to be a significant component of the District's projects.

The growth in recreation in Portland and the Pacific Northwest was part of a larger phenomenon in the nation's tourism and recreation industry. Following World War II, the demand for recreational opportunities increased considerably. Travel for recreation had fallen sharply during the war. Gas rationing decreased the amount of automobile trips, and many resorts closed for the duration of the conflict. After 1945, resorts reopened and businesses along the nation's highways boomed. Not only did people have more money after the war, they also had more time for leisure activities due to shorter work weeks and longer vacation periods. In 1940 the average

work week was 44 hours. By 1950, however, it had fallen to 40 hours, and by 1960 it had dropped to 37.5 hours.[97]

Many of the people who traveled during the post World War II period wanted to spend their time enjoying the outdoors, as an increasingly urban population sought contact with nature.[98] Partly in response to the nation's desire for outdoor leisure opportunities, the Flood Control Act of 1944, as amended, authorized the Corps to construct, maintain, and operate public park and recreational facilities at its projects, and it directed that the water areas of these projects should be open to public use for boating, fishing, and other related purposes. The statute also permitted others to build, maintain, and operate these facilities. Subsequent legislation, such as the Federal Water Project Recreation Act of 1965 and specific project authorization acts, strengthened the agency's mandate to provide for recreation at its water resources projects.[99]

While the Flood Control Act of 1944 provided the authority necessary for the Corps to undertake recreation projects, the agency did not become closely associated with this activity until the mid-1960s.[100] Thereafter, the "recreation business" developed considerably over the next several decades and brought with it considerable public visibility to the agency. At Bonneville Lock and Dam, for example, the public had been visiting the project since it opened in the 1930s. Park rangers, however, were not hired until the late 1970s.[101] The concept of hiring personnel whose major responsibility was interacting with visitors was a relatively modern phenomenon.

The Corps first began counting visits to its sites in 1952, when there were 30 million days of use (a day of use is measured by the number of people visiting a site during a 24 hour period). That number steadily increased, and by 1980 more than 457 million people had visited the Corps' lakeside recreation areas. Throughout the 1980s and 1990s, the Corps was the nation's second largest federal provider of recreation, based on the number of visitor hours. The agency was second only to the United States Forest Service. Contributing to the popularity of the Corps' facilities was their accessibility; more than 80 percent of the sites were located within a 50-mile radius of urban areas with a population of more than 50,000.[102]

Within the North Pacific Division, Portland was second for the number of recreation visits. Nationally, out of more than 40 districts, the District ranked 21st. The number of visitors to the District's facilities may have been lower than other areas due to the wealth of outdoor recreational opportunities that abounded in the

Portland District recreation projects

Summer visitors to the Corps dams and lakes throughout the state enjoy various activities

Northwest. The region's numerous parks, forests, and lakes provide outdoor enthusiasts with a multitude of choices for boating, hiking, and camping. Even so, the District had nearly six million recreation visits in 1980 to its 16 recreational areas, and by 1999 that number had climbed to 10.7 million.[103]

As part of its recreation mission, the District developed outreach programs. Water safety, for example, remained an ongoing concern of the Corps. Rangers from many of the District's projects presented programs at schools, sports shows, and other events to promote safe boating. In 1998, for example, rangers spoke to more than 1,800 students at Willamette Valley schools about the subject. Using skits and props, they reminded students of the importance of wearing life jackets and the risks of hypothermia in Oregon lakes.[104] In 1995, rangers from the Bonneville Lock and Dam traveled to the annual sportsman's show in Portland, where they showed videos, presented computer games, and distributed posters, bumper stickers, and brochures addressing water safety issues at the project. One of the ranger's sub-themes at the show was "Don't anchor in the channel," addressing the conflict between anglers anchored below the downstream lock channel and commercial boat traffic.[105]

Some District facilities held public events related to their recreational resources. Each year at Foster Dam, for instance, project operators invited junior anglers to the site for a fishing derby. Foster Dam is located on the South Santiam near the town of Sweet Home, Oregon. The Corps built the dam in the 1960s to provide flood control, irrigation, power generation, downstream navigation improvement, and water-based recreation. Below the dam the Corps operated a park, featuring picnic areas and a boat ramp. In addition, Linn County Parks Department provided several day use areas and campgrounds surrounding Foster Lake.[106] The annual fishing derby, which was sponsored jointly by several agencies, promoted the message, "Get hooked on fishing, not on drugs." At the derby the District conducted tours of the fish hatchery and dam, held casting contests, and passed out various prizes. Conducted on the same day as the state of Oregon's free fishing day, anglers could cast their lines without a license in any Corps lake within the state on that day.[107] Other projects hosted similar functions. In 1993, Bonneville Lock and Dam rangers celebrated Earth Day activities with children from a local elementary school. Using puppets and songs, the employees discussed with the students how to protect the earth's resources.[108] The Corps also conducted more formal environmental education programs for the public. Park rangers at Bonneville, for example, held a three-day workshop at the Bass Lake natural area to advance better understanding of wildlife habitats.[109]

Water safety is a big concern at all the Corps projects

The District also led a workshop for teachers and youth leaders on Columbia River salmon and human impacts on their habitat. The workshop, which was jointly sponsored by several agencies, was designed to increase educators' awareness of educational resources and provide them with information that could be disseminated to their students.[110]

In addition to workshops and events, the Corps also created permanent amenities for environmental education. District employees worked with other federal agencies, state agencies, and the private sector to develop interpretive facilities in the Rogue River basin in southwestern Oregon. The goal of the project was to provide the public with enjoyable and educational experiences relating to the upper Rogue aquatic ecosystem. The development included exhibits at the Cole M. River hatchery, an education center at McGregor Park, and a wildlife observation and wetland area. The center at McGregor Park featured a warm water aquarium, interactive displays, classroom, laboratory, conference area, and outdoor amphitheater. The observation area allowed visitors to view otters, herons, muskrats, beavers, and other birds, mammals, and reptiles. They could also observe salmon and steelhead at a natural spawning area.[111]

While the Corps' environmental programs and other public events drew many visitors to the agency's sites, millions more came for more traditional outdoor activities, particularly water-based sports. Two of the District's most popular recreational spots were the Bonneville Lock and Dam and Fern Ridge. Bonneville, a National Historic Landmark located 40 miles east of Portland, was one of Oregon's top tourist attractions. At the site's main visitor center on Bradford Island, visitors examined historic displays, viewed the spillway, original powerhouse, and surrounding mountains of the Columbia River Gorge, and attended a variety of presentations in the center's theater. The project also featured viewing windows on the bottom floor, allowing visitors to observe salmon migrating up a fish ladder. Other activities at Bonneville included boating, fishing, bird-watching, and windsurfing. The sport of windsurfing was especially significant, growing considerably as both a recreation activity and a local economic resource. The strong wind, the number of windy days, and the height of the swells all contributed to the popularity of windsurfing in the Bonneville pool.[112]

Located just 12 miles west of Eugene, Fern Ridge Lake also proved to be a popular destination, drawing hundreds of thousands of visitors each year in the 1980s and 1990s. Constructed in the 1940s, the project originally consisted of a dam and a reservoir designed to provide flood control and irrigation. While recreation was not an authorized primary project purpose, it became increasingly popular at Fern Ridge. In 1971, the Willamette Basin Comprehensive Study recommended modifying the project to permit fuller use of its recreation potential. Since that time, the lake was heavily used for picnicking, swimming, sailing, water skiing, and fishing. It was surrounded by numerous parks operated by the Corps, with additional facilities managed by the Lane County Parks Department under lease agreements.[113]

Recreation at Corps facilities remained focused on water – and dependent on its availability. In the spring of 1988, for example, a drought lowered water levels at Fern Ridge, threatening the summer season. "We've got lots of things that are usually scheduled here, like sailboat regattas all summer long, but right now it's wait and see," explained Jim Beal, supervisory park ranger. "The lake's low right now so

Fern Ridge Dam, originally planned for flood control and irrigation, now hosts many summer recreational guests.

we'll just have to see what happens." Despite such setbacks, the site continued to entice water enthusiasts, and in 1996 approximately 845,700 recreation visits were made to Fern Ridge.[114]

Funding also became an important issue at District projects. As the number of visits to the Corps' water resource projects exploded, the agency faced funding cuts that severely hampered its ability to manage projects. In 1979, faced with projected budget reductions, the agency initiated a nationwide effort to increase the efficiency and quality of park management and to reduce recreation costs. A national study evaluated Corps recreation programs by comparing operation and maintenance costs with visitor use and uniqueness of the area. The impact on natural and social resources was also considered. By 1982, in an effort to "trim many less essential programs," the Corps had closed 15 recreation areas at lakes in Oregon and Washington and curtailed maintenance and recreation programs at another 24 sites. Through this action, the District hoped to save an estimated $340,000.[115]

The effort to cut costs continued throughout the 1980s. In 1989 the agency embarked on another nationwide study to find new ways to maintain and enhance recreation services at its water resources projects. "The Corps is the nation's second largest federal provider of recreation," explained District Commander Colonel Charles E. Cowan, " and we need to find new ways to make our limited funds go further in this era of budget constraints." Rather than closing facilities or deferring maintenance, the study examined possibilities for partnerships with non-federal agencies and the private sector in the development and operation of recreational facilities. This idea was not entirely new – many recreation areas were already being operated by state, county, and other local public entities under lease agreement with the Corps.[116]

While budget-deficit legislation in 1993 provided some resolution to funding problems, the District continued to search for innovative ways to manage its recreation program. In 1998 the agency's work was honored with Vice President Al Gore's Hammer Award, which was given to teams of federal employees who found new and better ways to accomplish their responsibilities. The Corps, Lane County Parks, and Oregon State Parks and Recreation received the award for their creative efforts to realign their park management systems on a team concept. These agencies successfully "swapped" management responsibilities of a number of parks in overlapping jurisdictional areas, creating clusters of parks under the same agencies. Together, the three organizations cut travel time to and from managed lands, provided quicker responses to public needs, improved communication, and better supervised operations and facilities. Each agency estimated a yearly savings of $100,000 for a total savings of $300,000. "If Lane County Parks, Oregon State Parks and the Corps had not joined efforts to develop the park realignment plan, public recreation areas would either close or would begin offering fewer and fewer amenities due to

The Hammer Award was presented to Portland District in 1998

Windsurfing, fishing, and fish viewing are some of the activities at Bonneville Lock and Dam.

budget constraints," explained Wade Stampe, Willamette Valley Project Manager.[117]

In addition to new management techniques, the Corps incorporated new values into its recreation program. Initially, the agency had focused on providing structures, such as boat ramps, picnic tables, and campsites used in traditional recreation. By the 1980s, however, the District had begun to incorporate non-structural projects into its recreation mission – a shift that related to the environmental movement and its values [See Chapter Three]. One such project was the Row River Trail at Dorena Lake. In 1994 this 6.2-mile pedestrian-bicycle-equestrian trail was developed along an abandoned railroad right-of-way on the north shore of the lake. Several agencies, together with the cities of Cottage Grove and Oakridge, cooperated to construct the project, which was hailed as both a positive economic development for the area and a wonderful recreation opportunity.[118] At Hills Creek Lake, a popular recreation area located in the Willamette National Forest, the Corps developed a 130-acre wildlife and wetland area below Hills Creek Dam. The restored area featured open fields, small ponds, and riverside habitat for wildlife.[119] Similarly, flora and fauna were the focus of a project at Fern Ridge Lake. With the help of students from Looking Glass Youth and Family Services, an organization that supports at-risk youth, the District constructed a three-and-a-half foot wide boardwalk and interpretive kiosk along the lake's south shoreline. The kiosk was designed to help identify plants and animals that visitors observed at the site, as well as explain the relationship between them and the surrounding wetlands.[120]

While these projects signaled a new approach to recreation, the District continued to construct traditional facilities as well. In 1993, for example, the Corps allowed Lane County to develop 86 overnight campsites at Richardson Park, located on the shore of Fern Ridge Lake. Lane County, which managed the park under a recreational lease from the Corps, hoped the expansion would booster the local economy. These campsites required the removal of numerous mature trees and featured fire rings, picnic tables, and paved camping pads with water and electric hook-ups. Each section of the campground offered visitors a comfort station complete with showers, a trailer dump station, play structure, and grey water disposal area.[121]

While the Corps' recreation program evolved during the late 20th century, one challenge remained constant – the need to balance competing interests. As at most recreation sites, the District's water resources projects attracted a diverse crowd. Some visitors came seeking solitude and wanted to canoe calm waters or hike trails rich with wildlife. Others wanted a chance to use their motorized boats and jet skis on the Corps' reservoirs. While at times such activities could coexist, they also held the potential for conflict. Balancing recreationists' needs remained a struggle for project managers.

Bonneville Lock and Dam exemplified the problem. The Bonneville Master Plan, produced in 1997, discussed the increasing demand for recreation, which was coupled with a decrease in the available supply of public land for recreation. "More people share limited water and land resources; this has led to increasing user conflicts. These conflicts arise from sheer user numbers, different perceptions of what is an appropriate setting, user etiquette and user impacts on the recreation resource."[122] Much of the tension at Bonneville involved some type of fishing. Sport fishers, for example, resented crowding at boat ramps. This frustration stemmed in part from the fact that the spring chinook salmon run could be fished from only two sites on the Columbia River in an area that stretched from Portland to the Idaho border, causing the boat launches at each of these

Hills Creek Lake wetland and wildlife area development below the dam

sites to become overcrowded during the open season. Rangers also faced conflicts between sturgeon anglers and bank anglers. Problems arose when sturgeon anglers parked at spots where bank anglers enjoyed casting their lines. Moreover, sturgeon anglers sometimes fished from the top of a high bank, casting a shadow over shad anglers who fished at water level. Indian fishers and windsurfers, who shared several access sites, also occasionally clashed, although arguments were usually avoided because Indian fishing was frequently done in the evening, night, or early morning hours when windsurfers were not present.[123]

In addition to conflicts among different types of recreational users, disputes also occurred among special interest groups, such as recreationists, farmers, and anglers, all of whom depended on Corps projects to meet their needs. Although the agency's water resources projects were designed to meet multiple objectives, sometimes these goals were not compatible. Discussing projects in the Rogue and Willamette River basins, the District explained that "The Corps is committed to serving its customers – the people of the region. Corps projects ... are operated to serve multiple needs: flood control, hydropower, irrigation, fisheries, water supply, water quality and recreation." The agency's goal was "to effectively balance these competing needs to serve the region and its people."[124]

Controversies among competing user groups were common to districts across the country, but they were particularly acute in the Pacific Northwest, where many species of salmon were threatened and endangered. In periods of low rainfall or drought, conflicts were considerably heightened. In 1988, for example, the Corps, in response to a forecasted summer drought, proposed to lower the reservoirs at Lost Creek and Applegate lakes to aid fish populations. By releasing water from the lakes, the agency hoped to protect the spring and fall chinook salmon runs. Recreational users and farmers, however, strongly objected to the plan, telling Corps officials that too much emphasis was being placed on the downstream fishery. "There are lots of people fishing that lake," said Beth Ness of the Lost Creek Marina. "We're there and we're not going to go away." The Lost Creek Recreation Association also was concerned about the availability of lake water for recreation and vowed that, "It's not all going to go down the canyon if we can help it." Farmers, who were faced with additional costs for purchasing supplemental water, also were dismayed by the proposal. "The cost of that water is way out of bounds," asserted one farmer from Grants Pass. Another asked the District, "In an extreme year, who has precedence, the fish or the farmer?" [125]

This situation could not be easily remedied, and other drought years followed. In the year 2000, the Corps reported that seven reservoirs in the Willamette Basin would not be full by Memorial Day. A lack of rain, combined with NMFS recommended minimum flows, prompted the agency to change water releases from several dams to support the passage of juvenile upper Willamette salmon and steelhead. The Corps was well aware of the potential impact this would have on recreation in the area. "We realize these lakes are prime summer recreation spots," said District Commander Colonel Randall J. Butler. "It's frustrating for us to not be able to meet the needs of all our customers all the time... we are dependent on Mother Nature."[126]

The following year the situation had only worsened as the region faced another dry year. Especially hard hit was Detroit Lake, a popular recreation area located 50 miles east of Salem. The Detroit Lake project, constructed in the 1950s, consisted of Detroit Dam, the principal facility, and Big Cliff Dam, a smaller reregulating dam three miles downstream from Detroit. These reservoirs stored waters of the North Santiam River, controlling runoff from approximately 438 square miles of drainage area. The authorized primary project purposes were flood control, irrigation, downstream navigation improvement, and power generation.[127] Detroit Lake, however, was best known for its recreational opportunities. Its proximity to Salem, along with its massive acreage, made it a favorite destination for water sports enthusiasts and anglers. "Water skiers, jet skiers, sailors, party barge skippers, and luxury

Low water at Applegate Lake, Lost Creek Lake, and Green Peter Lake

boat captains weave between patient anglers during the summer season," said the Oregon Outdoor Recreation Guide. "With so much splashing, sometimes the lake looks like a scene from the movie 'Meatballs.'"[128]

Complicating the situation at Detroit Lake were the four threatened and endangered fish species that inhabited the Willamette River Basin. Spring chinook, winter steelhead, bull trout, and Oregon chub all depended on certain levels of water flow for passage through the watershed.[129] To comply with the requirements of the ESA, the District was required to release water from its reservoirs to ensure no direct harm to the listed fish. While lowering the lake level was unavoidable, the agency recognized the impact it would have on the local community whose economic fate was closely tied to the lake. "It's a difficult situation because we know it is having a really tremendous impact on them and their livelihood," explained Diana Brimhall, Chief of Public Affairs. "It's just unfortunate that Mother Nature has not given us enough water this year."[130]

Many residents of the Detroit Lake area vehemently opposed the Corps' plan. Oregon Representative Tootie Smith understood that "water resources across the state will be stretched to the limit," but wondered why the Corps seemed "so intent on letting Detroit Lake go so low." She further explained that "it doesn't look like recreators who depend on water will have much of a season." Mike Lamont, a marina owner, worried that the town of Detroit would suffer severe economic losses if the lake was not filled for the season. "It rained for four days last week and I got so excited because the water level was up to the docks," he explained. "Then they let [it] all out again – it's stump city up here." In response to Corps' explanation about the need to protect salmon and steelhead smolts, Tootie Smith declared, "The Corps told me they have a legal requirement for endangered species and they don't have one for recreation. I think it's about time we have a legal requirement for people in the Endangered Species Act."[131]

As the situation at Detroit Lake escalated, the Corps faced mounting pressures from local residents. "Our lakes were authorized for multiple purposes and that's something the people in Detroit don't quite want to understand – that recreation is not the one main purpose for that lake," explained Brimhall. At times the pressure took its toll on agency employees. "Somehow they've gotten the idea that [lowering the lake] is an intentional thing against them and that we are not planning

on ever filling the lake again, which is not true," Brimhall added. This dilemma remained "very frustrating for our people ... who are not used to not being trusted and not being believed."[132] To combat some of the myths that were being circulated, the District's web site devoted considerable coverage to the situation at Detroit Lake and even included several pages of "Facts & Myths" to dispel misconceptions. The agency also released numerous news releases on the subject and spoke with reporters covering the story.[133]

By the early 21st century, the problem of increasing demands for recreation and conflicts among users had shown no signs of abating. Despite the challenges in balancing competing needs, however, the District's recreation program remained an important part of its mission. In the late 20th century, recreation was an integral component of the District's projects. Lakes, trails, and campgrounds drew millions of visitors, and, in many cases, provided them with their only exposure to the Corps and its mission. Furthermore, as the District shifted from structural to non-structural projects, it demonstrated its ability to incorporate the values and objectives of the environmental movement. Nature centers, bike paths, and wildlife observation areas joined the more traditional facilities of campgrounds and boat launches. Finally, despite budgetary restraints, the Corps' approach to park operations, such as park swapping, illustrated its ability to tackle important management issues creatively.

Conclusion

Historically, the Portland District focused on its civil works mission, particularly the building of large multipurpose dams. By the 1980s, however, the era of dam building had ended in the Pacific Northwest due in large part to pressure from the environmental movement. Simultaneously, the District expanded its mission to include restoring wetlands, expanding fish-passage facilities, and providing additional recreational opportunities. These new areas of work gained increasing attention, highlighting the changing nature of the agency's operations, but the Corps' multipurpose projects continued to be an important component of the District's work.

Endnotes

[1] Mary E. Reed, *A History of the North Pacific Division* (North Pacific Division, U.S. Army Corps of Engineers, 1991), p. 48.

[2] Rick Minor and Stephen Dow Beckham, *Cultural Resources Overview and Investigations for the Bonneville Navigation Lock Project, Oregon and Washington*, Portland District, U.S. Army Corps of Engineers, 1984, p. 61.

[3] Carlos Schwantes, *The Pacific Northwest: An Interpretive History*, revised edition (Lincoln: University of Nebraska Press, 1996). pp. 411-412.

[4] Samuel P. Hays, *Conservation and the Gospel of Efficiency: The Progressive Conservation Movement*, *1890-1920* (Cambridge: Harvard University Press, 1959).

[5] Oregon Blue Book, accessed at http://www.sos.state.or.us/BlueBook/1999_2000/local/populations/pop06.htm, on June 1, 2001.

[6] Office of Financial Management, State of Washington, accessed at http://www.ofm.wa.gov/pop189090/pop189000.xls, on June 1, 2001.

[7] U.S. Army Corps of Engineers, Portland District, *Bonneville Second Powerhouse*, September 1984, Portland District Technical Library; "Dedication of Bonneville II Powerhouse," Bonneville, Washington, June 1, 1983, Federal Records Center Pacific Alaska Region, RG 77, Accession 77-91-0043, Box 2 of 2, Folder "Dedications – Bonneville Second Powerhouse."

[8] U.S. Army Engineer District, Portland Corps of Engineers, *Second Powerhouse Design Memorandum No. 22: Downstream Landscaping and Visitor Facilities*, September 1981, Portland District Technical Library.

[9] U.S. Army Corps of Engineers, Portland District, *Bonneville Second Powerhouse*, September 1984, Portland District Technical Library.

[10] U.S. Army Corps of Engineers, Portland District, *Bonneville Second Powerhouse*, September 1984, Portland District Technical Library.

[11] U.S. Army Corps of Engineers, Portland District, *Bonneville Second Powerhouse*, September 1984, Portland District Technical Library.

[12] U.S. Army Corps of Engineers, Portland District, *Bonneville Second Powerhouse*, September 1984, Portland District Technical Library.

[13] "Dedication of Bonneville II Powerhouse," Bonneville, Washington, June 1, 1983, Federal Records Center Pacific Alaska Region, RG 77, Accession 77-91-0043, Box 2 of 2, Folder "Dedications – Bonneville Second Powerhouse."

[14] U.S. Army Corps of Engineers, Portland District, *Bonneville Second Powerhouse*, September 1984, Portland District Technical Library; "Dedication of Bonneville II Powerhouse," Bonneville, Washington, June 1, 1983, Federal Records Center Pacific Alaska Region, RG 77, Accession 77-91-0043, Box 2 of 2, Folder "Dedications – Bonneville Second Powerhouse."

[15] U.S. Army Corps of Engineers, Portland District, "Powerhouse – Applegate ceremonies bring Bratton to Portland District," *Corps'pondent*, May 29, 1981; U.S. Army Corps of Engineers, Portland District, *Water Resources Development in Oregon, 1997*, Iron Mountain Records examined at Portland District Information Management Center, Location 277 cc 1950401, Binders and Books, Box 2.

[16] Dawn Mueller, "Thousands Find Work at Bonneville," *Corps'pondent*, June 1, 1983, Federal Records Center Pacific Alaska Region Pacific Alaska Region, RG 77, Accession 77-95-0183, Corps Newsletter, Box 1 of 2.

[17] "Dedication of Bonneville II Powerhouse," Bonneville, Washington, June 1, 1983, Federal Records Center Pacific Alaska Region, RG 77, Accession 77-91-0043, Box 2 of 2, Folder "Dedications – Bonneville Second Powerhouse."

[18] U.S. Army Corps of Engineers, Portland District, *Bonneville Second Powerhouse*, September 1984, Portland District Technical Library.

[19] U.S. Army Corps of Engineers, Portland District, *Bonneville Second Powerhouse*, September 1984, Portland District Technical Library.

[20] Washington Department of Game, "Proposal for Wildlife Mitigation, Bonneville Second Powerhouse Project," October 15, 1980, Federal Records Center Pacific Alaska Region, RG 77, Accession 77-95-0188, Box 2 of 2, Folder "Bonneville 2nd Mitigation."

[21] Sherry K. Horton, Portland Ecological Services Field Office, U.S. Fish and Wildlife Service, "Fish and Wildlife Impacts and Mitigation Recommendations, Bonneville Second Powerhouse Project, Skamania County, Washington," August 1982, Iron Mountain Records examined at Portland District Information Management Center, Location 6220106090304, Box 2 of 4, Unlabeled Folder.

Endnotes

[22] Washington Department of Game, "Proposal for Wildlife Mitigation, Bonneville Second Powerhouse Project," October 15, 1980, Federal Records Center Pacific Alaska Region, RG 77, Accession 77-95-0188, Box 2 of 2, Folder "Bonneville 2nd Mitigation;" Sherry K. Horton, Portland Ecological Services Field Office, U.S. Fish and Wildlife Service, "Fish and Wildlife Impacts and Mitigation Recommendations, Bonneville Second Powerhouse Project, Skamania County, Washington," August 1982, Iron Mountain Records examined at Portland District Information Management Center, Location 6220106090304, Box 2 of 4, Unlabeled Folder.

[23] Beth A. Allen, "Portland District Looks Ahead," January 14, 1992, Iron Mountain Records examined at Portland District Information Management Center, Location 277BB34140108, Box 2 of 3, Folder "360-5b News Media and Releases; Media Contacts 1992;" Personal Communication with Park Manager James E. Runkles, August 13, 2001, Bonneville Dam, Cascade Locks, Oregon.

[24] U.S. Fish and Wildlife Service, accessed at http://www.r1.fws.gov/gorgefish/STEIGER/STEIGERW.HTM, on June 1, 2001; Memo from Commander, North Pacific Division, "Steigerwald Lake Wetland Acquisition, Bonneville Second Powerhouse, Oregon and Washington," November 27, 1984, Federal Records Center Pacific Alaska Region, RG 77, Accession 77-95-0188, Box 2 of 2, Folder "Bonneville 2nd Mitigation;" Letter from R.L. Friedenwald, Colonel, Corps of Engineers to Jack Wayland, Director, Washington Department of Game, June 11, 1985, Federal Records Center Pacific Alaska Region, RG 77, Accession 77-91-0028, Box 1 of 1, Folder "Bonneville Second Powerhouse, 1985."

[25] "Dedication of Bonneville II Powerhouse," Bonneville, Washington, June 1, 1983, Federal Records Center Pacific Alaska Region, RG 77, Accession 77-91-0043, Box 2 of 2, Folder "Dedications – Bonneville Second Powerhouse."

[26] U.S. Army Corps of Engineers, Portland District, "Bonneville First Powerhouse Rehabilitation," January 1993.

[27] U.S. Army Corps of Engineers, Portland District, "Bonneville First Powerhouse Rehabilitation," January 1993.

[28] Personal Communication with Dave Shank, Assistant Operations Manager, Bonneville Lock and Dam, August 13, 2001, Bonneville Dam, Cascade Locks, Oregon.

[29] U.S. Army Corps of Engineers, Portland District, "Bonneville First Powerhouse Rehabilitation," January 1993.

[30] Mike Allegre, "Aging Corps of Engineers infrastructure getting needed facelifts," May 26, 1995, Portland District, Iron Mountain Records examined at Portland District Information Management Center, Location 277 cc 19150401, Box 1 of 4, Folder: "Fish 1995."

[31] U.S. Army Corps of Engineers, Portland District, "Bonneville First Powerhouse Rehabilitation," January 1993.

[32] U.S. Army Corps of Engineers, Portland District, "Bonneville First Powerhouse Rehabilitation," January 1993.

[33] U.S. Army Corps of Engineers, Portland District, "Bonneville First Powerhouse Rehabilitation," January 1993; Mike Allegre, "Aging Corps of Engineers infrastructure getting needed facelifts," May 26, 1995, Portland District, Iron Mountain Records examined at Portland District Information Management Center, Location 277 cc 19150401, Box 1 of 4, Folder: "Fish 1995."

[34] U.S. Army Corps of Engineers, Portland District, "Bonneville First Powerhouse Rehabilitation," January 1993.

[35] U.S. Army Corps of Engineers, Portland District, "Bonneville First Powerhouse Rehabilitation," January 1993.

[36] U.S. Army Corps of Engineers, Portland District, "Bonneville First Powerhouse Rehabilitation," January 1993.

[37] U.S. Army Corps of Engineers, Portland District, "Bonneville First Powerhouse Rehabilitation," January 1993.

[38] Army Corps of Engineers, Portland District, accessed at https://www.nwp.usace.army.mil/pm/projects/welcome.htm, on June 1, 2001.

[39] Army Corps of Engineers, Portland District, "Summary of Activities for Calendar Year 1995," Portland District, Public Affairs Office, 870-5a, Organizational Histories, 1990-1999.

[40] U.S. Army Corps of Engineers, Portland District, "Bonneville First Powerhouse Rehabilitation," January 1993.

[41] Personal Communication with Park Manager James E. Runkles, August 13, 2001, Bonneville Dam, Cascade Locks, Oregon.

[42] U.S. Army Corps of Engineers, Portland District, *Water Resources Development in Oregon, 1997*, Iron Mountain Records examined at Portland District

Endnotes

Information Management Center, Portland District, Location 277 cc 19150401, Box 2: Binders and Books.

[43] U.S. Army Corps of Engineers, Portland District, *Water Resources Development in Oregon, 1997*, Iron Mountain Records examined at Portland District Information Management Center, Portland District, Location 277 cc 19150401, Box 2: Binders and Books; "Bonneville New Navigation Lock Opens," Portland District, Army Corps of Engineers, March 26, 1993, Portland District, Public Affairs Office, 870-5b Installation Navigation Lock, Bonneville Navigation Lock, News Releases.

[44] Beth A. Allen, "Portland District Looks Ahead," January 14, 1992, Portland District, Iron Mountain Records examined at Portland District Information Management Center, Location 277 BB 34 14 01 08, Box 2 of 3, Folder: 360-5b News Media and Releases, Media Contacts 1992; "Corps Portland District Looks to New Year," January 15, 1991, Portland District, Iron Mountain Records examined at Portland District Information Management Center, Location 277 BB 34 14 01 08, Box 2 of 3, Folder: News Releases, 1991-1993.

[45] U.S. Army Corps of Engineers, *Annual Historical Report*, 1994, Portland District, Public Affairs Office, 870-5a, Organizational Histories, 1990-1999.

[46] Sara Walters, "Bonneville Navigation Lock Challenges Met," *Corps'pondent*, February 1989, Federal Records Center Pacific Alaska Region Pacific Alaska Region, RG 77, Accession 77-95-0183, Box 1 of 2, Corps Newsletter; "Bonneville New Navigation Lock Opens," Portland District, Army Corps of Engineers, March 26, 1993, Portland District, Public Affairs Office, 870-5b Installation Navigation Lock, Bonneville Navigation Lock, News Releases.

[47] "Bonneville New Navigation Lock Opens," Portland District, Army Corps of Engineers, March 26, 1993, Portland District, Public Affairs Office, 870-5b Installation Navigation Lock, Bonneville Navigation Lock, News Releases.

[48] "Bonneville New Navigation Lock Opens," Portland District, Army Corps of Engineers, March 26, 1993, Portland District, Public Affairs Office, 870-5b Installation Navigation Lock, Bonneville Navigation Lock, News Releases; "1995 Presidential Design Awards, Bonneville New Navigation Lock," Portland District, Public Affairs Office, 870-5b Installation Navigation Lock, Bonneville Navigation Lock, General.

[49] "Bonneville New Navigation Lock Opens," Portland District, Army Corps of Engineers, March 26, 1993, Portland District, Public Affairs Office, 870-5b Installation Navigation Lock, Bonneville Navigation Lock, News Releases.

[50] U.S. Army Corps of Engineers, Portland District, *Excavated Material Evaluation for Upland Disposal,* December 1993, Federal Records Center Pacific Alaska Region Pacific Alaska Region, RG 77, Accession 77-97-0051, Box 6 of 9; "Corps Portland District Looks to New Year," January 15, 1991, Portland District, Iron Mountain Records examined at Portland District Information Management Center, Location 277 BB 34 14 01 08, Box 2 of 3, Folder: News Releases, 1991-1993.

[51] Letter from Patrick J. Keough, Chief, Planning Division, December 2, 1986, Federal Records Center Pacific Alaska Region Pacific Alaska Region, RG 77, Accession 77-90-0008, Box 1 of 1, Folder: Fish and Wildlife #9; U.S. Army Corps of Engineers, Portland District, *Bonneville Master Plan*, March 1997, Portland District Technical Library.

[52] "Corps Portland District Looks to New Year," January 15, 1991, Portland District, Iron Mountain Records examined at Portland District Information Management Center, Location 277 BB 34 14 01 08, Box 2 of 3, Folder: News Releases, 1991-1993.

[53] "Corps Portland District Looks to New Year," January 15, 1991, Portland District, Iron Mountain Records examined at Portland District Information Management Center, Location 277 BB 34 14 01 08, Box 2 of 3, Folder: News Releases, 1991-1993.

[54] "Bonneville New Navigation Lock Opens," Portland District, Army Corps of Engineers, March 26, 1993, Portland District, Public Affairs Office, 870-5b Installation Navigation Lock, Bonneville Navigation Lock, News Releases.

[55] Arthur E. Williams, Bonneville Lock Dedication, July 10, 1993, Portland District, Public Affairs Office, 870-5b Installation History Files, Bonneville Navigation Lock, General.

[56] Major General Ernest J. Harrell, Bonneville Navigation Lock Dedication, July 10, 1993, Portland District, Public Affairs Office, 870-5b Installation Navigation Lock, Bonneville Navigation Lock, General.

[57] Keith Peterson, "The Army Corps of Engineers and the Environment in the Pacific Northwest," unpublished manuscript for the Army Corps of Engineers, Office of the Chief of Engineers, Historical Division, May 1982, pp. 32-38.

Endnotes

[58] U.S. Army Corps of Engineers, Portland District, *Elk Creek Lake: Master Plan for Resource Use*, December 1987, Portland District Technical Library; Keith Peterson, "The Army Corps of Engineers and the Environment in the Pacific Northwest," unpublished manuscript for the Army Corps of Engineers, Office of the Chief of Engineers, Historical Division, May 1982, pp. 32-38.

[59] Keith Peterson, "The Army Corps of Engineers and the Environment in the Pacific Northwest," unpublished manuscript for the Army Corps of Engineers, Office of the Chief of Engineers, Historical Division, May 1982, pp. 42-48.

[60] Keith Peterson, "The Army Corps of Engineers and the Environment in the Pacific Northwest," unpublished manuscript for the Army Corps of Engineers, Office of the Chief of Engineers, Historical Division, May 1982, pp. 42-48.

[61] U.S. Army Corps of Engineers, Portland District, *Elk Creek Lake, Design Memorandum No. 10, Supplement No. 2*, July 1985, Federal Records Center Pacific Alaska Region Pacific Alaska Region, RG 77, Accession 77-89-0085, Box 1 of 37.

[62] Keith Peterson, "The Army Corps of Engineers and the Environment in the Pacific Northwest," unpublished manuscript for the Army Corps of Engineers, Office of the Chief of Engineers, Historical Division, May 1982, pp. 53-54.

[63] Keith Peterson, "The Army Corps of Engineers and the Environment in the Pacific Northwest," unpublished manuscript for the Army Corps of Engineers, Office of the Chief of Engineers, Historical Division, May 1982, pp. 54-55.

[64] Keith Peterson, "The Army Corps of Engineers and the Environment in the Pacific Northwest," unpublished manuscript for the Army Corps of Engineers, Office of the Chief of Engineers, Historical Division, May 1982, p. 58.

[65] U.S. Army Corps of Engineers, Portland District, *Elk Creek Lake: Master Plan for Resource Use*, December 1987, Portland District Technical Library.

[66] Keith Peterson, "The Army Corps of Engineers and the Environment in the Pacific Northwest," unpublished manuscript for the Army Corps of Engineers, Office of the Chief of Engineers, Historical Division, May 1982, p. 57; Comptroller General, *Report to the Honorable James H. Weaver, House of Representatives of United States: Corps of Engineers Should Reevaluate the Elk Creek Project's Benefits and Costs*, March 15, 1982, United States General Accounting Office, p. 40.

[67] "Elk Creek: Supreme Court Weighs Future of District Project," April 1989, *Corps'pondent*, Federal Records Center Pacific Alaska Region Pacific Alaska Region, RG 77, Accession 77-95-0183, Box 1 of 2.

[68] Tom White, Interview with Lisa Mighetto, Portland, Oregon, October 18, 2001. Hereafter cited as White Interview.

[69] Martin Reuss, *Reshaping National Water Politics: The Emergence of the Water Resources Development Act of 1986* (Fort Belvoir, VA: U.S. Army Corps of Engineers, Institute for Water Resources, 1991), pp. 175-176.

[70] White Interview.

[71] John A. Ferejohn, *Pork Barrel Politics: Rivers and Harbors Legislation, 1947-1968* (Stanford University Press: Stanford, California, 1974).

[72] White Interview.

[73] Tom Davis, Interview with Lisa Mighetto, Portland, Oregon, October 18, 2001.

[74] *Congressional Record*. 99th cong., 1st sess., 1985, 131, no. 94.

[75] *Congressional Record*. 99th cong., 1st sess., 1985, 131, no. 156; *Congressional Record*. 99th cong., 1st sess., 132, no. 4.

[76] Paul Fattig, "Elk Creek Master Plan Released," July 22, 1988, *Daily Courier*, Portland District, Iron Mountain Records examined at Portland District Information Management Center, Location 6220106090304, Box 4 of 4, Folder: Elk Creek Lake Master Plan; U.S. Army Corps of Engineers, Portland District, "Elk Creek: Supreme Court Weighs Future of District Project," April 1989, *Corps'pondent*, Federal Records Center Pacific Alaska Region Pacific Alaska Region, RG 77, Accession 77-95-0183, Box 1 of 2.

[77] "Elk Creek: Supreme Court Weighs Future of District Project," April 1989, *Corps'pondent*, Federal Records Center Pacific Alaska Region Pacific Alaska Region, RG 77, Accession 77-95-0183, Box 1 of 2; Robert Sterling, "Corps Sets Elk Creek Timetable," *Corps'pondent*, February 1988, Federal Records Center Pacific Alaska Region Pacific Alaska Region, RG 77, Accession 77-95-0183, Box 1 of 2; U.S. House. Committee on Agriculture. *U.S. Army Corps of Engineers' Proposal to Restore a Fish Passage Corridor Through Elk Creek Dam*. Hearing, 13 November, 1997 (Serial no. 105-36). Washington, D.C.: Government Printing Office, 1998. (Y4. AG 8/1: 105-36), p. 164.

Endnotes

[78] "Elk Creek: Supreme Court Weighs Future of District Project," April 1989, *Corps'pondent*, Federal Records Center Pacific Alaska Region Pacific Alaska Region, RG 77, Accession 77-95-0183, Box 1 of 2; U.S. House. Committee on Agriculture. *U.S. Army Corps of Engineers' Proposal to Restore a Fish Passage Corridor Through Elk Creek Dam*. Hearing, 13 November, 1997 (Serial no. 105-36). Washington, D.C.: Government Printing Office, 1998. (Y4. AG 8/1: 105-36), p. 119.

[79] Dawn M. Edwards, "One Step Closer to Elk Creek Decision," January 1991, *Corps'pondent*, Federal Records Center Pacific Alaska Region Pacific Alaska Region, RG 77, Accession 77-95-0183, Box 1 of 2.

[80] Video Recording of February 15, 1990 newscast, Channel 8, 5 p.m. News, provided by Portland District Information Management Center.

[81] U.S. Army Corps of Engineers, Portland District, "Corps Releases Final Elk Creek Environmental Impact Statement," May 2, 1991, News Release, Iron Mountain Records examined at Portland District Information Management Center, Location 277 BB 34140108, Box 2 of 3, Folder: News Releases, 1991-1993.

[82] U.S. Army Corps of Engineers, Portland District, "Court Decision Issued on Injunctions," October 25, 1993, News Release, Iron Mountain Records examined at Portland District Information Management Center, Location 277 BB 34140108, Box 2 of 3, Folder: News Releases, 1991-1993.

[83] Video recording of May 17, 1993 newscast, "Elk Creek Dam at Issue," Portland news channel KATU 2, 5:02 p.m., provided by Portland District Information Management Center; Video recording of May 17, 1993 newscast, "Your Money, Your Choice: Elk Creek Dam," ABC World News report to Portland news channel KATU 2, 6:25 p.m., provided by Portland District Information Management Center.

[84] U.S. Army Corps of Engineers, Portland District, "Court Decision Issued on Injunctions," October 25, 1993, News Release, Iron Mountain Records examined at Portland District Information Management Center, Location 277 BB 34140108, Box 2 of 3, Folder: News Releases, 1991-1993.

[85] Dawn M. Edwards, "Elk Creek Dam Ruling Issued," March 1994, *Corps'pondent*, Iron Mountain Records examined at Portland District Information Management Center, Location 277 BB 34140108, Box 2 of 3.

[86] Video recording of June 21, 1994 newscast, "Northwest Reports: Elk Creek Dam," Portland news channel KPTV 12, 9:42 p.m., provided by Portland District Information Management Center.

[87] Video recording of June 21, 1994 newscast, "Northwest Reports: Elk Creek Dam," Portland news channel KPTV 12, 9:42 p.m., provided by Portland District Information Management Center.

[88] Video recording of June 21, 1994 newscast, "Northwest Reports: Elk Creek Dam," Portland news channel KPTV 12, 9:42 p.m., provided by Portland District Information Management Center.

[89] U.S. Army Corps of Engineers, Portland District, "Elk Creek Dam Modifications Most Successful Way of Providing Fish Passage," January 9, 1998, News Release, Iron Mountain Records examined at Portland District Information Management Center, Location 277 cc34060105, Folder: News Releases 1998.

[90] U.S. Army Corps of Engineers, Portland District, "Elk Creek Dam Modifications Most Successful Way of Providing Fish Passage," January 9, 1998, News Release, Iron Mountain Records examined at Portland District Information Management Center, Location 277 cc34060105, Folder: News Releases 1998.

[91] Video recording, "Elk Creek Dam Debate," November 12, 1997, Medford News channel KTVL 10, 5:03 p.m., provided by the Portland District Information Management Center.

[92] Video recording, "Elk Creek Dam Debate," November 12, 1997, Medford News channel KTVL 10, 5:03 p.m., provided by the Portland District Information Management Center.

[93] Video recording of "Elk Creek Dam Debate," November 13, 1997, Medford news channel KOBI 5, 11:06 p.m., provided by the Portland District Information Management Center.

[94] Video recording, "Elk Creek Dam Debate," November 12, 1997, Medford News channel KTVL 10, 5:03 p.m., provided by the Portland District Information Management Center.

[95] Mark Freeman, "Elk Creek Dam Battle Taken up a Notch: Fisheries Report Proposes Restoring Channel to Save Fish," February 2001, *Mail Tribune News*, accessed at http://www.mailtribune.com/archive/2001/february/020201n5.htm, on June 1, 2001.

[96] Beth Quinn, "Opinion adds ammo to foes: A report says breaching the Elk Creek Dam is vital to threatened coho in the Rogue River tributary."

Endnotes

February 1, 2001, *The Oregonian*, accessed at http://www.oregonlive.com/printer/printer.ssf??news/oregonian/01/02/nw_51dam01.frame, June 1, 2001.

[97] John A. Jakle, *The Tourist: Travel in Twentieth-Century North America* (Lincoln: University of Nebraska Press, 1985), pp. 185-186.

[98] Jakle, *The Tourist: Travel in Twentieth-Century North America*, p. 187. In his book Jakle discussed several recreational surveys conducted in the 1950s that reflect tourism's outdoor orientation. A survey of 1,600 tourists in Michigan in 1952, for example, revealed that 70 percent came for sightseeing, 55 percent to fish, 40 percent for the beaches, and 13 percent to camp. Of the major state attractions, scenery was mentioned by 62 percent of the respondents – more than any other single factor. A 1953 survey of 2,600 tourists in Colorado found similar results. Ninety-four percent were interested in general sightseeing, 77 percent in "taking it easy," 62 percent in visiting historic sites, 60 percent in picnicking, 49 percent in shopping, and approximately 40 percent in fishing, camping, and hiking.

[99] U.S. Army Corps of Engineers, Portland District, *Water Resources Development in Oregon, 1997*, p. 4, Iron Mountain Records examined at Portland District Information Management Center, Location 277 cc 19150401, Box 2 Binders and Books; U.S. Army Corps of Engineers, "Civil Works Overview," Portland District, Public Affairs Office, 870-5a, Organizational Histories, 1990-1999, p. 14.

[100] Civil Works Overview, Public Affairs Office, Fort Worth District, no date, p. 2.

[101] Personal Communication with Park Manager James E. Runkles, August 13, 2001, Bonneville Dam, Cascade Locks, Oregon.

[102] U.S. Army Corps of Engineers, Portland District, "Corps recreation site draws many," March 6, 1981, *Corps'pondent*, Federal Records Center Pacific Alaska Region, Pacific Alaska Region, RG 77 Accession 77-95-0183, Box 1, Corps Newsletter; U.S. Army Corps of Engineers, Portland District, "Millions visit Corps projects annually," April 8, 1983, *Corps'pondent*, Federal Records Center Pacific Alaska Region, Pacific Alaska Region, RG 77 Accession 77-95-0183, Box 1, Corps Newsletter.

[103] U.S. Army Corps of Engineers, Portland District, "Millions visit Corps projects annually," April 8, 1983, *Corps'pondent*, Federal Records Center Pacific Alaska Region, Pacific Alaska Region, RG 77 Accession 77-95-0183, Box 1, Corps Newsletter; U.S. Army Corps of Engineers, Portland District, "Corps of Engineers recreation season begins," May 17, 2000, News Release, accessed at https://www.nwp.usace.army.mil/pa/info/summer2000%5Frec.htm, on June 1, 2001.

[104] U.S. Army Corps of Engineers, *Annual Historical Report*, 1998, p. 1-14, Portland District, Public Affairs Office, 870-5a, Organizational Histories, 1990-1999.

[105] U.S. Army Corps of Engineers, *Annual Historical Report*, 1995, p. A-9, Portland District, Public Affairs Office, 870-5a, Organizational Histories, 1990-1999.

[106] U.S. Army Corps of Engineers, accessed at https://www.nwp.usace.army.mil/op/v/wvprjts.htm and http://www.nwp.usace.army.mil/pa/news/archive/1997/97%D47.htm, on June 1, 2001.

[107] U.S. Army Corps of Engineers, *Annual Historical Report*, 1997, p. C-12, Portland District, Public Affairs Office, 870-5a, Organizational Histories, 1990-1999; U.S. Army Corps of Engineers, *Annual Historical Report*, 1999, p. 1-16, Portland District, Public Affairs Office, 870-5a, Organizational Histories, 1990-1999.

[108] U.S. Army Corps of Engineers, *Annual Historical Report*, 1993, p. 7, Portland District, Public Affairs Office, 870-5a, Organizational Histories, 1990-1999.

[109] U.S. Army Corps of Engineers, *Annual Historical Report*, 1997, p. C-12, Portland District, Public Affairs Office, 870-5a, Organizational Histories, 1990-1999.

[110] U.S. Army Corps of Engineers, *Annual Historical Report*, 1997, p. C-10, Portland District, Public Affairs Office, 870-5a, Organizational Histories, 1990-1999.

[111] U.S. Army Corps of Engineers, *Annual Historical Report,* 1994, p. 10, Portland District, Public Affairs Office, 870-5a, Organizational Histories, 1990-1999.

[112] U.S. Army Corps of Engineers, Portland District, *Bonneville Master Plan, Final March 1997*, pp. 65-68, Portland District Technical Library.

[113] U.S. Army Corps of Engineers, Portland District, *Water Resources Development in Oregon, 1997*, pp. 24-25, Iron Mountain Records examined at Portland District Information Management Center, Location 277 cc 19150401, Box 2 Binders and Books; U.S. Army Corps of Engineers, Portland District, "When vacation rolls around, how about...Corps recreation areas?" May 1988, *Corps'pondent*, Federal Records Center Pacific Alaska Region, Pacific Alaska Region, RG 77 Accession 77-95-0183, Box 1, Corps Newsletter.

[114] U.S. Army Corps of Engineers, Portland District, *Water Resources Development in Oregon, 1997*, pp. 24-25, Iron Mountain Records examined at Portland District Information Management Center, Location

Endnotes

277 cc 19150401, Box 2 Binders and Books; U.S. Army Corps of Engineers, Portland District, "When vacation rolls around, how about...Corps recreation areas?" May 1988, *Corps'pondent*, Federal Records Center Pacific Alaska Region, Pacific Alaska Region, RG 77 Accession 77-95-0183, Box 1, Corps Newsletter.

[115] U.S. Army Corps of Engineers, Portland District, "Recreation cuts planned," February 26, 1982, *Corps'pondent*, Federal Records Center Pacific Alaska Region, Pacific Alaska Region, RG 77, Accession 77-95-0183, Box 1, Corps Newsletter.

[116] U.S. Army Corps of Engineers, Portland District, "Corps to Seek Recreation Alternatives," December 8, 1989, News Release, Federal Records Center Pacific Alaska Region, Pacific Alaska Region, RG 77, Installation History Files, Accession 77-98-0005, Box 24 of 51.

[117] U.S. Army Corps of Engineers, Portland District, "Willamette Valley's key parks providers hammered by Al Gore," March 31, 1998, News Release, accessed at https://www.nwp.usace.army.mil/pa/news/archive/1998/98%2D25.htm, on June 1, 2001.

[118] U.S. Army Corps of Engineers, *Annual Historical Report,* 1994, p. 10, Portland District, Public Affairs Office, 870-5a, Organizational Histories, 1990-1999.

[119] U.S. Army Corps of Engineers, Portland District, "Corps of Engineers recreation season begins," May 17, 2000, News Release, accessed at https://www.nwp.usace.army.mil/pa/info/summer2000%5Frec.htm, on June 1, 2001.

[120] U.S. Army Corps of Engineers, *Annual Historical Report*, 1997, p. C-9, Portland District, Public Affairs Office, 870-5a, Organizational Histories, 1990-1999.

[121] U.S. Army Corps of Engineers, Portland District, "Overnight Camping Facilities Proposed at Fern Ridge Lake," January 21, 1993, News Release, Iron Mountain Records examined at Portland District Information Management Center, Location 277 bb 34140108, Box 2 of 3, Folder: News releases, 1991-1993.

[122] U.S. Army Corps of Engineers, Portland District, *Bonneville Master Plan, Final March 1997*, pp. 68-69, Portland District Technical Library.

[123] U.S. Army Corps of Engineers, Portland District, *Bonneville Master Plan, Final March 1997*, p. 69, Portland District Technical Library.

[124] U.S. Army Corps of Engineers, Portland District, "Corps water regulation efforts reduced overall river levels," January 15, 1997, News Release, accessed at https://www.nwp.usace.army.mil/pa/news/archive/1997/97%2D13.htm, on June 1, 2001.

[125] Paul Fattig, "Corps hears outpouring of water woes: Users steam over proposals for reservoir outflows," May 5, 1988, *Daily Courier*, Portland District, Public Affairs Office, 870-5b Installation History Files, Rogue River Basin Correspondence.

[126] U.S. Army Corps of Engineers, Portland District, "Seven Willamette Basin reservoirs may not fill by Memorial Day," April 10, 2000, News Release, accessed at https://www.nwp.usace.army.mil/pa/news/archive/2000/00%2D47.htm, on June 1, 2001.

[127] U.S. Army Corps of Engineers, Portland District, *Water Resources Development in Oregon, 1997*, p. 29, Iron Mountain Records examined at Portland District Information Management Center, Location 277 cc 19150401, Box 2 Binders and Books.

[128] Oregon Outdoor Recreation Guide, accessed at http://ptopia.com/cascade/lakes/detroit.html, on June 1, 2001.

[129] U.S. Army Corps of Engineers, Portland District, "Willamette Low Water Situation," accessed at http://www.nwp.usace.army.mil/issues/lowwater/willamette/welcome.htm, on June 1, 2001.

[130] Diana Brimhall, Interview with Lisa Mighetto, Portland, Oregon, June 13, 2001. Hereafter cited as Brimhall Interview.

[131] Representative Tootie Smith's column, accessed at http://www.leg.state.or.us/smitht/column4_20.htm, on June 1, 2001.

[132] Brimhall Interview.

[133] Brimhall Interview; U.S. Army Corps of Engineers, accessed at https://www.nwp.usace.army.mil/issues/lowwater/willamette/facts.htm, on June 1, 2001.