

Colorado River Project

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2000

Table of Contents

The Colorado River Project	2
Project Location	2
Historic Setting	3
Project Authorization	5
Construction History	9
Part I: 1937	9
Funding, Purpose, and the 1938 Flood	11
Part II: 1938-1942	12
Post-Construction History	16
Settlement of Project Lands	21
Project Benefits	22
Conclusion	23
About the Author	23
Bibliography	24
Archival Collections	24
Books	25
Internet	25
Index	26

The Colorado River Project (Marshall Ford Dam)

In 1942, the Bureau of Reclamation, in concert with the Lower Colorado River Authority (LCRA) of Texas, oversaw completion of the Marshall Ford Dam (known by Reclamation as the Colorado River Project) on the Colorado River of Texas (not the “other” Colorado River, which runs through six western states). The dam was built in response to the devastating floods that had plagued the capital city of Austin for decades since its establishment as the state capital in 1846. Through the efforts of Texas’ incredibly tenacious politicians, such as Lyndon B. Johnson, the city and the land northwest along the Colorado River basin became the focus of a major flood control and hydro-electric project that included six dams, two of which (the Granite Shoals and Marble Falls dams) were added after World War II. This project was largely under the jurisdiction of the LCRA after money for the projects began to be appropriated in 1935, but Marshall Ford was the only dam in this series that was designed primarily for flood control, as well as the only one to which Reclamation devoted its expertise and resources, and for which it took the responsibility for overseeing construction.

Project Location

The Colorado River Project (Marshall Ford Dam) is located 18 miles northwest of Austin, Texas, and one component of a large flood control and hydro-electric project headed by the Lower Colorado River Authority. Although the LCRA is responsible for the operation and maintenance of several dams along the Colorado River, including Austin Dam and Buchanan Dam, the Colorado River Project itself is comprised of Marshall Ford Dam (known locally as Mansfield Dam), and Lake Travis. Marshall Ford Dam gets its name from the river crossing that is near the dam site. The dam is a concrete gravity structure, flanked by earthen embankments,

and is 278 feet high by 2,423 feet long. The combined length of the earthen embankments is 2,670 feet, and is composed of earth, rock and gravel fill. The spillway contains an ogee section that extends 700 feet in the river channel, and the outlet works has a capacity of 125,000 cubic feet per second. Lake Travis, the reservoir behind the dam, holds 1,953,900 acre-feet of water, with a flood-control capacity of 580,800 acre-feet. The powerhouse at the foot of the dam is capable of generating 67,500 kw of power.¹

Historic Setting

Approximately 11,000 BC, bands of indigenous tribes began to enter the area of Lake Travis and Marshall Ford Dam, in what is today the state of Texas. Over time, three tribes came to control much of the land in the region—the Lipan band of the Apache culture, the Tonkawa, and the Comanche, who migrated to Texas after splitting off from their Shoshoni relatives in the Rocky Mountains. Each of these tribes lived a largely nomadic existence, hunting bison, bear, and antelope along the southern plains. The Lipans in particular were able to carve out a prosperous lifestyle during their first years in the area, aided by horses taken or purchased from Spanish settlers. Armed with lances, the Lipan established control over much of what is now northern Texas. Upon arriving in the area in the late Seventeenth to early Eighteenth Centuries, the Comanche, armed with guns, drove the Lipans to central Texas. In 1836, the newly formed Republic of Texas began expulsion of the Lipans from the area to acquire land for Anglo settlement, and to eventually establish what would become its capital, Austin, in 1839. The Tonkawa, in the meantime, became part of the relocations of indigenous tribes to Indian Territory(Oklahoma) that took place between 1866 and 1885.²

1. United States Department of the Interior, Water and Power Resources Service, *Project Data* (Denver, Colorado: U.S. Government Printing Office 1981), 293.

2. Garrick Bailey, Roberta Glen Bailey, "Indian Territory," Henry F. Dobyns, "Lipan Apache," *Encyclopedia of North American Indians* (Boston: Houghton-Mifflin Publishing Co. 1996), 272, 337.

Austin's importance and place as the capital of Texas was precarious during the Republic's first years. Texas remained in conflict with Mexico for a number of years, conflicts with the indigenous inhabitants were frequent, and Austin was distant from other population centers. When San Antonio was captured by Mexican forces in 1842, President Sam Houston moved the capital to the city of Houston, then to Washington-on-the-Brazos. The 1845 convention, which approved annexation of Texas to the United States, also approved establishing the capital of the state at Austin (this was no doubt helped by the fact that the convention itself was held in Austin). The city was officially declared the capital on February 19, 1846, when the republic's formal authority was transferred to the new state of Texas. Although Austin and Travis County, where the city is located, voted against secession from the Union, residents loyally followed the Confederacy when the ordinance was ratified February 1861. The Texans proved themselves to be tough fighters throughout the Civil War, and Austinites composed a large portion of General J. B. Hood's Texas Brigade.³

After the war ended, Austin emerged as an important economic and cultural center of the state. When the Houston and Texas Central railway established a spur through Austin in 1871, the city became the westernmost terminus in Texas, and the only town with a rail connection for miles in all directions. Capitalizing on its location monopoly, Austin became the immediate area's trading center, and the population grew as a result. The number of African Americans in the city had grown significantly (36 % of the city's population by 1870), even before the railroad's arrival, to the point that they were able to establish distinct communities in spite of segregation. Germans, Swedes, Irish, and Mexicans all established their own communities as

3. David C. Humphery, "Austin, Texas," *The Handbook of Texas Online* [database on-line] (Austin, Texas: Texas State Historical Association 1997, 1998, 1999), available from <http://www.tsha.utexas.edu/handbook/onlinearticles/view/AA/hda3.html>, Internet, accessed 25 July 2000.

well.⁴

By 1888, boosters such as Alexander P. Woolridge contended that Austin's economy could not support its growing population, and proposed building a dam that would use hydroelectric power to attract manufacturing to the city. Austin's location on the Colorado River meant that the city also was occasionally subject to floods. Although the basin only receives about 15 inches of rain a year at its upper end, periods of heavy rainfall on the watershed below the western cities of Big Springs and Colorado City can result in flows on the main river that can cause serious damage if unchecked. The city had attempted to solve the dilemma of attracting businesses by constructing Austin Dam in 1893, but it did not have the desired effect on the town's economy, and in 1900, the dam collapsed in a flood that raged at approximately 151,000 cubic feet a second. Four major floods, between 1900 and 1923, caused a great deal of damage to the city and surrounding communities.⁵

Project Authorization

The Colorado River Project, Marshall Ford Dam, was the culmination of a long, arduous political struggle that came about from a public outcry for flood relief, following floods of the Colorado River in the 1920's. The construction of Hoover Dam on the "other" Colorado River, at the Nevada/Arizona border, demonstrated that a large river could not only be controlled, but also used for multiple purposes such as hydroelectric power. Furthermore, the onset of the Great Depression, and the advent of New Deal programs under Franklin Roosevelt, insured that large-scale public works projects would be primarily Federal Government efforts, rather than state government or private efforts. The availability of federal funds, coupled with a pool of expertise

4. *Ibid.*

5. *Ibid.*; Denver, Colorado, National Archives and Records Administration: Rocky Mountain Region, Records of the Bureau of Reclamation, Record Group 115, "Annual Project History, Colorado River Project, Texas," Volume 1, 1936, 16.

required to construct large-scale projects, allowed Texas politicians to seriously explore methods of harnessing the power of the Colorado River of Texas.⁶

Among the leaders in this new collaboration were former Texas senator Alvin J. Wirtz, Representative James P. Buchanan, Colorado River Company president C. G. Mallot, and John A. Norris, chairman of the state Water Board of Engineers. These men, plus other individuals within the Colorado River Company, persuaded Secretary of the Interior Harold Ickes to instruct the Bureau of Reclamation to investigate the future site of the Colorado River Project. This prompted Ickes to issue a non-specific investigation order to Reclamation Commissioner Elwood Mead on January 19, 1935. Ickes personally chose engineer L. H. Mitchell to conduct the investigations. These investigations were submitted in a report by Mitchell to the Washington office on February 12.⁷

In the meantime, Alvin Wirtz lobbied hard for creation of a public agency that would handle the project's funding, aided by legal precedent under article 16, section 59 of the Texas state constitution; this allowed the creation of public agencies for the conservation and reclamation of the state's natural resources, which included "the control, storing, preservation and distribution of its storm and flood waters, the waters of its rivers and streams, for irrigation, power and all other useful purposes." The Colorado River Company, which was headed by C. G. Mallot, was actually a transitional firm that would theoretically allow Wirtz and other interests to secure funding for Colorado River projects. Unfortunately, attempts to secure such funding from the Public Works Administration(PWA) failed, leading Wirtz to draft a state bill in October, 1933, that called for the creation of a "Colorado River Authority." However, the bill

6. John A. Adams, Jr., *Damming the Colorado: The Rise of the Lower Colorado River Authority, 1933-1939* (College Station, Texas: Texas A&M University Press 1990), 25-9, 52.

7. *Ibid.*, 33-4.

failed to make it through the Texas legislature in 1933 and early 1934, due to lack of organized support.⁸

In June 1934, the PWA appropriated \$4 million for completion of Hamilton Dam and reservoir, but on the condition that a majority number of the CRC's board of directors be appointed by Ickes, and that the CRC would eventually be taken over by a public authority, designated by the Texas legislature. With the funding for Hamilton Dam ensured, Wirtz and Congressman Buchanan were able to push the state legislature into creating the Lower Colorado River Authority in November, 1934. Buchanan in particular had a personal stake in the creation of such an agency. In mid-July of 1934, Buchanan promised a large audience, composed largely of individuals from the Austin Chamber of Commerce and the Colorado River Improvement Association, that once such an authority was created, large amounts of federal money would pour in for Hamilton Dam and other projects along the river. The crowd, glorying in the possibility of a federal *carte blanche* that would protect their financially struggling state capital from the ravages of nature, enthusiastically renamed Hamilton Dam, "Buchanan Dam," in honor of the exuberant congressman, despite the fact that such action was in violation of federal law.⁹

The LCRA encountered further problems when it was discovered that the money granted for Buchanan Dam did not include a powerplant. Despite opposition from Texas power companies, another \$20 million was granted by the PWA in 1935 after the investigations conducted by L. H. Mitchell, as well as Henry Hunt and Elwood Mead, included hydroelectric power within the estimates. \$5 million was to be used by the Bureau of Reclamation for the purpose of flood-control engineering, while the remaining \$15 million covered construction and

8. *Ibid.*, 34-5; "Article 16, Section 59—Conservation and Development of Natural Resources; Conservation and Reclamation Districts," *Texas State Constitution*, Internet, available from <http://capitol.tlc.state.tx.us/txconst/sections/cn001600-0059-.html>, accessed 4 August 2000.

9. Adams, Jr., *Damming the Colorado*, 35-9.

the rest of the projects; of the latter amount, \$10.5 million would be loan, to be repaid by the LCRA through the purchase of revenue bonds. The other \$4.5 million would be classified as a grant. With funding in place, work to rehabilitate Buchanan Dam began October 1935; contracts were issued for the Arnold Dam, the North Dike, and Hamilton Reservoir in May of 1936, and for the Marshall Ford Dam on December 7, 1936. The construction company of Brown and Root, Inc., received the lion's share of the contracts, although they shared the contract at Marshall Ford with the McKenzie Construction Company.¹⁰

The Marshall Ford Dam, the feature of what would be the Colorado River Project, was to be the main flood control structure on the Colorado River. It was part of a comprehensive plan that included Marshall Ford, the completion of Buchanan and Marble Falls Dams, erection of a tunnel near the Arnold Dam site, repairing and raising Austin Dam, construction of a diversion dam and irrigation canals for 125,000 acres of farmland for rice, and powerplants at each damsite. At the urging of Congressman Buchanan, and in spite of the protests of acting Reclamation commissioner John Page(who was concerned about Reclamation's limited funds), the dam was planned in two stages. The first stage was to build Marshall Ford as a "low" straight gravity-type concrete dam that would be 190 feet high, then expanded to a "high" dam with a height of 265 feet. Although Reclamation's Board of Engineers recommended that Marshall Ford be placed at the upper, or "Hughes" site, the LCRA, exercising the power granted to them in the contract signed with the government, designated the lower, or "Maxwell" site as the place where Marshall Ford would be built. As contemptuous of Reclamation as the LCRA demonstrated themselves to be, they could not complete the project without the Bureau's expertise; coupled with the uncertainty of future funding, Buchanan compelled the Authority to

10. *Ibid.*, 40-2, 67; "Annual Project History, Colorado River Project, Texas," Volume 1, 1936, 11-2.

concede the responsibility of overseeing construction to Reclamation so that the project could be accomplished, and limited LCRA's say in the design and construction of the dam.¹¹

LCRA and Reclamation received a boost in January 1937, when the Supreme Court ruled government-sponsored hydroelectric projects to be acceptable. The elation over the ruling, along with the progress of the projects on the river, was tempered when Congressman Buchanan died of a heart attack on February 22, three days after a dedication ceremony for the dam site. His death raised the question of who would take his place in lobbying for project funds. The Texas delegation committed themselves to keeping the projects alive, and were led by the 28-year-old director of the Public Youth Administration, Lyndon Baines Johnson, who was elected to take Buchanan's place in Congress.¹²

Johnson distinguished himself from a field of eight candidates for the Congressional seat, by taking advantage of the political mentorship of Alvin Wirtz and unequivocally supporting the policies of President Franklin Roosevelt, including the controversial "court-packing" plan. Johnson proved in coming years to be the most important figure in keeping construction of Marshall Ford in motion, and his role in the project became the catalyst of a political career that culminated in his election as U.S. President in 1964. Johnson was also helped by Congressman Joseph Mansfield, who together managed to acquire another \$5 million for Marshall Ford through the passage of the Rivers and Harbors Act on August 26, 1937, which officially authorized the project.¹³

Construction History

Part I: 1937

11. Adams, Jr., *Damming the Colorado*, 39; "Annual Project History, Colorado River Project, Texas," Volume 1, 1936, 18.

12. Adams, Jr., *Damming the Colorado*, 64-72.

13. *Ibid.*, 72-9.

Although the project was not officially authorized by President Roosevelt until August of 1937, work on the site began in February of that same year, thanks to a \$5 million appropriation to the LCRA. Work during the first months of construction consisted mostly of preparing the dam site for the facilities that would be needed in building the dam and its structures. These projects included erecting camp buildings, improvement of roads to the site, layout of the railroad which would carry material to the site, and clearing of trees around the dam area and the reservoir. On February 19, a ground-breaking ceremony was held at the site, where Interior Secretary Harold Ickes touched off the first dynamite blast for construction. In September, a grade school constructed for the children of workers at the site was opened for classes, and the contractor's plant, which sifted and separated material for the dam, was finished in October.¹⁴

Excavations for the dam foundation itself would begin a month later on March 19, with the majority of the work being accomplished through the use of ten six-yard dump trucks and three gasoline-operated one and a half yard shovels. By the end of the 1937, 85% of the material had been removed. A 36-inch drill was also put to great use throughout the year, providing data on foundation investigations and classifying dam materials. Stripping for the earthen embankment at the dam's left end was begun in May and largely completed in June. On July 16, the left concrete cofferdam was begun, supplemented with earth and gravel. A cofferdam without the concrete was placed at the right side of the dam the same month. On October 17 and December 30, the cofferdams were overtopped by floods, necessitating reconstruction in both instances.¹⁵

The contractor initiated grouting for the dam foundation on August 19, using equipment proven successful on the projects of the Tennessee Valley Authority. The first grouting efforts

14. *Ibid.*, 67; "Annual Project History, Colorado River Project, Texas," Volume 2, 1937, 5, 56, 77, 95.

15. "Annual Project History, Colorado River Project, Texas," Volume 2, 1937, 10-1, 59-65, 73.

in this area was a low-pressure program, carried out on a three-shift basis. The crew encountered problems when the foundation raised in some places despite the low pressure. Attempts to wash out some of the seams of soft clay and shale met with mixed results. High pressure grouting was initiated December 2, a program that consisted of drilling holes 30 feet deep, grouting the holes, drilling the same holes to 75 feet, then grouting again. Workers used six types of grouting throughout the period of construction.¹⁶

After July 2, two 5X10 cutoff drifts were driven into the left abutment's foundation, in order to halt the formation of two soft seams that had occurred at elevations 555 and 556. A calyx hole was then drilled into each, completing the excavation; the tunnels were then backfilled with concrete the first of November. Similar plans were made for the right side when soft seams appeared on the right abutment as well. On October 30, the first mass concrete was placed. A trestle and track was also installed over block 11 of the dam, extending into the mixing plant; the steel legs of the trestle would remain as a part of the dam as construction progressed.¹⁷

Funding, Purpose, and the 1938 Flood

The winter floods that overtopped the cofferdams in 1937 proved to be a harbinger of things to come in 1938, as both structures were again overtopped in January and April. The situation was made even more serious on July 23, when the river reached flood stage, flowing at a rate of 260,000 cubic feet a second. In the meantime, the July flood proved to be a boon for supporters of making Marshall Ford a high dam, a plan that Harold Ickes questioned; this concern came on the heels of assurances by John Page to Lyndon Johnson that neither LCRA nor the state of Texas would be responsible for repaying the reimbursable costs of the project under

16. *Ibid.*, 65-8; "Annual Project History, Colorado River Project, Texas," Volume 3, 1938, 51-3.

17. "Annual Project History, Colorado River Project, Texas," Volume 2, 1937, 68-73.

the 1902 Reclamation Act. By 1938, the estimate of the total cost of the dam had risen to more than \$28 million for completion of the dam at “high” stage, and unless “experience demonstrated the need,” Ickes said to Johnson, the dam would be completed at the low stage to encourage “economy in Federal expenditures.” Thanks to the July flood, not just politicians associated with the project, but now the populace as well, were calling for completion of Marshall Ford as a “high” dam. The situation was not helped by the investigations of the Texas senate, which found that LCRA had mismanaged Buchanan Dam, misleading the public into believing that its primary purpose was to be flood control rather than hydroelectric power. LCRA had allowed the waters of the Colorado River to build up too much behind the dam, thus proving to be a key contributor to the flood. The senate’s ruling, along with statistics that revealed at least 12 dead and 4,000 left homeless by the flood, ensured that the LCRA’s focus for Marshall Ford would be flood-control first and hydroelectric power second, the latter of which would be used to pay off debt on the projects.¹⁸

Part II: 1938-1942

Beginning in February of 1938, work forces under control of LCRA began clearing the reservoir area, starting at the left abutment of the damsite. These work forces also began construction of power lines from Marshall Ford to Buchanan Dam on March 11. After construction of two more cofferdams, the contractor diverted the river through the diversion conduits. The construction of a third cofferdam of earth material downstream from the spillway apron formed a three-sided enclosure that allowed for the placement of concrete from block 31 to the right abutment.¹⁹

18. “Annual Project History, Colorado River Project, Texas,” Volume 3, 1938, 5-6, 14-9; Adams, Jr., *Damming the Colorado*, 85-92.

19. “Annual Project History, Colorado River Project, Texas,” Volume 3, 1938, 5-6, 48.

The first mass concrete for the base of the high dam was placed beginning October 6. The spillway apron was constructed from January 6, 1938, to September 22, 1938, a process delayed by the July flood, after which the downstream cofferdam was removed and the apron flooded. Two intermediate training walls at the downstream end of the diversion conduits were built concurrently with the spillway apron, sloping from the contraction joint of the dam and apron to the apron's dentated sills. The walls were built from March 3-April 4, while the sills were completed September 22, in time for the opening of the apron. Steel frames for the bulkhead gates at the upper end of the diversion conduits were installed from March through April, and the outlet conduits in May and June. The trashrack structures were also begun for the low dam in the form of the floor and concrete to which the metal apparatuses would be bolted. Penstocks were installed from June to December, with some repair work brought about by debris damage from the July flood. The first of the pipes which would be used throughout the remainder of construction for concrete cooling was placed on October 24; this process involved the running of cold water through a system of thin-wall tubes, placed on the surface of five-foot lifts.²⁰

Although presently available funds for the project were sufficient to build the dam to an elevation of 620 feet, another \$5.5 million would be required to complete the dam at the final crest elevation of 750 feet. In March 1939, Johnson received notice from Page that the final cost of the dam would be \$30 million dollars; thanks to Johnson's efforts at securing funding, the project received nearly 10% of Reclamation's \$65 million budget for the 1939 fiscal year, ensuring that construction of Marshall Ford as a high dam would continue. In August, Secretary Ickes amended the original construction contract between the United States and the LCRA to

20. *Ibid.*, 5-6, 55-66.

officially include plans for the high dam, extending the work estimate by 470 days. The LCRA also took the opportunity to erect 115 miles of power lines for the dam although Marshall Ford's primary purpose was to remain as flood control. First right of power would go to the city of Austin and the 16-county area surrounding the entire Lower Colorado project, while the surplus would be sold to the Texas Power and Light Company.²¹

Construction on Marshall Ford continued briskly throughout 1939, as workers made the transition from the low to the high dam. Important excavations included the section for the powerhouse, which was completed in April, and the toe drain trench in March; excavation stopped for a short period until August, and was completed for good in November. The placement of mass concrete in the low dam, enlargement, and training walls all continued apace, including the movement of the 180 foot cableway tail tower to its new location on block 7 via a track, a method that only took 36 hours. The penstock intake was placed monolithically with concrete by the LCRA, and was completed in May. The installation of the trashrack structure between elevation 515 and 620 began during this period, but due to conflicts over payment with the contractor, the 10 foot lift had only been installed in three blocks of the dam.²²

Placement of earth embankments began at the downstream toe, and was compacted with sheepsfoot rollers over most of the embankment area, while pneumatic tampers were used along the walls. Ten passes were made, and hand sprinkling occurred where necessary to obtain the ideal moisture content, after which rockfill and riprap were placed in June and July. During this period, all paradox service gate castings and conduit liners for the low dam were placed in concrete; the hoists were then placed and adjusted, and the gates were painted. Three more

21. Adams, Jr., *Damming the Colorado*, 95; "Annual Project History, Colorado River Project, Texas," Volume 4, 1939, 43.

22. "Annual Project History, Colorado River Project, Texas," Volume 4, 1939, 46-8, 53-6.

penstocks were installed and coated with coal tar paint in May, and the power intake structure for the trashrack was installed.²³

With the low stage of the dam completed and all the necessary funding in place, construction on the enlargement was able to move steadily in 1940, if somewhat slowly. On January 5, 1940, Reclamation awarded a contract to the Marshall Ford Construction Company. The powerhouse, a three-unit structure capable of delivering up to 75,000 kilowatts, was finished by the company on December 5, 1940. Much of the year was devoted to embankment and concrete placement throughout the dam. The diversion conduits were backfilled with concrete, and metalwork for the trashracks was placed. Excavation and stripping of the embankment site for the dam enlargement began in August, starting further upstream from the low dam embankment; by the end of the year, stripping and placing of embankment for the right saddle dike began.²⁴

From 1941 to 1942, work on the project rapidly progressed to a satisfactory conclusion. By the beginning of December 1941, the last concrete had been placed in the dam. Parapets were also constructed on both wing dams on the upstream portion. After using river water to cool the concrete, the workers switched to refrigerated water when the temperature of the river water rose too high. An elevator tower was built at block 21, providing easy access to the top of the dam, as well as an installation point for some of the dam's electrical equipment. The last of the electrical equipment was placed in the parapets, roadway, and dam galleries, all connected with the powerhouse that was built the previous year. A steel spillway bridge was also constructed from September to November of 1941. LCRA spent the first half of the year installing generators on the power transmission lines, completing the task with the placement of

23. *Ibid.*, 51-2, 57-60.

24. "Annual Project History, Colorado River Project, Texas," Volume 5, 1940, 5, 51-2, 57-62.

the third generator on June 13. Much of the remainder of construction consisted of the completion of all grouting stages, cleanup, and the installation of a roadway over the top of the dam(which became known as Ranch Road 22 after the dam's completion). The final stages of dam construction were completed in May 1942.²⁵

The project had by this time been storing water behind the dam, holding 339,400 acre-feet of water at elevation 615 in January 1941. The structure received an early test in April and may, when a flood rushing at 51,000 cubic feet a second was abated by the operation of 12 of the dam's 24 outlet conduits. During the year, the average monthly discharge was 261,900 acre-feet a month, with the powerplant using a yearly total of 1,195,144 acre-feet. By end of the construction LCRA had twice been able to secure permission to raise the controlled surface level of the reservoir, ending at an allowable elevation of 655 feet and 756,000 acre-feet of storage, in an agreement signed in February 1942.²⁶

Post-Construction History

In 1941, Lyndon Johnson suggested that Marshall Ford Dam be renamed Mansfield Dam, in honor of the man who had been responsible for the authorization of the project, as well as much of its funding. To commemorate the renaming, a plaque was erected at the dam site by the Ninth Congressional District of Texas, which Mansfield served, and the LCRA . However, this renaming was not made official, as evidenced by a letter sent from the acting commissioner of Reclamation to the chief engineer of the dam in 1949, in which the commissioner requests that further reference to the dam as Mansfield rather than Marshall Ford should be avoided "until such a time as official action is taken to change the name."²⁷

25. "Annual Project History, Colorado River Project, Texas," Volume 6, 1941-2, 5, 23-48.

26. *Ibid.*, 26-7.

27. Michele Chan Santos, "The People Behind the Parks, Names From the 19th Century Live On in Central Texas' Public Lands," *Austin American-Statesman*, 1 September 1998, sec. Newspapers and Newswires, p. E1;

(continued...)

Throughout its lifetime, the Marshall Ford Dam has been kept in remarkably good condition, considering the annual stress of holding back the Colorado River. The only major concerns that have emerged since the dam's completion have occurred intermittently; the first of these was in 1948 and 1950, when Reclamation inspectors found the drain nipples rusted or completely corroded. By 1952, this problem was remedied by their replacement with wooden drain plugs, which appears to have solved the leakage and structural problems associated with the metal nipples. The 1948 inspection also found the uplift measuring system in the dam to be in bad shape, as several of the measuring gages, fastened to small metal pipes on the walls in the drainage galleries, were either gone or inoperative, and several of the pipes rusted. The inspectors recommended a reconditioning of the measuring system, as well as consistent readings of these gages by the LCRA. By 1971, LCRA had begun the process of rehabilitating the gates of the outlet works, at a rate of four per year. Other than these major maintenance projects, the LCRA has kept the dam in very good shape, due to the fact that it is the main flood control structure for the region.²⁸

Over the course of the dam's post-construction history, three recurring issues have emerged as the most important in analyzing the project, and the region's, history-- recreation, development, and the perpetual cycle of flood and drought that has occurred for centuries. In many ways, these issues have shown themselves to be as much interrelated as they are independent of each other.

Students at the University of Texas in the 1950's and 1960's, were some of the first to use the project for recreational purposes, albeit not for traditional recreational activities of boating,

27. (...continued)

United States Department of the Interior, Bureau of Reclamation, "Review of Operation and Maintenance," *Marshall Ford Dam*, Great Plains Region (Denver: Operation and Structural Safety Group 1941-78).

28. United States Department of the Interior, Bureau of Reclamation, "Review of Operation and Maintenance," *Marshall Ford Dam*.

swimming, and camping. These creative individuals developed an activity called “dam-sliding.” Students would slide on algae that had formed along small leaks in the dam’s flood gates, plunging along the sloped bottom of the dam into the cold water below. Although this activity stopped after the LCRA fixed the leaks, Lake Travis soon proved to be a very popular spot among local Austinites as well as tourists. This increasing popularity, reflective of the rise of recreational activity in the United States following World War II, led the Texas state legislature in 1971, to grant approval for converting the lands surrounding Lake Travis into public parks. Although the LCRA did not begin focusing resources on park improvement until 1991, since that time they have invested a total of \$12.3 million in developing recreational sites, including an additional \$9 million from various sources, among them the Texas Parks and Wildlife Department. All of these parks are financed yearly from electric and water revenues rather than public tax dollars.²⁹

The financial support was also coupled with community efforts to improve the parks, and the results have proven to be very fulfilling for those seeking to temporarily escape from the day to day grind. Lake Travis’ parks received a total of over one million visitors in 1999, and have featured activities such as swimming, boating, scuba-diving, camping, and wind-surfing. For the slightly more daring, nude sunbathing is a risky, if exciting option. These free spirits gained a measure of legal protection in October 1989, when a nude sunbather was acquitted of disorderly conduct for his revealing activities at Tom Hughes Park.³⁰

29. Pete Szyalgyi, “A Hill Country Landmark: Mansfield Dam Marks the Passage of a Half-Century,” *Austin American-Statesman*, 6 June 1991, sec. Newspapers and Newswires, p. 1; Paris Permenter, John Bigley, “Take Me to the Rivers and Lakes: The LCRA String of Recreational Pearls is a Chain that Links the Hill Country with the Gulf of Mexico,” *Austin American-Statesman*, 19 July 1998, sec. Newspapers and Newswires, p. J1.

30. “Mansfield Dam Park,” *Travis County Parks*, available from www.co.travis.tx.us/tnr/parks_graphic/mansfield_dam.htm, accessed 3 August 2000; Jim Phillips, “Proposal to Close Lake Travis Park Draws Opposition,” *Austin American-Statesman*, 12 June 1990, sec. Newspaper and Newswires, p. B1.

However, these activities are affected in subtle ways if the area experiences a drought or flood. The state of Texas, and the central portion in particular where Austin is located, are currently in the midst of a drought that has dropped lake levels drastically. If the lake drops too low, the water will be more crowded for swimmers, boaters, and divers, and as a result, fewer people will want to come. For the people whose livelihood depends on recreation at the dam, it can be even more devastating; for instance, marina owners are constantly watching lake levels in order to move their docks, and lower lake levels mean fewer customers. This is a serious situation for an industry that contributed \$252 million to the area economy when the lake level dropped to elevation 669 feet above sea level. The situation is so severe that in 1997, the local paper, the *Austin-American Statesman*, predicted that the average level of the lake will drop from 669 feet to 661 feet by the year 2005. During the summer of 2000, water use restrictions have swept all across Central Texas. Travis County currently has an ordinance in effect that limits hoses to hand-held use, although Austin for the time being has yet to impose any severe restrictions other than a five day rotation on sprinkling.³¹

The recent drought on the Colorado River perfectly illustrates the flood and drought cycle typical of the river. The floods of 1935 and 1938 demonstrated how dangerous the river could be, and why Texas politicians such as Wirtz and Johnson wanted a large project along the river that included flood control as a primary function. However, from 1946 to 1956, the river suffered from a drought that lowered the water level in Lake Travis down to 614 feet elevation. Yet, during that same drought, the region was struck by a series of storms in September 1952 that pushed the lake level up 56 feet. A wet April and May in 1957, following the drought,

31. Janet Wilson, "The Changing Face of Lake Travis: As Population and Water Rise, the Lake's Level Will Fall, Leaving Property Owners, Businesses in Dry Dock," *Austin American-Statesman*, 16 August 1997, sec. Newspapers and Newswires, p. A1; Ralph K. M. Haurwitz, "Water Limits Sweep Across Central Texas," 18 July 2000, *Austin American-Statesman*, p. A1.

pushed the lake up to 707 feet, its highest level ever.³²

The fluctuations in the level of the lake and the periods of flood and drought become even more significant when one takes into account the tremendous growth that the region has experienced in the past few years. This growth has spread to what is termed the Hill Country portion of the area, a once poor region that has witnessed first-hand the effects of development upon the land. The 1979 Safety Evaluation of Existing Dams Report found that houses had been built within the reservoir area below the maximum surface elevation for the dam. If the top of water elevation ever came up to 714 feet for flood control storage, it could potentially flood the developments, washing the homes from their foundations and blocking the spillway. More recently, the population of Austin has grown to approximately 567,566 residents by 1997, with a total of 1,026,299 in the Austin metropolitan area. To make matters even more difficult, the city's demand for water more than doubled between 1975 and 1995, a growth rate expected to continue between 1995 and 2015. The city by 1995 was consuming 121, 316 acre-feet of water a year; by 2015 it is expected, based on dry-weather conditions, that Austin will be using up to 240,758 acre-feet of water a year, much of it provided by Lake Travis.³³

Many new residents have built homes within range of the reservoir, putting new strain on water supplies in times of drought, and in some instances creating conflicts about development is encouraged and how the recreational facilities are used. LCRA general manager Mark Rose predicted during the 1997 drought that, because of the rising population strain on water resources from Lake Travis, the lake level could fall to as low as 590 feet, reducing the river in some areas

32. Szilagyi, "A Hill Country Landmark," 1; Dick Stanley, "Fear for the Lawn, not Lake Travis," 14 December 1999, *Austin American-Statesman*, sec. Newspapers and Newswires, p. A1.

33. United States Department of the Interior, Bureau of Reclamation, "SEED Report on Marshall Ford Dam, Colorado River Project, Texas" (Denver: Division of Dam Safety 1979), 21; City of Austin, *Austin: Basic Facts* [database on-line] (Austin, Texas: City of Austin 1999), available from www.ci.austin.tx.us/citymgr/basicfac.htm; Internet, accessed 9 August 2000; Wilson, "The Changing Face of Lake Travis," A1.

to little more than a stream. This type of strain would not affect municipal users for some time, thanks to conservation efforts and water-use restrictions within the city. However, farmers that rely on Lake Travis to provide irrigation water for their crops could have up to 25 percent of their water allocation reduced, and the economic and physical impact upon the recreational use of the reservoir could be quite severe as well.³⁴

Because LCRA plays a major role in the development of the lands along the various lakes, through access to water and electricity, it has often come under fire from critics for failing to provide leadership in managing growth and limiting urban sprawl. In addition, some residents have begun to fight over access to, and the nature of, recreational facilities. In 1990, on the heels of the sunbather's court case in October 1989, a proposal was put forth to close Tom Hughes Park.³⁵

This park during its lifetime provided little in the way of facilities, but was popular with visitors to Lake Travis for decades because it provided easy access to the shorelines. The visitors included some whom residents deemed an "undesirable element," and whose sometimes rowdy behavior had been the cause of local complaints to Travis County officials. Real-estate developers made no secret of their contempt for the area as "a blight on the neighborhood," and coupled disdain for the area with the desire to profit from the sale of what one of them viewed as "a really nice spot for some waterfront homes," rather than as a place meant for public use. The drive to close Tom Hughes Park failed, and it is still under the management of the Travis County Parks system.³⁶

Settlement of Project Lands

34. Stanley, "Fear for the Lawn," A1; Wilson, "The Changing Face of Lake Travis," A1.

35. Chuck Lindell, "Rising Force on the River," *Austin American-Statesman*, 31 October 1999, sec. Newspapers and Newswires, p. H1; Phillips, "Proposal to Close Lake Travis Park," B1.

36. Phillips, "Proposal to Close Lake Travis Park," B1.

Neither the Lower Colorado River Authority or the Bureau of Reclamation targeted the Colorado River Project for settlement of lands, but one of the hottest issues surrounding the area in recent years has been land development along the shores of the reservoir behind the dam, as well as downstream. Although the exact number of current residents will be difficult to determine until the new census for the year 2000 is released, it is clear from recent articles in the local Austin newspaper that the area has become a very desirable place to live, due in part to completion of the dam and the subsequent creation of scenic real-estate.

Project Benefits

The benefits derived from the presence of Marshall Ford Dam and Lake Travis are many. When water levels were high, the lake and its various parks have recently brought a yearly revenue of \$252 million dollars. Those figures will certainly drop if the current drought continues. Municipally, Lake Travis serves as the largest drinking water reservoir within a 170 mile radius, providing the city of Austin with a large share of its drinking water, as well as providing local rice farmers in the lower plains with water to irrigate their crops. The powerhouse at the right toe of the dam is a three-unit facility capable of generating 67,500 kilowatts. The production is timed with the release of water from the outlet works, and produces a portion of the hydro-electric revenues that make up 93% of the Lower Colorado River Authority's \$498 million total annual income. Lake Travis is also home to a popular series of parks that serve over one million visitors a year, with Mansfield Dam Park attracting over 300,000 in its own right. However, the Marshall Ford Dam's primary purpose is flood control, and since construction, damage to the area from floods has been kept to a minimum. From 1950-1992, the project prevented over \$256 million in potential damages, \$62.7 million of those

potential damages in 1992 alone.³⁷

Conclusion

The history of the Marshall Ford Dam and Lake Travis is one that has been marked by controversy since the project was first proposed by Alvin Wirtz and James Buchanan. In the beginning, it was acquiring funding, not just for the Marshall Ford Dam, but for the many other projects along the Colorado River that led to much political wrangling. During the construction period, the swirling winds of contention revolved around the use of Marshall Ford and other projects for large-scale hydroelectric power, as well as the final approval for a high dam following the flood of 1938. In recent times, development and the use of recreational facilities are two issues that have defined the project, showing the level of control that the Lower Colorado River Authority exercises in the region, as well as the level of public involvement and interest in the project's lands. Hanging over all of these issues is the continual specter of drought and flood that promoted construction of the dam in the first place, and the unpredictability of the Colorado River that continues to justify its existence. It is certain that as time wears on and the region of Travis County and the city of Austin experience even more growth, the presence of the dam will continue to be viewed as a necessary and viable source of life, and guardian against destruction.

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37. *Project Data*, 293; Lindell, "Rising Force," H1; "Mansfield Dam Park," www.co.travis.tx.us/tnr/parks_graphic/mansfield_dam.htm; United States Department of the Interior, Bureau of Reclamation, *1992 Summary Statistics* (Denver; Government Printing Office 1992), 16-7.

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Index

Alexander P. Woolridge	5
Alvin J. Wirtz	6, 9, 19, 23
Arnold Dam	8
Austin Dam	2, 5, 8
Austin-American Statesman	19
Buchanan Dam	2, 8, 12
Hamilton Dam	7
Bureau of Reclamation	2, 7, 8, 17, 22
C. G. Mallot	6
Civil War	4
Colorado River	2, 5, 6, 12, 17, 19, 23
Colorado River Company	6
Colorado River Project	2, 5, 22
Brown and Root, Inc.	8
Lake Travis	2, 18-20, 22
Mansfield Dam Park	22
Marshall Ford Dam	2, 5, 8, 9, 11-14, 16, 17, 22
McKenzie Construction Company	8
Tom Hughes Park	21
Elwood Mead	6, 7
Franklin Roosevelt	5, 9
General J. B. Hood	4
Granite Shoals Dam	2
Great Depression	5
Hamilton Reservoir	8
Harold Ickes	6, 10, 11, 13
Henry Hunt	7
Hill Country	20
Hoover Dam	5
Houston and Texas Central Railroad	4
Indian Territory(Oklahoma)	3
James P. Buchanan	6, 8, 23
John A. Norris	6
John Page	8, 11, 13
Joseph Mansfield	9, 16
L. H. Mitchell	6, 7
Lake Travis	2, 18-20, 22
Lower Colorado River Authority	2, 7, 8, 10, 11, 13-15, 17, 18, 20, 22, 23
Lyndon B. Johnson	2, 9, 11, 13, 16, 19
Marble Falls Dam	2, 8
Mark Rose	20
Marshall Ford Construction Company	15
Marshall Ford Dam	2, 5, 8, 9, 11-14, 16, 17, 22

Mansfield Dam	16
Mexico	4
Native Americans	3
Comanche	3
Lipan Apache	3
Shoshoni	3
Tonkawa	3
North Dike	8
Public Works Administration	6
Public Youth Administration	9
Ranch Road 22	16
Republic of Texas	3
Rivers and Harbors Act	9
Sam Houston	4
Tennessee Valley Authority	10
Texas	2-4, 6, 9, 11, 19
Austin	2, 4, 14, 19, 20, 22, 23
Big Springs	5
Colorado City	5
Houston	4
San Antonio	4
Washington-on-the-Brazos	4
Texas Power and Light Company	14
Travis County	4, 19, 21, 23
Travis County Parks	21
University of Texas	17