

Palmetto Bend Project

James M. Bailey
Bureau of Reclamation
2008

Table of Contents

Palmetto Bend Project 2
 Project Location, Geology 2
 Prehistoric and Historic Setting 3
 Project Authorization 8
 Construction History 12
 Uses of Project Water 23
 Conclusion 25

Bibliography 27
 Manuscript and Archival 27
 State and Federal Government Documents 27
 Secondary and Internet 27

Index 29

Palmetto Bend Project

Often, the horrific aftermath of a natural disaster can present opportunity for improvement. Such is the case with the Bureau of Reclamation's Palmetto Bend Project in southeast coastal Texas. In September 1961 Hurricane Carla inflicted an estimated \$34 million worth of property damage to Jackson and Calhoun counties, which were then declared major disaster areas by President John F. Kennedy. In addition to the costs to human lives and property, the hurricane dealt a severe blow to the region's agricultural economy. Once Kennedy made his disaster proclamation, the affected counties became eligible for Federal assistance under Public Law 875, 81st Congress, as amended.¹

Although relief funds distributed to both counties totaled nearly a half million dollars—and helped with reconstruction—state and local officials sensed a much bigger need. They concluded that a larger, more comprehensive water plan was essential to not only offset property losses inflicted by Carla, but to help expand industrial and economic growth beyond agriculture. Officials wanted the hurricane-ravaged area to become a major player in gulf coastal Texas's expanding Postwar petrochemical (oil and gas) and extractive (aluminum and magnesium) boom. This ambitious plan called not only for the construction of new water storage facilities to meet expanding municipal and industrial demands, but to also provide more comprehensive fish and wildlife habitats, and address increasing freshwater recreation needs.² Thus, from the wake of a hurricane's random fury, the Palmetto Bend Project was born.

Project Location, Geology

Located about halfway between Houston and Corpus Christi, the Lavaca-Navidad River

1. U.S. Department of Interior, Office of the Secretary, *A Report on the Palmetto Bend Project, Texas, Pursuant to Section 9(a) of the Reclamation Project Act of 1939 (53 Stat. 1187)*. 89th Congress, 1st Session, House Document no. 279, August 26, 1965, 20-1. Located in the Records of the Bureau of Reclamation (RG 115), Box 482, National Archives and Records Administration, Denver (hereafter RG 115, Box #, NARA Denver).

2. *Ibid.*, 21.

sub-basin of the gulf basins area of Texas is about 80 miles long and 50 miles wide. This sub-basin lies between the Colorado and Guadalupe River basins, and extends north from the gulf through Jackson, Lavaca, Wharton, and Colorado counties to the Navidad River's headwaters in Fayette County and the Lavaca River's headwaters in Gonzales County. The combined Lavaca-Navidad sub-basin drains an area covering 2,368 square miles.³ Edna, the Jackson County seat, is located a few miles northwest of Palmetto Bend Dam. The project is situated on the coastal prairie belt of the Texas coastal plain, with several thousand feet of clay, sandstone, and shale underneath the dam and its reservoir, known as Lake Texana. The reservoir's basin is underlain by the Beaumont Formation and flood plain deposits. Water tables are located near the ground surface.⁴

Prehistoric and Historic Setting

The archeological consensus, based on extensive pre-project field research, is that the area now occupied by Palmetto Bend Project was once the prehistoric territory of two major regional native groups, the Karankawa and the Coahuiltecs. Karankawans favored the coastal areas, gathering marine food resources along low-lying gulf shores and estuaries. Coahuiltecs, on the other hand, lived inland and survived on terrestrial food resources. Evidence indicates that both groups spoke derivatives of the same language group, with patrilineal descent systems. Additionally, another group, the Tonkawa, lived further inland to the north and west. Not only did this group speak a different language, archeologists suggest their descent system was matrilineal.⁵ Of the three groups, the Tonkawa had the most extensive cultural range, extending

3. United States Department of the Interior, Bureau of Reclamation, Southwest Region, *Palmetto Bend Project-Texas, Final Environmental Impact Statement*. Amarillo: Bureau of Reclamation, 1974, A-2.

4. P. C. Knodel, "Soil Studies for Palmetto Bend Project, Texas." Bureau of Reclamation Report No. EM-774, April 1986, 3. Located in RG 115, Box 486, NARA Denver.

5. Paul R. McGuff, et. al., "Prehistoric Archeological Investigations at Palmetto Bend Reservoir: Phase 1, Jackson County, Texas." Austin: Texas Archeological Survey, Research Report 58, February 1978, 14. Copy in RG 115, Box 71, NARA Denver.

all the way up to Oklahoma. Archeological evidence, however, indicates that Tonkawans (and Lipan Apaches) moved south into east central Texas in the mid-late eighteenth and early nineteenth centuries, mostly due to eastward and southward expansion of mounted Comanche and Apache groups from the southern plains, and expansion of the Spanish frontier into northeastern Mexico. As a result, Tonkawans lived with, then eventually displaced, the Karankawans and Coahuiltecans as these groups' populations diminished over time.⁶

The first documented instance of European contact with these cultural groups is the 1528 arrival of Cabeza de Vaca, a survivor of the ill-fated Navarez expedition, who lived for eight years among the south Texas native groups. In 1579, the province of Nueva Leon extended into what is now south Texas. There is no evidence of contact between the Spanish and indigenous peoples of south Texas until the seventeenth century, when the Spanish began their aggressive northward push. In February 1685 Rene Robert Cavalier Sieur de La Salle and 300 French colonists landed at Matagorda Bay. La Salle intended to establish his colony at the mouth of the Mississippi River, but missed his target, and erected Ft. St. Louis on the banks of Garcitas Creek in Karankawan territory. Plagued by disease, dissension, and hostile natives, the colony failed; Spanish explorer Alonso de Leon destroyed the fort in 1690. La Salle was killed by one of his own men as he attempted to reach the Mississippi River on foot.⁷

Spanish expansion into eastern Texas flourished in the wake of de Leon, mostly to check further French intrusion. In 1722, the Spanish erected two Franciscan missions on Garcitas Creek where Sieur de la Salle's fort once stood, Presidio La Bahia and Mission Espiritu Santo de Zuniga; both were moved over the course of the next 25 years, first to Mission valley on the

6. William W. Newcomb, Jr., and Thomas Campbell, "Tonkawa," in Raymond J. DeMallie, ed., *Handbook of North American Indians, Plains* (Volume 13, part 2 of 2). Washington, D.C.: Smithsonian Institution, 2001, 953.

7. Robert Mallouf, et. al., "An Assessment of the Cultural Resources of Palmetto Bend Reservoir, Jackson County, Texas." Austin: Texas Historical Commission and Texas Water Development Board, Archeological Survey Report Number 11, August 1973, 24. Copy in RG 115, Box 72, NARA Denver.

Guadalupe River in 1726, then in 1749 to the San Antonio River valley near the (modern) town of Goliad. These missions flourished early, but by 1800 most south Texas Coahuiltecs had disappeared, either through disease or assimilation into the Mexican populace. Much less inclined to accept mission life, the Karankawans also faced attrition through diseases, and with the increasing numbers of Anglos arriving after Mexico's 1821 victory over Spain, they were eventually reduced to small bands eking out a living in limited coastal areas.⁸

Scarcely a few months before Mexico's 1821 independence, Missourian Moses Austin arrived at San Antonio de Bexar with plans for colonization, with the Spanish granting him permission to do so on the Brazos and Colorado rivers. On his way back to the United States, Austin died, leaving his son Stephen in charge. To complicate matters, the newly-formed Mexican provisional government refused to recognize and approve the elder Austin's Spanish grant. To settle the issue, Stephen Austin went to Mexico City where not only did he get his father's request reapproved, but he helped the Mexicans shape their 1824 constitution, which joined Coahuila and Texas into one state, and included a clause permitting colonization contracts. One year later, in 1825, the state legislature of Coahuila y Texas legalized the empresario system, which issued generous land grants for colonists to help settle Texas—nearly 4,000 acres worth of grants.⁹

Over the next decade, Stephen Austin and other colonizers brought roughly 25,000 (mostly Anglo) settlers into southern Texas. Because the settlers, despite their "Mexican" nationality, retained their English language, formed their own schools and freely traded with the United States, in 1830 the Mexican government attempted to halt immigration, raise taxes, and establish military garrisons. Five years later, Mexican President Antonio Lopez de Santa Anna

8. *Ibid.*, 24-5.

9. Howard R. Lamar, ed., *The New Encyclopedia of the American West*, New Haven: Yale University Press, 1998, s.v. "Texas" and "Empresario System".

abolished the 1824 constitution, anointed himself dictator, affirmed martial law, and attempted to disarm the Texans—who duly resisted. On October 2, 1835, the two sides went to war, with the Texans only wanting restoration of the 1824 Constitution. The first victory, at San Antonio, witnessed the Texans defeating a small Mexican garrison, but a few months later, in February 1836, a larger Mexican force, estimated at 5,000, returned to San Antonio and trapped 187 Texans at the Alamo. Led by David Crockett and James Bowie, the outnumbered, yet determined ragtag force held off the Mexicans for a couple weeks until all were killed, along with 1,200-1,600 Mexicans. At the same time, Texans who desired independence from Mexico held a constitutional convention at Washington-on-the-Brazos where, on March 2, 1836, all in attendance voted for independence. A couple days later, the convention named Sam Houston as the army's commander, drafted a constitution, and appointed an interim government. Houston took charge and trained the army, and on April 21 defeated Santa Anna at the Battle of San Jacinto, securing Texas' independence from Mexico. Shortly thereafter, Houston was elected the first president of the Republic of Texas. Formal statehood soon followed; nine years later, on December 29, 1845, President James Polk signed the proclamation that added Texas to the United States.¹⁰

The area around (the future) Jackson County has its own illustrious history centering on some of Austin's original 300 settlers. In 1832, some of these settlers, mostly Alabamans, established the village of Santa Anna near the confluence of the Lavaca and Navidad rivers. As tensions escalated between the Mexican government and colonists, three years later the settlers renamed their colony Texana, and declared their intent to resist Mexican forces sent their way. During this time, two brothers named Allen offered \$100,000 for a large chunk of land containing Texana to build an inland deepwater port, but were rebuffed by the local property

10. *Ibid.*, s.v. "Texas," "Sam Houston," and "San Jacinto."

owner, who countered with \$200,000. Discouraged, the Allens eventually purchased a half-league of land further northeast for their inland harbor, and named their settlement Houston after the nascent republic's new President. At about this time, various bloody conflicts during Texas's struggle for independence from Mexico affected Texana, with most settlers abandoning the colony for safe harbor in Louisiana and Galveston Island. Once the conflicts ended in 1836, however, settlers returned to Texana and the newly-formed Jackson County.¹¹

Over the next few decades Texana's fortunes fluctuated. At first, it served as an inland port for commercial services. The amount of land under agricultural cultivation also increased. Other than population declines because of the Civil War (most residents sided with the South), until 1883 it remained an important inland port. But that year, the New York, Texas, and Mexican Railway Company bypassed Texana for a location six miles north later named Edna, because Texanans rejected the railway for fear it would jeopardize their port. Once the Jackson County seat was moved to the new rail town, Texanans migrated to Edna to be closer to the railroad. One year later, Texana was a ghost town, while the rest of the county experienced a railroad-fueled boom.¹²

By the twentieth century, agriculture dominated Jackson County, with cotton, sugarcane, and beef cattle as the county's primary economic mainstay. Overgrazing and slumping prices in the 1910s, however, caused a noticeable decline in the beef cattle industry and, as a result, the economy shifted as many farmers gave up on cattle and returned to cotton. Although the county experienced prosperous times in the 1920s—many infrastructural improvements like better roads and bridges were constructed during this time—this decade also witnessed an increase in

11. Mallouf, "An Assessment of the Cultural Resources of Palmetto Bend Reservoir, Jackson County, Texas," 27-8.

12. *Ibid.*, 29-30. In 1979, Palmetto Dam's backwater was officially named Lake Texana in honor of Jackson County's original settlement.

sharecropping (or tenant farming), a practice that resulted in severe hardship during the depressed 1930s. As banks defaulted, droughts lingered, and boll weevils feasted on what cotton crops existed, many farmers, tenant and otherwise, fell on hard times and abandoned their farms; the number of county farms during the 1930s fell from 1,799 to 1,251. The 1934 discovery of oil, however, helped mitigate the Great Depression's economic and social wrath, for this new discovery helped farmers resolve long-standing debts.¹³

After World War II, the county's economy rebounded into a leading producer of rice and cattle. Other crops included corn, sorghum, and cotton, although cotton never rebounded from its peak production period of the 1920s. Major vegetable crops included watermelons, potatoes, peaches, and pecans.¹⁴ But in the 1950s, the county's agricultural segment suffered from several years of reduced crop yields due to excess rainfalls in the planting and harvesting seasons. Additionally, the area suffered business and population losses through removal of oil company administrative offices, as part of an industry wide consolidation program.¹⁵

After Hurricane Carla wreaked its havoc in 1961, county residents and planners decided the area needed a stable, dependable water supply to not only help support municipal and industrial growth (for crops and extractive production), but create needed fresh water fish habitats and provide fresh water recreational opportunities. Out of this disaster rose the Bureau of Reclamation's Palmetto Bend Project—one of only five built by the agency in Texas since the state fell under Reclamation's seventeen state umbrella after 1906.

Project Authorization

Bureau of Reclamation studies and surveys in the Lavaca-Navidad River basin originally

13. *Handbook of Texas Online*, s.v. "Jackson County," <http://www.tshaonline.org/handbook/online/articles/JJ/hcj2.html> (accessed May 7, 2008).

14. *Ibid.*

15. Bureau of Reclamation *Dataweb*, s.v. "Palmetto Bend Project," at <http://www.usbr.gov/dataweb/html/palmetto.html>

began in 1954 as part of the Texas Basins Project investigation. The primary purpose behind these investigation was to devise a larger plan of water use and control for the portion of Texas lying within basins of rivers and streams entering the Gulf of Mexico from the Sabine River southwest to the Rio Grande. Four years later, the U.S. Study Commission was created to formulate an overall plan for water development for all areas included in the Texas Basins Project investigation, but unlike the Reclamation report, the Commission narrowed their focus to exclude those portions of the Rio Grande and Sabine Rivers in Texas. Additionally, at the same time, the Jackson County Flood Control District (later renamed the Lavaca-Navidad River Authority) investigated the area that fell within their jurisdiction; reports produced as a result of these studies concluded that reservoirs were required to meet the area's future water needs ¹⁶

Reclamation studies concluded that while the smaller Palmetto Bend Project should be developed independently from the larger Sabine to Rio Grande interbasin canal proposal, there should be a provision for possible future integration of Palmetto Bend with the interbasin canal. Thus, Reclamation recommended that any Palmetto Bend project be included in any larger Texas Basins authorization. The blow inflicted by Hurricane Carla, however, scrapped this plan, and added a new sense of urgency to local water supply issues. In the wake of Carla, local, state, and federal officials agreed that construction of Palmetto Bend dam and reservoir at the earliest practicable date—in advance of any Texas Basins authorizations—would immediately benefit local interests as they attempted to reconstruct the area and expand its economy. Barely three months after Carla, in December 1961, local and state officials concluded that the Palmetto Bend Project must be expedited through congress for authorization at the earliest possible date, well in

16. U.S. Department of the Interior, Bureau of Reclamation, *Annual Project History, Palmetto Bend Project*, Vol. 1, 1972, n.p., RG 115, Box 149, NARA Denver. Hereafter *Palmetto Bend Project History*, Vol., (year), (page), only if the box numbers are different (project histories are spread out in different boxes). The first two volumes have no page numbers.

advance of Reclamation's report on the overall Texas Basins Project.¹⁷

Palmetto Bend Project authorization proceeded with timely efficiency. On April 26, 1963, Reclamation's Southwest Region director transmitted the development plan to Reclamation Commissioner Floyd Dominy's office. Fourteen months later, in June 1964, Dominy sent the reports to Interior Secretary Stewart Udall, then on May 20, 1965, Udall submitted his report to President Lyndon B. Johnson through the Bureau of the Budget, and three months later to the House of Representatives. Another re-evaluation statement dated April 1967 updated the previous report and was used as the basis for final project authorization. In fall and winter of 1967 the House Subcommittee on Irrigation and Reclamation, of the Committee on Interior and Insular Affairs, held hearings in Washington, D.C. (August) and in Edna, Texas (December). Three months later, in March 1968, a comparable Senate subcommittee held hearings in Washington, D.C. On October 12, 1968, Congress authorized the construction and operation of Stage I of the Palmetto Bend Project, and the purchase of lands for Stage II, under Public Law 90-562 (82 Stat. 999).¹⁸

A 1971 updated plan report prepared by Reclamation for the staged construction of Palmetto Bend Project detailed the project dual-stage construction and funding, as authorized by Public Law 90-562. Located in Jackson County on the Navidad and Lavaca Rivers, the damsite slated for Stage 1 would be located on the Navidad River about four miles north of the confluence. However, Public Law 90-562 only authorized land acquisitions for Stage 2, not actual dam construction. Palmetto Bend Project's top priority would be to provide a dependable municipal and industrial water supply; use of the reservoir for project purposes would preclude its use for flood control (deemed unsuitable due to topography), irrigation, hydropower, or any

17. *Ibid.*

18. *Ibid.*

other purpose.¹⁹

The Texas Water Development Board, representing the state, and the Lavaca-Navidad Water Authority, representing local interests, would repay reimbursable project costs to the United States, and assume full responsibility for post-construction operation and maintenance of project works. Furthermore, this local water authority, with state assistance, would plan and finance construction, operation, and maintenance of works required to divert and deliver project water from the reservoir to municipal and industrial water users. The total repayment obligation, including interest, equaled \$43,975,000 for both stages of project construction.²⁰

As authorized, Stage 1 called for a 7.9 mile long rolled earthfill dam and dike system across the Navidad River floodplain, a concrete spillway, multiple-level river outlet works for water releases, and a reservoir that would cover about 11,000 acres at normal surface elevation, extending about eighteen miles up the Navidad River valley. Stage 1 would also develop the reservoir's Navidad River arm for recreational purposes and fish and wildlife measures. If built, Stage 2 would enlarge the reservoir by extending the earthfill dam three additional miles across the Lavaca River, and provide for more wildlife, fish, and recreational facilities similar to Stage I. The reservoir's annual water supply called for 75,000 acre-feet in Stage I, with an additional 35,000 acre-feet available after Stage 2's completion.²¹

Additionally, Stage 2's construction would be deferred until Navidad arm's water supply is fully utilized. If Congress did not authorize Stage 2 within twenty years of Stage 1's initial operation, the lands acquired for Stage 2 under Public Law 90-562 would be utilized or disposed of in accordance with the provisions of the Federal Water Projects Act. With planning funds of

19. U.S. Department of the Interior, Bureau of Reclamation, "Palmetto Bend Project, Texas, Definite Plan Report," September 1971 (revised April 1972), n.p. In RG 115, Box 483, NARA Denver.

20. *Ibid.*, April 1971 numbers presented in report.

21. Bureau of Reclamation *Dataweb*, s.v. "Palmetto Bend Project," at <http://www.usbr.gov/dataweb/html/palmetto.html> See also *Palmetto Bend Project History*, Vol. 1, 1972.

\$2.5 million appropriated for FYs 1971 and 1972, on March 13, 1972, Reclamation opened a temporary project construction office at 600 North Wells in Edna.²² Thus, barely a decade after Hurricane Carla's wrath, Stage 1 of Reclamation's Palmetto Bend Project was about to become a reality.

Construction History

Initial project work, similar to other Reclamation projects, concentrated on drilling and testing of core and water samples below the dam's foundation and other key locations, initiating the highway and utility line relocation process, establishing field survey control points and collecting design data, purchasing lands right-of-way, and coordinating with federal, state, and local agencies that would also have a stake in the final project like the National Park Service, the Texas Parks and Wildlife Service, and the Lavaca-Navidad River Authority. During the first six weeks of preconstruction activities, the project employed 38 Bureau and 8 contracting employees.²³

On May 10, 1972, Reclamation awarded the first contract for exploratory drilling of the dam's foundation to Houston's Southern Inspection Service. Over the course of the next six months, the company drilled over thirty deep holes for numerous core and water samples. By October, when Southern Inspection completed its work, the Bureau sent out a drill crew to dig auger holes along the proposed East Dike and drainage channel alignments. Wet and muddy conditions, however, slowed the work; the weather proved to be a formidable obstacle that Reclamation and its contract workers had to overcome as construction progressed.²⁴

Construction, survey, and land purchase work continued unabated. By the end of 1972, relocation construction of state highway 111 by the Texas Highway Department progressed well,

22. *Palmetto Bend Project History*, Vol. 1, 1972.

23. *Ibid.*

24. *Ibid.*, "Highlight Summary of Construction Activities" (June-December 1972).

despite the wet weather that hampered other crews. This included placing of 73,000 cubic yards of embankment east of the Navidad River, driving concrete pilings for the Navidad River and East Relief Channel bridges, and erecting concrete columns for the East Relief Channel bridge. Bureau survey crews continued to set right-of-way boundaries, collect design data, and locate auger hole sites, while the Bureau's materials laboratory tested samples taken from East Dike drain centerline. Negotiations continued with land owners on land purchases. By year's end, the government had purchased three tracts and entered into negotiations for five others. Through December 1972, 4,491 acres, representing 23.8 percent of the ownerships, were appraised at \$1,424,050, with a total of 612 acres either purchased or under contract. Additionally, by year's end, Reclamation moved project headquarters from the temporary building in Edna to a new General Services Administration (GSA) building.²⁵

As 1973 dawned, major pre-construction work continued. Reclamation entered into a contract with Mobil Pipeline Company to relocate oil and gas pipelines, with the contractor completing most of the work by year's end. By 1973's end, the Texas Highway Department had completed most of the relocation work for U.S. Highway 59 and, unlike 1972, weather cooperated for the work involved to relocate state highway 111, including a bridge over the Navidad River. By May, Reclamation opened bids on the exploratory drilling of the dam and spillway foundation, with this work completed by the low bidders Southwestern Laboratories and Frank B. Younger Inc. on August 4. And on June 28 the project submitted design data to Reclamation's Engineering and Research Center for the dam, drains, dikes, and all appurtenant structures and roads. Additionally, Reclamation discussed proposed reservoir clearing plans with various local, state, and Federal officials. By year's end, 13,749 acres had been acquired

25. *Ibid.*

for the project.²⁶

Much like the previous two years, 1974 and 1975 witnessed more necessary pre-construction work, mostly relocations of pipelines, highways, railroad tracks, and other critical infrastructural components. Additionally, Reclamation entered into a contract with National Park Service (NPS) archeologists to excavate and investigate a section of Palmetto Bend Reservoir for prehistoric or historic remains; the NPS completed this work by the end of 1974. And on September 13, 1974, Reclamation completed and filed the project's final environmental impact statement with the Council on Environmental Quality, after extensive public hearings in the area and inclusion of pertinent information based on research by various agencies since 1972.²⁷

Yet all did not proceed smoothly. In 1973, the Sierra Club (with support from some local citizens) filed a Complaint for Injunction and Declaration Judgment against the Department of the Interior and Reclamation. The civil suit sought to refrain the defendants from undertaking further land purchases or condemnations, site preparations, development, construction, or any other preconstruction activities related to Palmetto Bend Project; ten relief claims were included in the complaint, with the government seeking a motion to strike all claims. In October 1973, after United States District Judge Owen Cox struck most claims, he stated that Interior is entitled to immediate possession of the lands filed for condemnation, and declined to issue an injunction or restraining order against Interior and Reclamation.²⁸ One year later, however, after further hearings Judge Cox issued a preliminary injunction against Reclamation prohibiting some project construction; the only exceptions were the relocations of highways 111 and 59. Not long after, in November 1974, Cox amended his injunction to permit Reclamation to continue

26. *Palmetto Bend Project History*, Vol. 2, 1973.

27. *Palmetto Bend Project History*, Vol. 3, 1974, 4-6.

28. *Palmetto Bend Project History*, Vol. 2, 1973.

with pipeline and railroad relocation work, pending review of further findings put forth by the government. By 1974's end, the judge had not issued a formal decision.²⁹

One move toward this decision came a year later, on September 10, 1975. Judge Cox ordered, adjudged, and decreed that Reclamation could erect a barrier and boundary fence around project lands that it had acquired to date. One month later, on October 3, 1975, Cox issued his final decision. It stated that "the Plaintiffs' prayer for a permanent injunction, in all respects, is denied and the case is dismissed." Immediately, the Sierra Club (and partner plaintiffs) filed an appeal with the U.S. District Court, along with a application for injunction to enjoin the Bureau from further work pending the appeal's outcome. The district court immediately denied the injunction application, and by year's end nothing had happened on the appeal.³⁰

This prolonged legal wrangling did not prevent Reclamation and its contractors from performing their pre-project construction work. Weather conditions during 1975 helped various relocation projects gain steam. By the end of 1975 the relocation work for highway 59 was finished, with highway 111 work slated for completion early in 1976. Most utility lines were successfully relocated. In the wake of the favorable court ruling, land acquisitions proceeded to the point that, by the end of 1975, Reclamation had acquired 16,670 acres, or 95.8 percent of the project's right-of-way.³¹

Reclamation also opened bid invitations for Specifications No. DC-7175, the dam's construction, in October 1975. Work to be performed under this specification included the main rolled earthfill dam (also known as the "maximum dam" or "flood plain" section), the two dikes, multilevel river outlet works, dual level municipal and industrial outlet works structures, a radial

29. *Palmetto Bend Project History*, Vol. 3, 1974, 5.

30. *Palmetto Bend Project History*, Vol. 4, 1975, 9.

31. *Ibid.*, 11-3.

gate-controlled spillway, concrete drop structures along the east and west drains, miscellaneous access roads and culverts, spillway and east drain bridges, a footbridge across the river outlet works, and east and west drain channels. Eight potential contractors submitted bids for this work, with a low bid of \$24,919,052.60 (13.3 percent below engineer estimates) awarded on January 16, 1976 to the Holloway Construction Companies (Holloway) of Wixom, Michigan, with notice to proceed issued seven days later on January 23. The contractor had a completion time frame of 1,280 days, or until July 27, 1979; this was later extended (through Order for Changes No. 1) to 20 calendar days, or August 16, 1979. And, despite further motion for stay and injunction attempts by the Sierra Club to keep Reclamation from proceeding with project construction—later denied by the U.S. Court of Appeals in New Orleans—on February 11, 1976, Holloway commenced construction on Palmetto Bend Project.³²

Holloway's first construction procedure, as with most dams, was to divert the Navidad River away from the main construction site, specifically the dam's foundation. The company excavated and constructed a temporary diversion channel approximately 1,000 feet east of the existing river channel, then erected upstream and downstream coffer dams across the existing river channel. Once completed, Holloway excavated the cutoff trench for the dam's foundation, and started work on the dam embankments. By the first week of August, water was being diverted into the diversion channel, and the contractor continued to work on the cutoff trench and embankments. Although the river flooded on four occasions in December, the coffer dams protected the dam's primary section from damage.³³

Work on the spillway and other appurtenant features also commenced. In addition to excavating the spillway, by October workers started driving the steel sheet pilings around the

32. *Palmetto Bend Project History*, Vol. 5, 1976, 3, 10.

33. *Ibid.*, 13.

spillway's perimeter, and the same month began placing concrete for the spillway's foundation protection. By year's end, Holloway had poured 858 cubic yards of concrete for foundation protection in the spillway structure area. Additionally, progress was made on the river outlet works; Holloway poured the first concrete for the foundation protection slab on August 17, with more concrete poured for the intake structure, the conduit, the gate structure, and the footbridge pier of the river outlet works over the next few months, as weather permitted. The reservoir clearing subcontractor Robert P. Barnhill (Barnhill), began clearing operations in February; however, these operations were hampered by inclement weather and wet field conditions exacerbated by a high water table.³⁴

Early labor issues affected the work site, but not for long. On April 19th, the International Union of Operating Engineers Local 450 of Corpus Christi established a picket line at Holloway's jobsite entrance. Although the union sought better wages and working conditions for the heavy equipment operators employed by Holloway, none of the company's workers belonged to the union. Nonetheless, forty of the company's fifty employees refused to cross the line on April 19 and 20, but by the 22nd all had returned to their work. No settlement was reached, and subcontractor work was unaffected.³⁵

Although 1977 witnessed some progress on the dam and its features, wet weather and soggy field conditions before May and after August slowed construction. Heavy rain and runoff in April caused significant erosion of the cutoff trench's walls, and washed large amounts of sand and silt into the trench, requiring considerable cleanup. While work progressed well during the dry summer months, by September the wet weather returned, and slowed work in the dam's main maximum section (a.k.a. flood plain section) between stations 170+00 and 189+00.

34. *Ibid.*, 14.

35. *Ibid.*, 15, 28.

Nonetheless, due to the wet weather, Holloway spent much of 1977 dewatering the cutoff trench and dam foundation areas.³⁶

This wet weather also affected spillway construction. Mid-April rains and runoff caused extensive damage in the spillway construction area, and in areas being prepared for placement of the spillway's concrete foundation protection slab. Once wet weather abated in July—and the contractor finished dewatering and removing mud—Holloway placed concrete for the spillway's first structure. Despite pouring concrete over two 10-hour shifts six days a week, work did not meet expectations, although the first two major concrete placements in the month were made in the spillway gate structure, crest, and pier section. Unlike the rest of the project, however, work along the river outlet works proceeded well throughout the wet year, although Holloway lost some work days clearing out mud and dewatering after each heavy rain. By November, Holloway completed all concrete placements in the river outlet works except for the baffles near the outlet end, with all structural concrete placed by December.³⁷

A very wet 1978 proved equally unfavorable for project construction. Although wet, cold weather in the first two months slowed progress, Holloway and other project subcontractors made considerable progress in the unusually dry spring months until June 5, when four inches of rain fell in a 24-hour period. Although there was no actual structural damage to finished work, the contractor spent considerable time performing dewatering and cleanup operations after every downpour before they could continue construction activities. Then, in September, the heavens literally broke loose; from the 3rd to the 22nd, eighteen inches of rain fell on the project, inundating the contractor's workbridge (which had to be abandoned) and costing Holloway several days of cleanup before operations could resume. For the year, the area received almost

36. *Palmetto Bend Project History*, Vol. 6, 1977, in RG 115, Box 102, NARA Denver, 11.

37. *Ibid.*, 13-5, 45.

four feet of measurable precipitation; the yearly average is just over three feet.³⁸

Despite terrible conditions that resulted in only eighteen days worked the first two months, Holloway pressed on with maximum dam section earthwork construction. By July, as the weather improved, Holloway had overcome enough obstacles, including problems with aggregate intermixed with “clay lenses,” to where the dam’s maximum section rose to approximate elevation 41 between Stations 152+00 and 197+00. Still, poor and congested working conditions on the maximum dam section, along with the weather, hampered Holloway’s progress. By year’s end, the contractor had placed 972,898 cubic yards of materials in the maximum dam section’s zones 1, 1A, 2, and 3. Work on the spillway and inlet and outlet channels, however, proceeded well despite the weather, with Holloway completing 75-85 percent of the required excavation work. This work included installation of the 96-by-96-inch slide gate in the river outlet works, and placement of sill plates, side seals, and pedestals for the radial gates in spillway bays 2, 3, and 4.³⁹ Despite the wet year, Holloway placed 29,173 cubic yards of concrete, with most of this (25,975 cubic yards) going to the spillway structure.⁴⁰

1978 also saw the project’s east and west dikes, and other features, take shape. Using excavated materials from drain work, Holloway began placing materials in February, and by November the entire Zone 1 section of east dike was above original ground level for the entire length. The west dike started receiving attention in September, as Holloway started to excavate and backfill the dike’s key trench. The contractor also completed all excavation earthwork for east and west drains (using materials excavated for the dikes) and finished earthwork for the operations and maintenance complex and storage area, as well as various access road crossings. By year’s end, Holloway reported that 2,076,661 cubic yards of materials had been placed on the

38. *Palmetto Bend Project History*, Vol. 7, 1978, in RG 115, Box 110, NARA Denver, 11.

39. *Ibid.*, 15-6, 23.

40. *Ibid.*, 20.

project, with almost 70 percent of this total going to all zones of the maximum dam section and the east dike.⁴¹

Much as history has a tendency to repeat, so did the wet weather in 1979. Over the course of the year nearly five feet of rain fell on the project, with most of this amount falling in January, February, and September. Again, Holloway found itself losing more precious construction time, working on the earthwork for the maximum dam section only fourteen days the first two months. Still, despite wet weather, and heavy September rains that slightly damaged the maximum dam section and the East Dike, Holloway completed the maximum dam section between Stations 153+00 and 197+00 to elevation 55, and the sections between Stations 138+00 and 143+00 to about elevation 50; additionally, in August, Holloway placed topsoil slope protection on the maximum dam section.⁴²

Despite waterlogged conditions, construction on other features proceeded well. Holloway completed excavation of the spillway's inlet and outlet channels, and finished the east and west dikes and drains, and also added the required six inches of topsoil slope protection on both dikes and drains. Although weather prevented any spillway concrete placement early in the year, over the next several months Holloway rushed to get most of the concrete for the spillway and outlet works in place, with only minimal repairs to work performed. By December, Holloway had placed structural concrete for the east spillway highway bridge approach slab, the spillway gate structural control and access stairway, and blockout concrete for spillway stoplog guides in bays six and seven. The contractor also placed lean concrete for slope protection on the right side of the spillway stilling basin between stations 27+96 and 28+99, and placed

41. *Ibid.*, 11.

42. *Palmetto Bend Project History*, Vol. 8, 1979, in RG 115, Box 118, NARA Denver, 11.

concrete for the office building floor slab and for walks and curbs around the complex.⁴³

1980 was a banner year for Palmetto Bend Project, for this is when final construction efforts proceeded to the point of dam closure, and the filling of the dam's backwater Lake Texana (decreed in 1979 as the reservoir's official name) commenced. As usual, poor weather in January and February hampered some progress, but despite the weather Holloway was able to complete the maximum dam section (minus the closure section) during these months. As the weather dried out, in March Holloway erected the closure section's upstream and downstream coffer dams to divert the river through the outlet works, and began construction of the closure fill on March 11. By May—after Holloway was granted an extension to April 11 to complete the job due to so many days lost to wet weather and cleanup—work progressed so efficiently on the river closure embankment that by month's end the closure section was completed.⁴⁴

In addition to completing remaining embankments with earthfill, between January and June Holloway finished the final concrete placements, mostly on various sections of the spillway. By May, except for minor repairs to concrete already placed, the spillway and its appurtenant features were finished; only final concrete placements for the East Drain's drop inlet structures needed attention, with the contractor completing these by the end of June.⁴⁵ On May 17, water impoundment started, and on June 23 Reclamation closed the spillway gates, with only the river outlet works discharging water. By year's end, Lake Texana's water surface reached an elevation of 33.20 feet above mean sea level (amsl). On May 29, Reclamation formally accepted all work under Holloway's contract as "substantially complete," and the contractor began equipment removal and cleanup operations. The only work that remained were the finishing touches to the operations and maintenance office, paving of parking lots, assorted small repairs,

43. *Ibid.*, 14, 17-20, 25, 65.

44. *Palmetto Bend Project History*, Vol. 9, 1980, in RG 115, Box 125, NARA Denver, 3, 11, 14.

45. *Ibid.*, 21-3.

spillway fencing, and the marina and campground recreation facility subcontractor Mercer Construction Company completing installation of comfort stations, and other related recreational features, while the boat pad subcontractor Rio Enterprises started boat ramp construction by year's end.⁴⁶

As completed under project Stage 1 (Stage 2 was deferred pending utilization of Stage I water, and to date has not been built), the Palmetto Bend Project provides flow regulation of the Navidad River (via Lake Texana) for the main purpose of supplying municipal and industrial (M&I) water requirements in Jackson and Calhoun Counties; this use precludes any flood control requirements due to the topography. The dam, constructed across the Navidad River Valley approximately seven mile southwest of Edna, is a rolled earthfill structure with a separate concrete spillway. Total length of the dam and dike system is about eight miles, with the flood plain (maximum) section being 1.3 miles long. The dam's crest reaches elevation 55 feet amsl, with a crest width of 42 feet, and stands 63 feet high above the stream bed.⁴⁷

The concrete spillway is 464 feet wide and has twelve 35-foot-wide by 22.61-foot-high radial gates, and can discharge up to 190,000 cubic feet per second of water. A 5-foot-wide by 7-foot-long service gallery runs through the gate structure crest section. Dual-level M&I outlet works structures are located on each side of the spillway. They include an intake structure with two 48-by-60-inch gates, a conduit, and a terminal structure. In 1982, the Lavaca-Navidad River Authority constructed, by contract, a pumping plant and delivery system on the east M&I outlet works. The river outlet works consist of a multi-level intake structure with one 96-by-96-inch gate and two 48-by-48-inch gates, an 8-by-8-foot upstream conduit, a gate structure with 96-by-96-inch gate, an 8-by-10-foot downstream conduit, and a stilling basin; the intake and gate

46. *Ibid.*, 43, 45, 52.

47. *Palmetto Bend Project History*, Vol. 10, 1981-3, in RG 115, Box 125, NARA Denver, 1.

structures are connected with a concrete access footbridge. In addition, open drains were constructed along the downstream toes of both dikes and the dam to intercept flows from natural drainage, with a seepage measuring device and a low water crossing installed in 1982 on the East Drain.⁴⁸

With impounded water at the conservation pool elevation of 44 feet amsl, the dam's backwater, Lake Texana, extends about 18 miles up the Navidad River Valley and backs up Mustang Creek to the vicinity of Ganado. At this elevation, Lake Texana has a total capacity of 165,918 acre-feet, including 20,700 acre-feet for 100 years of sediment deposit. Thus Lake Texana, as completed, provides a dependable annual M&I water supply of 75,000 acre-feet.⁴⁹

Reclamation's final *Summary Cost and Progress Report* dated September 30, 1983, submitted to the Southwest Regional Office reported that total project construction costs, including the dam and appurtenant features, fish habitats, offices, and recreational facilities (before consolidated expenditures and credits), amounted to \$72,492,083, \$171,799 below the official project estimate of \$72,663,882.⁵⁰

Uses of Project Water

The best place to get an idea of the project's water use is to overview the concern in charge of Palmetto Bend Project maintenance, the Lavaca-Navidad River Authority, or LNRA. Known as the Jackson County Flood Control District until 1969, in May 1978 the LNRA executed a lease agreement with Reclamation, which provided for LNRA to assume control and operation of project lands. Two years later, in 1980, Reclamation relinquished to LNRA all project lands and facilities except the spillway and river outlet works. In 1985, upon the

48. *Ibid.*

49. *Ibid.*

50. *Ibid.*, 197, numbers reported at 99 percent project completion. These numbers do not include a estimated \$1,015,502 required to fully complete the project.

project's completion, the LNRA assumed operation and maintenance responsibility, including the spillway and river outlet works.⁵¹ And, on June 26, 2001, Reclamation officially transferred ownership title of the project to the LNRA.⁵²

One of the project's priorities was to provide water for increased industrial growth, and the LNRA did not waste time addressing this priority. Before the project was officially completed, in 1980 the LNRA entered into a 50 year water supply contract with the Formosa Plastics Corporation of Texas to build and operate a pumping plant and a 15-mile-long, 36-inch-wide pipeline to deliver 5,000 acre-feet of water to Formosa's Point Comfort plant. Two years later, in 1982, the plant began receiving project water. In 1990, the LNRA tendered another agreement with Formosa Plastics; this one centered on a supplemental 54-inch water pipeline which, together with the existing 36-inch line, delivers an additional 32,000 acre-feet of water to Formosa's PVC plant and its expanded Point Comfort facility. By 1991, both Formosa manufacturing facilities were receiving project water. Additionally, another Jackson County plastics company, Interplast, receives 2,000 acre-feet of project water annually for their plant near Lolita.⁵³

The LNRA also delivers project water to various regional municipalities. Both Corpus Christi (41,840 acre-feet annually) and Point Comfort (178 acre-feet annually) receive project water through delivery agreements with the Authority. And, in the mid-1990s, the LNRA entered into water contracts with the Calhoun County Navigation District for an annual delivery of 584 acre-feet, and the Central Power and Light Company for an annual delivery of 56 acre-feet of project water. By terms of these water supply contracts, the various entities pay their proportionate share of the LNRA's general Operations and Maintenance (O&M) budget, 100

51. Information from the LNRA website: <http://www.lnra.org/about.asp>, p. 2-3

52. Interview with Mark Trevino, Oklahoma-Texas Area Office Manager, June 25, 2008.

53. <http://www.lnra.org/about.asp>, p. 3

percent of the pipeline O&M budget, and payments for project debt service in accordance with the repayment schedule to the United States. The LNRA also oversees freshwater recreation on Lake Texana, another project priority, and maintains and operates two campgrounds, eight public boat ramps, and three fishing areas.⁵⁴

A 1990 Bureau of Reclamation Safety Evaluation of Existing Dams (SEED) inspection of Palmetto Bend Dam gave the facility a “fair” grade. The report noted no existing or potential dam safety deficiencies of either geotechnical or structural nature, and expected safe performance under normal static and dynamic (seismic) loading conditions. The report did acknowledge, however, that “infrequent” hydrologic events could present a problem. The only dam safety issue would be the passing of a 100 percent maximum flood, one that would result in a 1.3 foot overtopping of the dam’s flood plain section for about 10 hours. The Bureau concluded that this overtopping “may cause a dam safety problem.”⁵⁵

Conclusion

Acting as a rude wake-up call for change, Hurricane Carla compelled local, state, and Federal officials to plan, construct, and operate a multipurpose water project that would spark municipal and industrial growth, provide freshwater habitats for fish and wildlife, and address increasing freshwater recreational needs. The jury is still out as to whether Palmetto Bend Project literally assisted municipal growth, because population figures reported by *Handbook Of Texas Online* (a project of the Texas State Historical Association) point to no population increases between the end of the 1950s and 2000; the closest town and county seat, Edna, lost

54. *Ibid.*, p.4.

55. U.S. Department of the Interior, Bureau of Reclamation, “Safety Evaluation of Existing Dams Analysis Summary, Palmetto Bend Dam.” October 11, 1990. pp. 1-12 *passim*.

population during this period.⁵⁶

On the other hand, the project's role in providing water for industrial growth is applauded by the Authority that operates the project, through numerous diversions of project water to local plants and factories. Additionally, Lake Texana not only offers a multitude of freshwater recreational opportunities for the regional populace, such as boating, camping, picnicking, and waterskiing, but provides vital fish and wildlife habitats throughout most of its 125 mile shoreline.

Thus, Palmetto Bend Project, while diminutive in the comparative scope of other Bureau of Reclamation projects throughout the American West, is no less important, for it met specific needs and goals expressed by planning officials as they recovered from Carla. Furthermore, while it is unknown how many Reclamation projects arose from a natural disaster, it is safe to say that Palmetto Bend is significant in that it is the only Reclamation project that became reality because of one hurricane's chaotic fury.

56. In 1958, Edna had an estimated 6,500 residents. By 2000, this number dropped to 5,899. Source: *Handbook of Texas Online*, s.v. "Edna" and "Jackson County" at <http://www.tshaonline.org/handbook/online/articles/EE/hfe1.html> (accessed May 15, 2008.)

Bibliography

Manuscript and Archival

Record Group 115, Records of the Bureau of Reclamation, National Archives and Records Administration, Denver, Colorado. *Annual Project History, Palmetto Bend Project*, Vols. 1-10, 1972-83. Engineering and Research Center Project Histories.

State and Federal Government Documents

State of Texas. "An Assessment of the Cultural Resources of Palmetto Bend Reservoir, Jackson County, Texas." Austin: Texas Historical Commission and Texas Water Development Board, Archeological Survey Report Number 11, August 1973.

_____. The University of Texas at Austin. "Prehistoric Archeological Investigations at Palmetto Bend Reservoir, Phase 1, Jackson County, Texas." Austin: Texas Archeological Survey, February 1978.

U.S. Department of the Interior, Bureau of Reclamation. "Backwater Study for Navidad River (1st stage construction of Palmetto Bend Reservoir)." Austin: Bureau of Reclamation, February 1971.

_____. "Palmetto Bend Project, Texas, Definite Plan Report, " September 1971, rev. April 1972.

_____. "Safety Evaluation of Existing Dams Analysis Summary, Palmetto Bend Dam. Denver: Safety of Dams Office, October 11, 1990.

_____. *Final Environmental Impact Statement, Palmetto Bend Project – Texas*. Amarillo: Bureau of Reclamation, Southwest Region, 1974.

_____. Knodel, P. F. "Soil Studies for the for Palmetto Bend Dam, Palmetto Bend Project, Texas." Denver: Engineering and Research Center, April 1986, Report No. EM-774.

U.S. Department of the Interior, Water and Power Resources Services, *Project Data*. Washington, D.C.: Government Printing Office, 1981.

U.S. House of Representatives. *A Report on the Palmetto Bend Project, Texas, Pursuant to Section 9(a) of the Reclamation Project Act of 1939 (53 stat. 1187)*. 89th Congress, 1st Session, 1965. H. Doc. 279.

Secondary and Internet

DeMallie, Raymond J. vol. ed., *The Handbook of North American Indians, Volume 13, Part 1 of 2, Great Plains*. Washington, D.C., Smithsonian Institution, 2001.

Lamar, Howard R., ed., *The New Encyclopedia of the American West*. New Haven: Yale University Press, 1998.

Lavaca-Navidad Water Authority, at <http://www.lnra.org>

The Handbook of Texas Online, at <http://www.tshaonline.org>

Index

Alamo	6
Alonso de Leon	4
Antonio Lopez de Santa Anna	5
Apache	4
Battle of San Jacinto	6
Beaumont Formation	3
Bureau of Reclamation	2, 3, 8, 9, 11, 25-27
Cabeza de Vaca	4
Calhoun County Navigation District	24
Central Power and Light Company	24
Civil War	7
Coahuila	5
Coahuila y Texas	5
Coahuiltecs	3, 5
coffer dams	16, 21
Comanche	4
Corpus Christi	2, 17, 24
Council on Environmental Quality	14
David Crockett	6
diversion channel	16
east and west drains	16, 19
East Dike	12, 13, 20
East Relief Channel bridge	13
Edna	3, 7, 10, 12, 13, 22, 25, 26
empresario system	5
Engineering and Research Center	13, 27
Floyd Dominy	10
Formosa Plastics Corporation	24
Frank B. Younger Inc.	13
French	4
Ft. St. Louis	4
Galveston Island	7
Garcitas Creek	4
General Services Administration	13
Goliad	5
Great Depression	8
Guadalupe River	3, 5
Holloway Construction Companies (Holloway)	16
House of Representatives	10, 27
House Subcommittee on Irrigation and Reclamation	10
Houston	2, 6, 7, 12
Hurricane Carla	2, 8, 9, 12, 25
inlet and outlet channels	19, 20
interbasin canal proposal	9

International Union of Operating Engineers Local 450	17
Interplast	24
Jackson County	3, 4, 6-10, 23, 24, 26, 27
James Bowie	6
John F. Kennedy	2
Karankawa	3
Lake Texana	3, 7, 21-23, 25, 26
Lavaca River	3, 11
Lavaca-Navidad River Authority	9
Lavaca-Navidad Water Authority	11, 28
Lipan Apaches	4
LNRA	23, 24
Lolita	24
Louisiana	7
Lyndon B. Johnson	10
Matagorda Bay	4
Mercer Construction Company	22
Mexico City	5
Mission Espiritu Santo de Zuniga	4
Mississippi River	4
Mobil Pipeline Company	13
Moses Austin	5
Mustang Creek	23
National Park Service	12, 14
Navidad River	2, 8, 10-13, 16, 22, 23, 27
New York, Texas, and Mexican Railway Company	7
Nueva Leon	4
Owen Cox	14
Palmetto Bend Dam	3, 25, 27
Palmetto Bend Project	2, 3, 8-12, 14-16, 18-23, 25-27
Point Comfort	24
Presidio La Bahia	4
Public Law 90-562	10, 11
Rene Robert Cavalier Sieur de La Salle	4
Rio Enterprises	22
Rio Grande	9
river outlet works	11, 15, 17-19, 21-23
Robert P. Barnhill	17
Sabine River	9
Safety Evaluation of Existing Dams	25, 27
San Antonio	5, 6
San Antonio de Bexar	5
San Antonio River	5
Senate	10
sharecropping	8
Sierra Club	14-16

Southern Inspection Service	12
Southwest Regional Office	23
Southwestern Laboratories	13
Spanish frontier	4
Specifications No. DC-7175	15
spillway	11, 13, 16, 18-23
Stage 2	10, 11, 22
Stage I	10, 11, 22
Stephen Austin	5
Stewart Udall	10
Texana	6, 7, 23
Texas Basins Project	9, 10
Texas Highway Department	12, 13
Texas Parks and Wildlife Service	12
Texas Water Development Board	4, 11, 27
Tonkawa	3, 4
U.S. Study Commission	9
Washington-on-the-Brazos	6
World War II	8