

2016-01-01

Constructing a River, Building a Border: An Environmental History of Irrigation, Water Law, State Formation, and the Rio Grande Rectification Project in the El Paso/Juárez Valley

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CONSTRUCTING A RIVER, BUILDING A BORDER:
AN ENVIRONMENTAL HISTORY OF IRRIGATION, WATER LAW, STATE
FORMATION, AND THE RIO GRANDE RECTIFICATION PROJECT IN THE
EL PASO/JUÁREZ VALLEY

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Doctoral Program in Borderlands History

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Dedication

This dissertation is dedicated to my family and friends. I could never have completed this work without the constant support and encouragement provided by my wonderful husband, my amazing children, and my beautiful grandchildren. My many friends cheered me on through the process and helped keep me on the path to completion. I am grateful to have been blessed with such a marvelous family and group of friends.

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FORMATION, AND THE RIO GRANDE RECTIFICATION PROJECT IN THE
EL PASO/JUÁREZ VALLEY

by

JOANNE TORTORETE KROPP, BA., MA.

DISSERTATION

Presented to the Faculty of the Graduate School of
The University of Texas at El Paso
in Partial Fulfillment
of the Requirements
for the Degree of

DOCTOR OF PHILOSOPHY

Department of History
THE UNIVERSITY OF TEXAS AT EL PASO
December 2016

Acknowledgements

I owe a debt of gratitude to the many, many people who helped me with this project. I was very fortunate to have an excellent dissertation committee. First, I am deeply grateful to my chairperson, Sam Brunk, for working so tirelessly with me on this project. His insights, suggestions, and critical questions caused me to think more deeply about my ideas and explore angles I had not previously considered. Furthermore, he was a constant source of encouragement and good cheer. Second, I would like to thank Ann Gabbert for her close reading of this work, catching many errors and helping tremendously with some organization problems. She too was a source of support, as a friend, a colleague, and a mentor. Third, I appreciate the suggestions and advice provided by Jeff Shepherd, who not only had many ideas for this work but also helped me to navigate the process of graduating. Last, but hardly least, I would like to thank Tim Collins for stepping in as my outside reader and enthusiastically offering helpful comments and ideas. The four of them did a wonderful job of helping to shape this work, but all of the remaining errors are my own.

I would never have reached this point if not for all of the outstanding professors in the Department of History, who taught me so much over the years. Sam Brunk graciously agreed to work with me in an Independent Readings course, and we read numerous works in the field of Environmental History. That was the beginning of my project and his involvement in its progress. I had wonderful experiences in all of my coursework, and wish to thank Cheryl Martin, Sandy McGee-Deutsch, Yolanda Leyva, Paul Edison, Ernesto Chavez, Ron Weber, Carl Jackson, Charles Martin, Sandra Harding, and Kenneth Shover for introducing me to outstanding books, teaching me how to think historically, and striving to improve my writing skills. In

addition, I want to thank the ladies who keep the department functioning smoothly, Edith Yanez, and her assistant Clara Giroux.

I also had the good fortune to work with many helpful archivists, especially Claudia Rivers and Abbie Weiser in the UTEP Library Special Collections Department. I met many great people in the six archives I visited, but would like to especially thank Rodney Krajca at the National Archives and Records Administration (NARA) in Ft. Worth, Texas, and Marene Baker at NARA, Denver, Colorado. Michael Tarabulski, archivist at the International Boundary and Water Commission (IBWC), El Paso, was very helpful as well, as was Albert Flores, IBWC Environmental Protection Specialist, who graciously gave me a tour of the American Dam and Canal.

I also wish to thank my supervisor, Dorothy Ward. She recognized the difficulties associated with working full-time and attending graduate school and did everything she could to support me. My colleagues in the Entering Student Program also encouraged me to keep going and stepped in to cover tasks I could not complete due to working on this project, especially Daniel Duarte and Beau Pihlaja.

Thanks again to everyone who made this dissertation possible.

Abstract

The Rio Grande in the El Paso, Texas, U.S./Juárez, Chihuahua, Mexico, Valley has a long history of human use from prehistoric to modern times. Formal irrigation began in the 1600s, mainly for viticulture, changing to cotton and pecans in the 1900s. The Rio Grande was subject to bed shifting and flooding that, after 1848, affected the location of the international boundary. During the Great Depression the U.S. and Mexican governments sponsored conservation projects to provide jobs and increase agricultural production. The 1933 “Convention - Rectification of the Rio Grande” was the culmination of interstate and bi-national agreements to divide Rio Grande water between the U.S. and Mexico and prevent flooding in the valley. The Civilian Conservation Corps assisted with flood control and soil conservation work as part of the project, and symbolizes how conservation in the 1930s melded environmentalism, nationalism, and prevalent ideas about masculinity. Rectification permanently established the U.S.–Mexico border in the valley, improved irrigation and flood control, and increased agricultural acreage along the river, but led to soil salinization, water pollution, and strained a dwindling water supply. The Rio Grande Rectification Project was a rare instance of bi-national cooperation in an otherwise acrimonious relationship between the U.S. and Mexico. The environmental impact of the project led to further bi-national collaboration on environmental sustainability and infrastructure in the late twentieth century that continues today.

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Introduction

“The river that flows past Mount Cristo Rey and through the Pass has little resemblance to the mighty stream that welcomed Juan de Oñate’s party in 1598, a stream so deep and turbulent that two of the company’s horses were drowned in their frantic efforts to get a drink. In contrast, I recall the visit of a favorite niece to El Paso some years ago. One of the first things she wanted to see was the Rio Grande. My reply was ‘It will be here next Tuesday.’”

Conrey Bryson, 1973.¹

The anecdote above illustrates the common perception that rivers are natural formations. When envisioning the Rio Grande, called the Río Bravo in Mexico, what comes to mind is a wide, deep river flowing powerfully to the Gulf of Mexico. But rivers, just like human individuals and nation states, have their own unique histories. This is particularly true for the Rio Grande in the El Paso/Juárez Valley because the river is not only a shared source of water in an arid region, but also the border separating two nations. Over the centuries, climate, human activity, cultural practices, and social perceptions have altered the Rio Grande to the point that in the El Paso/Juárez metroplex the river has virtually disappeared. Existing histories of the Rio Grande tend to focus on interstate and international legal and diplomatic battles over water apportionment, rather than how dams, irrigation, and other water projects impacted the environment in the El Paso/Juárez Valley. This study examines the factors leading to and the aftermath of the Rio Grande Rectification Project during the 1930s and the role it played in transforming the Rio Grande in the El Paso/Juárez Valley into a constructed, rather than a natural, environment. Socially constructed ideas regarding human interactions with nature, the rule of law concerning water apportionment and national sovereignty, and the role of the state in promoting progress led to the implementation of the Rectification Project. The physical construction itself determined the location of the border and substantially impacted development.

¹ Conrey Bryson, *The Land Where We Live* (El Paso, Texas: Guynes Printing Company, 1973), 23.

It also caused environmental degradation, leading to new approaches regarding water sustainability in the El Paso/Juárez Valley in the late twentieth and early twenty-first centuries.²

This dissertation adds to the existing literature on Borderlands environmental history by examining the legal, economic, racial, and gendered aspects, as well as the environmental impact, of the Rio Grande Rectification Project and associated conservation and flood control projects during the 1930s in the El Paso/Juárez Valley. This work illustrates how Mexico and the U.S. cooperatively completed the largest and most expensive international water apportionment, irrigation, and flood control project of its time in order to support development and, ultimately, to exercise state power over the environment. Rectification also definitively established the location of the border itself in the El Paso/Juárez Valley, which had been disputed by both nations throughout the nineteenth and early twentieth centuries, except for the international boundary at El Chamizal and Córdova Island. There are studies that tangentially address the Rio Grande Rectification Project, but none of those works provide any analysis of the intersections between constructs of nature and gender, and the role of the state in reconstructing a natural environment for political reasons. Racial constructs are an important component of the events that led to the establishment of the border, and then to conflicts between the two nations over sharing the water in the Rio Grande. Race also played a role in who performed the actual labor on the Rectification Project and associated public work projects. Gender and racial constructs, as well as intersections between labor and public health, are symbolized in the Civilian Conservation Corps (CCC), which conducted work projects associated with rectification on the U.S. side of the river. There was no corresponding entity in Mexico at the time, illustrating that although both nations were committed to public works that impacted the environment, their

² For a map of the Rectification Project see <http://www.ibwc.state.gov/Files/Canalization-Rectification.pdf>

agendas were not exactly the same. The physical construction of the Rectification Project and associated public work projects had significant economic and environmental outcomes that also need to be addressed. The Rio Grande Rectification Project was a step forward towards the bi-national cooperation regarding the environment that exists today, now that water availability in arid regions has become an important component in sustainability studies and development planning along the border. Using a comparative approach, this project shows that these shared concerns in a discrete space did not result in similar economic or environmental outcomes because El Paso benefited far more than Juárez from flood control projects and improved irrigation. In both the U.S. and Mexico the role of local, state, and federal governments in directing conservation, environmental management, and water projects increased in the early twentieth century, but not in the same ways and not with the same outcomes. This study highlights these differences.

In arid regions access to water has always been a key determinant of development, and therefore a topic integral to historical studies of economics, politics, and the law. This is particularly true for investigations that involve the water in the Rio Grande, water that is used for irrigation in three states located in the U.S. and four states in northern Mexico. “Whiskey is for drinking, water is for fighting over,” a quote famously, although perhaps erroneously, attributed to Mark Twain, seems to best epitomize attitudes towards water in the arid Borderlands and the American West. Access to water has pitted neighbor against neighbor, state against state, and nation against nation. Due to the climate and geological formation of the river, as well as the soils and sands through which it runs, the Rio Grande in the El Paso/Juárez Valley can be a mere trickle or grow into a raging flood. Prior to rectification, during floods or periods of high velocity flow the river often cut new channels and changed its course. Indigenous peoples adapted to the

river as it existed and employed simple techniques to use its water. When there was sufficient water they stayed, when there wasn't they left. The Spanish settlers used their irrigation techniques to introduce non-native agricultural species into the region and, due to a relatively low population, managed to survive periodic droughts and floods. They also imported their notions about water law and irrigation customs. From 1846 to 1848 the U.S.-Mexico War took place. The U.S. won, and justified the conquest of the American Southwest by promoting Anglo conceptions of the Mexican and Indian "races" and how those groups were not capable of progress. After the war, both nations agreed that the Rio Grande would demarcate the international boundary line between Texas and Mexico, despite the fact that its bed frequently changed locations in areas where the river did not run through canyons. This was the case in the El Paso/Juárez Valley as well as the 17 mile long portion of the Colorado River that marked the international boundary between Arizona and Mexico. Treaties between both nations in 1884 and 1889 attempted to settle the question of the international boundary line's location by setting the border as the center of the normal channel in both rivers, but neither treaty provided a satisfactory, long-term solution to the natural processes of meanders and channel shifts.

The outcome of the U.S.-Mexico War also meant that above the El Paso/Juárez Valley the Upper Rio Grande now exists entirely within the territorial U.S., running through Colorado and New Mexico before reaching the valley where it becomes the property of two nations. By the 1880s irrigation upstream had increased significantly, reducing the amount of water flowing downstream. This seriously strained the water supply in the valley and exacerbated tensions over water apportionment between the two nations, especially during drought cycles. During the latter half of the nineteenth century multiple conceptions of human interaction with nature developed, but advocates of either preservation or conservation shared the underlying premise that humans

could control and shape the natural world. In the El Paso/Juárez Valley, drought and periods of low flow during the second half of the nineteenth century and into the twentieth pitted Mexicans and Americans against each other as they competed for water, but during floods people on both sides of the border faced a common enemy together. Attempts at the local level to combat the problems of either too much or not enough water in the river continuously failed. During the 1920s the federal governments in both nations actively supported agricultural and social development in arid regions through building dams and creating reservoirs to improve irrigation systems. The power to alter the environment to suit human needs became a concept tied directly to progress and modernity and an activity directed by the state as part of nation-building. Ad hoc local decisions and individual efforts in the El Paso/Juárez Valley could not resolve the problems caused by the erratic behavior of the river because the Rio Grande is not only a natural formation but is also a political entity, the international boundary, and as such falls under the jurisdiction of two federal governments.

The Rio Grande Rectification Project resulted, in part, from attempts to settle questions over sovereignty and water law in the region. Prior to setting the Rio Grande as the international boundary between Texas and Mexico in 1848, the entire Rio Grande ran through territory belonging to Spain and then Mexico. Spanish and Mexican law established the prevailing legal principles regarding surface water in what is now the American Southwest, but when that territory became part of the U.S., settling disputes over access to water became difficult because contradictory tenets in the English Common Law introduced by Anglo settlers complicated adjudication. Increased irrigation in the U.S. along the Rio Grande before the river reached the international boundary prompted numerous protests by Mexico and drew attention to the fact that international law was not absolutely clear on how to adjudicate water apportionment between

two nations, especially when those nations did not share the entire course of a river. The Rio Grande's natural tendency to meander and shift channels meant that the border's location was never permanent in the El Paso/Juárez Valley, which bred confusion over which nation had legal jurisdiction over specific tracts of land. Negotiations over water distribution and sovereignty between the two countries had to be handled in a cooperative, bi-national manner, leading to the establishment of the permanent International Boundary Commission (IBC) in 1889.³ The first mission of the IBC was to settle questions over national jurisdiction because the river had cut new channels after the initial international boundary surveys in the 1850s. These questions could not be settled prior to the Rio Grande Rectification Project because the river continued to move.

In 1902 the U.S. Congress passed the Reclamation Act, creating the U.S. Reclamation Service, which began investigating sites in the American West to build dams and reservoirs to support irrigation.⁴ In 1906, the U.S. and Mexico signed the "Convention between the United States and Mexico - Equitable Distribution of Waters," which allowed the Reclamation Service to build Elephant Butte Dam near Engle, New Mexico, in order to regulate the amount of water reaching the El Paso/Juárez Valley.⁵ The treaty specified that Mexico would get 60,000 acre feet of water annually delivered to a point just above the city of El Paso. However, because Mexico got her share of water first, farmers on the Texas side of the valley complained that far more than 60,000 acre feet was going into Mexico. A major flood in 1925 caused extensive damage in El Paso and Juárez, illustrating that Elephant Butte Dam alone could neither prevent natural disasters nor guarantee an equitable distribution of water. Both Mexico and the U.S. turned

³ In 1944 renamed the International Boundary and Water Commission (IBWC) in the U.S., Comisión Internacional de Límites y Aguas (CILA) in Mexico.

⁴ The Reclamation Service became the U.S. Bureau of Reclamation (USBR) in 1923.

⁵ U.S. Department of State, "Convention between the United States and Mexico - Equitable Distribution of Waters, U.S.-Mexico," May 21, 1906, T.S. 2593.

towards finding a solution to the alternating problems of flooding and insufficient water for irrigation in the El Paso/Juárez Valley in the late 1920s.

Due to the Great Depression, during the 1930s public works projects also became a source of employment and economic development in both nations. Decades of litigation, diplomatic disputes, and local pleas for solutions finally resulted in a rare moment of accord in an otherwise acrimonious international relationship when the U.S. and Mexico agreed to cooperatively control flooding and stabilize irrigation in the El Paso/Juárez Valley, signing the “Convention between the United States and Mexico - Rectification of the Rio Grande,” in 1933.⁶ Mexico and the U.S. set aside longstanding political differences and turned to science and engineering in order to improve the lives of their citizens; in this instance the idea in both countries that progress could be achieved through the purposeful reconstruction of the natural world led to compromise rather than conflict. The Rio Grande Rectification Project also illustrates the growth of the federal governments in both nations because the project required coordination among the U.S. State Department, the U.S. Department of the Interior, which oversaw the U.S. Bureau of Reclamation (USBR), the U.S. Department of War, The U.S. Department of Labor, the U.S. Department of Agriculture (USDA), the Civilian Conservation Corps (CCC), the International Boundary and Water Commission (IBC – U.S. and Mexico Sectors), the Mexican Foreign Ministry, the Mexican Departamento de Agrario, overseen by the Secretaría de Agricultura y Fomento (SAF), the Comisión Nacional de Irrigación (National Irrigation Commission, CNI), the Departamento de Comunicaciones y Obras Públicas (Department of Communications and Public Works, DCOP) and the Treasury Departments in both nations. Engineers proposed building Caballo Dam and Reservoir 25 miles below Elephant

⁶ U.S. Department of State, “Convention between the United States and Mexico - Rectification of the Rio Grande, U.S.-Mexico,” Signed February 1, 1933, T.S. 864.

Butte Dam in New Mexico, building levees where necessary along the Rio Grande from that point to Fort Quitman, and straightening the path of the river in the El Paso/Juárez Valley.⁷ Taming the river permanently established the location of the boundary line for most of the valley, settling numerous longstanding disputes regarding sovereignty over land along the river.⁸ The Rio Grande Rectification Project began in the valley in 1934 and the majority of that portion of the work ended in 1938. Rectification meant that the U.S. and Mexico exchanged approximately 3,500 acres while straightening the river; land formerly in one country was now legally situated in another.

The Rio Grande Rectification Project provided protection from destructive floods and helped stabilize the water supply for irrigation, allowing for the continued growth of cotton production as well as the introduction of pecan farming. The project itself and the expansion of agriculture impacted the ecology of the region on both sides of the border, improving the viability of farming, but affecting native plants and wildlife. In the American Southwest and in northern Mexico people purposefully introduced tamarisk, a non-native shrub, as a windbreak and to hold soil in place after removing native cottonwoods and willows to construct water projects in the 1920s and 1930s, and the invasive plant proliferated along rivers. Tamarisk shrubs seep salt and add to salinity in the river bank's soil and the water of the Rio Grande. Increased irrigation raised levels of salinity and heavy metals in the soil; upstream and local irrigation discharges and seepage returned salt, fertilizers, and pesticides leached from the soil to the river. The negative impact of salinization is worse on the Mexican side of the river due to river water salinity compounded by water shortages. The Rectification Project drew attention to other water

⁷ Fort Quitman is 80 miles downriver from El Paso in south Hudspeth County.

⁸ There are three exceptions. Mexico and the U.S. did not definitively resolve the dispute over ownership of the Chamizal Tract and the location of the border there until 1963. The 1963 Chamizal Settlement also changed the location of the border at Córdova Island, which resulted in a land swap downstream at San Elizario as compensation for moving the border further south.

apportionment issues between the two nations, and the U.S. Congress authorized constructing the American Dam and Canal in 1936 to guarantee that Mexico did not receive any more water than agreed upon by treaty. The American Dam and Canal were built 1937-1938, within the territory of the U.S. and just above the international boundary, in order to siphon off the river's water for the U.S. first, leaving only the 60,000 acre feet of water promised to Mexico in 1906 available for that side of the border. The allotment to Mexico was, and remains, so low that Mexican farmers have had to supplement with wastewater and groundwater ever since. During droughts El Paso farmers must also use groundwater, which further impacts the bolson El Paso and Juárez share because as the level drops the water becomes more saline. Rectification altered and often destroyed bird and animal habitats while dams and canals interfered with the ability of fish to navigate the river. Water pollution also eliminated numerous species of fish. However, the economic downturn in the 1930s meant that the cities of El Paso and Juárez and their respective governments wanted to stabilize irrigation and prevent destructive flooding for economic reasons. At the time, the IBC's Rio Grande Rectification Project, the USBR's work at Caballo Dam as well as construction to improve irrigation downstream from that point, and the Civilian Conservation Corps' soil conservation and flood control projects were all perceived as improving, rather than degrading, the environment.

The CCC came to El Paso in 1934 to provide labor for the Rio Grande Rectification Project. The CCC is a rich source for examining gender and nationalism, as well as illustrating public perceptions in the U.S. regarding the environment during the 1930s. The CCC was limited to work within the U.S., and became a national symbol of masculinity and the power of men to control the feminine realm of nature, as seen in advertising and recruitment posters. The CCC promised that hard work outdoors would turn boys into men, and offered enrollees access

to educational programs to help these men find employment that would improve their lives and add to the vitality of the nation. Mexico did not have a comparable entity, but from 1935 through 1940 the Mexican federal government committed to establishing national parks and did create a Forestry Service to protect woodlands in order to prevent deforestation and subsequent soil erosion. The CCC engaged in public work missions targeting the environment in the U.S. They built parks so that the public could enjoy nature, worked on soil conservation and water projects to improve agricultural practices, planted trees to restock forests, and fought forest fires. The work of the CCC along the border during the Rectification Project is a case study of nationalism and state formation because the Corps exemplified the power of the state to direct economic development while improving both the education and physical fitness of its youth.

The CCC also illustrates how race, class, and citizenship impacted labor practices. During the 1930s racial constructions were in flux in the U.S. In 1930, for the first and only time, the U.S. Census classified “Mexican” as a race, the implication being that Mexican Americans were racially mixed. But Mexican Americans continued to identify themselves racially as “White,” served in White CCC units, and were not listed separately in CCC records.⁹ These claims of “whiteness” illustrate the tenuous hold on citizenship ethnic Mexicans had during the 1930s. In 1928 Texas began a deportation campaign, which became a U.S federal effort to deport persons of Mexican descent after the economic downturn began in 1929.¹⁰ It was during the 1930s that many ethnic Mexicans born in the U.S. began to identify themselves as Mexican *Americans* [emphasis mine] as a reminder to others of their citizenship and civil rights.¹¹

⁹ Local Experienced Men (LEMs) worked alongside the CCC in El Paso, but their names, race, or ethnicity are not recorded.

¹⁰ Casey Walsh, *Building the Borderlands: A Transnational History of Irrigated Cotton Along the Mexico-Texas Border* (College Station: Texas A&M University, 2008.), 83.

¹¹ Mario T. Garcia, *Mexican Americans: Leadership, Ideology, and Identity, 1930-1960* (New Haven: Yale University Press, 1989), 15. See also Emilio Zamora, *The World of the Mexican Worker in Texas* (College Station:

However, because El Paso and Juárez had close economic ties, and the fact that ethnic Mexicans comprised the majority of the population in El Paso, although anti-Mexican sentiment did exist in El Paso it did not reach the same proportions as occurred in other parts of the U.S.¹² The CCC work along the Rio Grande in El Paso during the Rectification Project is an example of Anglo Americans, Mexican Americans, and African Americans working on a major construction site situated between two nations. Their participation illustrates the intersections of race, class, and citizenship. On the U.S. side of the river only American citizens could be hired. Poor Anglos, Mexican Americans, and African Americans carried out the hard physical labor, and educated Anglos held the professional supervisory positions that commanded substantially higher wages.

When the U.S. and Mexican federal governments committed to the Rio Grande Rectification Project, the El Paso County Commissioners lobbied for more CCC units to participate in additional flood control and soil conservation projects and also to build public parks. But here too the future environmental impact was not foreseen. The CCC projects

Texas A&M University, 1993) for discussions of how in the late 1920s an identity divergence began between Mexican immigrants and ethnic Mexicans born in the U.S. See also Benjamin Heber Johnson, *Revolution in Texas: How a Forgotten Rebellion and Its Bloody Suppression Turned Mexicans into Americans* (New Haven: Yale University Press, 2003). Johnson argues that the violent repression of the 1915 Plan de San Diego uprising in south Texas, which sought to overthrow Anglo rule in the American Southwest, had a direct link to the formation of the League of United Latin American Citizens (LULAC) in the 1930s, an organization that worked to promote the idea that Tejanos (ethnic Mexicans born in Texas) were Americans who did not want to want to reassert Mexican rule. For a further discussion of racial classifications and race relations among Anglos, Hispanics, and African Americans see Neil Foley, *The White Scourge: Mexicans, Blacks, and Poor Whites in Texas Cotton Culture* (Berkeley: University of California Press, 1997). For more discussions of repatriation and deportation efforts in the 1920s and 1930s as well as racial reclassification and the economic impact of the Depression on Hispanics and Asians see: Sarah Deutsch, *No Separate Refuge: Culture, Class, and Gender on an Anglo-Hispanic Frontier in the American Southwest, 1880-1940* (New York: Oxford University Press, 1987); David Montejano, *Anglos and Mexicans in the Making of Texas, 1836-1986* (Austin: University of Texas Press, 1987); George J. Sánchez, *Becoming Mexican American: Ethnicity, Culture and Identity in Chicano Los Angeles, 1900-1945* (Oxford: Oxford University Press, 1993); Matt Garcia, *A World of Its Own: Race, Labor, and Citrus in the Making of Greater Los Angeles, 1900-1970* (Chapel Hill: The University of North Carolina Press, 2001); Gilbert G. Gonzalez and Raul A. Fernandez, *A Century of Chicano History: Empire, Nations, and Migration* (New York: Routledge, 2003); Rodolfo Acuña, *Occupied America: A History of Chicanos*, Fifth Edition (New York: Pearson Longman, 2004); Mae M. Ngai, *Impossible Subjects: Illegal Aliens and the Making of Modern America* (Princeton: Princeton University Press, 2004); Manuel G. Gonzalez, *Mexicanos: A History of Mexicans in the United States*, 2nd ed. (Bloomington: Indiana University Press, 2009).

¹² Manuel Bernardo Ramirez, "When the Mexicans Go Home: El Paso and the Mexican Exodus, 1929-1934" (M.A. thesis, The University of Texas at El Paso, 1994), 3.

included improving and expanding Ascarate Park in El Paso and, as part of flood control and soil conservation, constructing San Felipe Dam at Fabens. Their work included creating two artificial lakes, one at Ascarate Park and a second at San Felipe Park. These lakes illustrate the idea embodied in the U.S. Reclamation Act of 1902, amended to include Texas in 1906, that water projects in western states would change arid desert regions into lands more like those in lush eastern states. However, these artificial lakes must now be continuously resupplied with groundwater, adding to salinity in the aquifer.

Environmental history is a fairly recent, but rapidly expanding, field. Richard White's seminal 1985 article, "American Environmental History: The Development of a New Historical Field," called upon historians to think critically about the shape and purpose of the field.¹³ Not only are environmental historians of the Borderlands, Latin America, and the American West working to define the field itself, they are also struggling to define its geographic boundaries. As Samuel Truett has noted, Frederick Jackson Turner opened up the field of both "environmental history and the history of the American West [but] although historians of land and life in the American West no longer embrace Turner's frontier thesis, their scholarship remains trapped within the national perspective it inaugurated."¹⁴ Truett has also written about how Herbert Eugene Bolton not only initiated the field of Borderlands History, but also attempted to move the field into the realm of "continental and hemispheric approaches." Truett has himself shown that "economic and cultural lifelines" have not been transected by the border and that, in particular, "railroads and industrial development [have linked] the United States and Mexico as neighbors

¹³ Richard White, "American Environmental History: The Development of a New Historical Field," *The Pacific Historical Review* 54: 3 (Aug., 1985), 335.

¹⁴ Samuel Truett, "Neighbors by Nature: Rethinking Region, Nation, and Environmental History in the U.S.-Mexico Borderlands," *Environmental History* 2:2 (Apr., 1997), 160.

within a capitalist transformation of land and life.”¹⁵ Truett calls upon Borderlands historians to think in terms of region, rather than nation. For Truett regions are defined as ecological units that contain connected social systems sharing a common economic trajectory. Unfortunately, Borderlands environmental histories that are transnational in scope and take this approach are still scarce.¹⁶

There are very few transnational environmental histories that focus on the Rio Grande in the secondary literature. Paul Horgan’s *Great River: The Rio Grande in North American History* (1954) covers the history of the Native American, Spanish, Mexican, and Anglo-American groups that lived along the Rio Grande, but this work is a narrative history of events and not an analysis of water and development along the river.¹⁷ Most works written by U.S. historians tend to address how international and interstate water apportionment along the Rio Grande changed U.S. federal and state water law. These works do not investigate Spanish and Mexican water law in depth and tend to skim the surface of Mexican politics. For example, Donald J. Pisani in *Water, Land, and Law in the West: The Limits of Public Policy, 1850-1920* (1996) explores how federal efforts to develop the American West impacted water and land tenure laws in the U.S.¹⁸ He mentions how Spanish and Mexican legal precedents affected these legal changes, but this is not his major focus. The literature on water law in the American West is quite large, but few works focus on the Rio Grande, a river that demands a transnational approach. Norris Hundley’s

¹⁵ Samuel Truett, “Epics of Greater America: Herbert Eugene Bolton’s Quest for a Transnational American History,” in Christopher Schmidt-Nowara and John Nieto-Phillips, eds., *Interpreting Spanish Colonialism: Empires, Nations, and Legends* (Albuquerque: University of New Mexico Press, 2005), 213.

¹⁶ Some exceptions are Samuel Truett, *Fugitive Landscapes: The Forgotten History of the U.S. – Mexico Borderlands* (New Haven: Yale University Press, 2006); Evan R. Ward, *Border Oasis: Water and the Political Ecology of the Colorado River Delta, 1940-1975* (Tucson: The University of Arizona Press, 2003); John D. Wirth, *Smelter Smoke in North America: The Politics of Transborder Pollution* (Lawrence, Kansas: University Press of Kansas, 2000).

¹⁷ Paul Horgan, *Great River: The Rio Grande in North American History* (Middletown, Connecticut: Wesleyan University Press, 1984)

¹⁸ Donald J. Pisani, *Water, Land, and Law in the West: The Limits of Public Policy, 1850-1920* (Lawrence: University Press of Kansas, 1996).

Dividing the Waters: A Century of Controversy between the United States and Mexico (1966), is an exception.¹⁹ The work traces the process of deciding who had access to water from the Colorado River at the state level inside the territorial U.S., and the allotment of both Colorado River and Rio Grande water to both the U.S. and Mexico after 1911. Hundley's focus is on political actors, in particular the U.S. State Department, U.S. Senators, U.S. Congressmen, and local politicians in the U.S., and includes some information on how the Mexican government acted and reacted in the negotiations over water treaties. Jerry Mueller also investigates the treaties and other legal agreements that defined the uses of water from the Rio Grande, the location of the river itself and, therefore, the border, in *Restless River: International Law and the Behavior of the Rio Grande* (1975).²⁰ This work discusses the morphology of the river and the history of human construction up to 1970 along the Rio Grande where it demarcates the international boundary. There is an explanation of the Rio Grande Rectification Project, but no examination of its economic or environmental impacts. Douglas R. Littlefield's *Conflict on the Rio Grande: Water and the Law, 1879-1939* (2008) focuses on how irrigators in the Mesilla Valley and the El Paso/Juárez Valley competed for water from the Rio Grande and is primarily a study of how water law and federalism evolved in the U.S. as a result of the efforts to build Elephant Butte Dam.²¹ The work has an extensive bibliography but no Mexican sources and neither brings in the local Mexican perspective nor any information on irrigation or farming on the Mexican side of the Rio Grande.²²

¹⁹ Norris Hundley, Jr., *Dividing the Waters: A Century of Controversy between the United States and Mexico* (Berkeley: University of California Press, 1966).

²⁰ Jerry Mueller, *Restless River: International Law and the Behavior of the Rio Grande* (The University of Texas at El Paso: Texas Western Press, 1975).

²¹ Douglas R. Littlefield, *Conflict on the Rio Grande: Water and the Law, 1879-1939* (Norman: University of Oklahoma Press, 2008).

²² Helen A Orndorff's 1957 M.A. thesis "History of the Development of Agriculture in the El Paso Valley" looks at crops grown using irrigation, but has limited information on the 1930s and does not address the economy in El Paso or Juárez in that decade.

The environmental history of the interwar years in the U.S. reveals how state formation and management of natural resources became inextricably linked, and many scholars have begun to focus on this period as the precedent for modern environmentalism in America.²³ Donald Worster's *Rivers of Empire: Water, Aridity, and the Growth of the American West* (1985) and Marc Reisner's *Cadillac Desert: The American West and its Disappearing Water* (1993) both examine how the U.S. federal government built hundreds of dams in the American West during the 1930s, but their studies do not examine in detail how those projects impacted Mexico.²⁴ Donald Pisani, in *Water and American Government: The Reclamation Bureau, National Water Policy, and the West, 1902-1935* (2002) is another study of how the U.S. government increased its authority to manage the environment to promote economic development in the early twentieth century.²⁵ Other studies explore how perceptions of the value of nature beyond its economic potential evolved over the first half of the twentieth century. Both Roderick Frazier Nash in *Wilderness and the American Mind* (1982) and Ben A. Minteer in *The Landscape of Reform: Civic Pragmatism and Environmental Thought in America* (2006) study how a growing appreciation for promoting the American pioneer past became linked to preserving pristine wilderness areas.²⁶ These sites became national treasures representing the grandeur of the nation. Conservation emerged in the U.S. as the desire to maximize productivity through stewardship,

²³ See Paul Sutter, "Terra Incognita: The Neglected History of Interwar Environmental Thought and Politics," *Reviews in American History* Vol. 29, No. 2 (June, 2001): 289-297; Donald Worster, *Dust Bowl: The Southern Plains in the 1930s* (New York: Oxford University Press, 1979).

²⁴ Donald Worster, *Rivers of Empire: Water, Aridity, and the Growth of the American West* (New York: Oxford University Press, 1985); Marc Reisner, *Cadillac Desert: The American West and Its Disappearing Water*, Revised Edition (New York: Penguin Books, 1993).

²⁵ Donald Pisani, *Water and American Government: The Reclamation Bureau, National Water Policy, and the West, 1902-1935* (Berkeley: University of California Press, 2002).

²⁶ Roderick Frazier Nash, *Wilderness and the American Mind*, 4th ed. (New Haven: Yale University Press, 1982); Ben A. Minteer, *The Landscape of Reform: Civic Pragmatism and Environmental Thought in America* (Cambridge: Massachusetts Institute of Technology Press, 2006).

rather than exploitation, of resources. Progressivism offered the political framework for preservation and conservation becoming state-sponsored, and state-funded, activities.

Concerns regarding conservation, economic development, and access to natural resources as a right of citizenship became an important aspect of state formation in Mexico in the late nineteenth and early twentieth centuries. Clifton B. Kroeber addresses irrigation and development in Mexico during the Porfiriato in *Man, Land, and Water: Mexico's Farmlands Irrigation Policies, 1885-1911* (1983) and includes a few pages on efforts to build an International Dam in the El Paso/Juárez Valley during the 1890s.²⁷ Kroeber uses extensive Mexican sources, illustrating that most works tend to use materials from one nation or the other, rather than both, when discussing the shared Rio Grande. After the Mexican Revolution, successive Mexican administrations promoted the idea that the state should conserve natural resources and improve the national economy, especially in the realm of agriculture.²⁸ In the U.S. and Mexico the government's role in these regards followed somewhat similar paths during the 1920s and 1930s. The U.S. Reclamation Service, overseen by the United States Geological Survey (USGS), began to work on irrigation projects in 1902 under Theodore Roosevelt's administration. In 1923 it became the Reclamation Bureau within the Department of the Interior and obtained authorization to build Hoover Dam in 1928. In 1926 the Mexican Congress passed the Federal Law of Irrigation (la Ley sobre Irrigación con Aguas Federales), creating the Comisión Nacional de Irrigación (CNI) to oversee federal irrigation projects. President Plutarco Elías Calles' administration began a commitment to dam and irrigation projects in 1926, which continued under his successors Emilio Portes Gil, Pascual Ortiz Rubio, and Abelardo L.

²⁷ Clifton B. Kroeber, *Man, Land, and Water: Mexico's Farmlands Irrigation Policies, 1895-1911* (Berkeley: University of California Press, 1983).

²⁸ Steven E. Sanderson, *Agrarian Populism and the Mexican State: The Struggle for Land in Sonora* (Berkeley: University of California Press, 1981) and *The Transformation of Mexican Agriculture: International Structure and the Politics of Rural Change* (Princeton: Princeton University Press, 1986).

Rodríguez, although on a very small scale.²⁹ Luis Aboites Aguilar termed this approach “revolutionary irrigation,” and, in spite of the fact that Mexican administrations in the 1920s and 1930s had different ideas as to how irrigation could spur social mobility and economic growth, water projects became an endeavor sponsored by the national government.³⁰ José Esteban Castro examines how access to water is a right of citizenship in *Water, Power and Citizenship: Social Struggle in the Basin of Mexico* (2006), and although the work is a study of central rather than northern Mexico it does illustrate how access to water was a political tool in nation-building in Mexico.³¹

During the administration of U.S. President Franklin Delano Roosevelt the U.S. Bureau of Reclamation (USBR) oversaw numerous dam and irrigation projects. There are studies that focus on his commitment to conservation, but even those that primarily focus on his economic policies during the Depression also address conservation, which Roosevelt saw as both the preservation of wilderness and the profitable exploitation of natural resources.³² Parks would provide enjoyment for the public as well as jobs for those who built and maintained them, and flood control, improved irrigation, and soil conservation would make agribusiness more profitable. Similarly, in Mexico conservation of forests became a priority in the late nineteenth

²⁹ Or, perhaps more accurately, surrogates.

³⁰ Luis Aboites Aguilar, *La irrigación revolucionaria: Historia del sistema nacional de riego del río Conchos, Chihuahua, 1927-1938* (Mexico City: Secretaría de Educación Pública [SEP] and Centro de Investigaciones y Estudios Superiores en Antropología Social [CIESAS], 1987). See also Luis Aboites Aguilar, *El agua de la nación: Una historia política de México, 1888-1946* (Mexico City: Secretaría de Educación Pública [SEP] and Centro de Investigaciones y Estudios Superiores en Antropología Social [CIESAS], 1987), and *Demografía histórica y conflictos por el agua: Dos estudios sobre 40 kilómetros de historia del río San Pedro, Chihuahua* (Mexico City: Centro de Investigaciones y Estudios Superiores en Antropología Social [CIESAS], 2000); Ronald G. Cummings, *Water Resource Management in Northern Mexico* (Baltimore: The Johns Hopkins University Press, 1972).

³¹ José Esteban Castro, *Water, Power and Citizenship: Social Struggle in the Basin of Mexico* (Oxford: Palgrave Macmillan, 2006).

³² A.L. Riesch Owen, *Conservation Under F.D.R.* (New York: Praeger Publishers, 1963); H.W. Brands, *Traitor to His Class: The Privileged Life and Radical Presidency of Franklin Delano Roosevelt* (New York: Doubleday, 2008); Jim Powell, *F.D.R.'s Folly: How Roosevelt and His New Deal Prolonged the Great Depression* (New York: Three Rivers Press, 2003); Amity Shlaes, *The Forgotten Man: A New History of the Great Depression* (New York: HarperCollins Publishers, 2007).

century, culminating in the Ley Forestal in 1926, and national park building began in earnest in the 1930s.³³ Emily Wakild provides an in-depth treatment of the creation of parks in Mexico during the Cárdenas administration in *Revolutionary Parks: Conservation, Social Justice, and Mexico's National Parks* (2012). According to Walkild, "Mexico's national parks embodied a promise to incorporate all people into a national system of governance and to provide stability through federal resource control."³⁴ However, the literature for the 1930s concerning Mexican conservation in the Borderlands is quite limited. Lane Simonian's *Defending the Land of the Jaguar: A History of Conservation in Mexico* (1995) devotes a chapter to discussing conservation in Mexico under President Lázaro Cárdenas.³⁵ This chapter examines the creation of parks and the preservation of forests and wildlife, not water projects, and the only international aspects discussed are a proposed International Parks Commission and combined U.S.-Mexican efforts to protect migratory birds. Cárdenas did not create anything like the CCC, instead his agrarian reforms included land redistribution as well as crop management programs provided to small producers on *ejidos*. Cárdenas also funded irrigation projects in Baja California, Chihuahua, and the Rio Grande delta, and his administration passed several laws regarding water.³⁶ Luis Aboites Aguilar examines many of these water projects in numerous

³³ For works on forestry conservation in Mexico see Nora Haenn, *Fields of Power, Forests of Discontent: Culture, Conservation and the State in Mexico* (Tucson: University of Arizona Press, 2005), Andrew S. Mathews, "Unlikely Alliances: Encounters between State Science, Nature Spirits, and Indigenous Industrial Forestry in Mexico, 1926–2008," *Current Anthropology* 50:1 (2009): 75-101; Andrew S. Mathews, *Instituting Nature: Authority, Expertise, and Power in Mexican Forests* (Cambridge: Massachusetts Institute of Technology, 2011); Emily Walkild, "It is to preserve life, to work for the trees": The Steward of Mexico's Forests, Miguel Angel de Quevedo, 1862-1946," *Forest History Today* (Spring/Fall, 2006): 4-14.

³⁴ Emily Wakild, *Revolutionary Parks: Conservation, Social Justice, and Mexico's National Parks, 1910-1940* (Tucson: University of Arizona Press, 2011), 19. See also Christopher R. Boyer and Emily Wakild, "Social Landscaping in the Forests of Mexico: An Environmental Interpretation of Cardenismo, 1934-1940," *Hispanic American Historical Review* 92:1 (February 2012): 73-106.

³⁵ Lane Simonian, *Defending the Land of the Jaguar: A History of Conservation in Mexico* (Austin: University of Texas Press, 1995).

³⁶ He continued his commitment to irrigation in his home state of Michoacán after he left office.

works, but does not cover flooding, irrigation, and access to water in the El Paso/Juárez Valley.³⁷ Casey Walsh looks at national irrigation projects and agribusiness under President Calles, his successors, and Cárdenas along the U.S.-Mexico border in *Building the Borderlands: A Transnational History of Irrigated Cotton along the Mexico-Texas Border* (2008). This work includes information on the Cárdenas administration's efforts to improve irrigation along the portion of the lower Rio Grande that separates south Texas from Tamaulipas, particularly in the delta region.

The CCC played an important role in environmental management in the U.S. during the 1930s, but there are few scholarly works on the Corps and no studies of its participation in the Rio Grande Rectification Project. Charles Price Harper's *The Administration of the Civilian Conservation Corps* (1939) covers the establishment of the CCC and how the federal government funded and ran the program.³⁸ John Salmond's *The Civilian Conservation Corps, 1933-1942: A New Deal Case Study* (1967) examines the entire history of the agency itself.³⁹ Two U.S. government-sponsored works that cover the CCC's work in forest conservation and parks are Alison Otis's *The Forest Service and the Civilian Conservation Corps, 1933-1942* (1986), and John Paige's *The Civilian Conservation Corps and the National Park Service: An Administrative History* (1985).⁴⁰ *The Soil Soldiers: The Civilian Conservation Corps in the Great Depression* (1976), by Leslie Alexander Lacy, contains a brief overview of the types of projects the CCC undertook, supplemented with enrollees' letters, testimonials, pictures, and

³⁷ See above, n. 30.

³⁸ Charles Price Harper, *The Administration of the Civilian Conservation Corps* (Clarksburg, W.Va.: Clarksburg Publishing Company, 1939).

³⁹ John A. Salmond, *The Civilian Conservation Corps, 1933-1942: A New Deal Case Study* (Durham, N.C.: Duke University Press, 1967).

⁴⁰ Alison Otis, *The Forest Service and the Civilian Conservation Corps, 1933-1942* (Washington, D.C.: National Forest Service, U.S. Department of Agriculture, 1986); John Paige, *The Civilian Conservation Corps and the National Park Service: An Administrative History* (Washington, D.C.: National Park Service, U.S. Department of the Interior, 1985).

excerpts from camp newspapers.⁴¹ Richard Melzer's more recent work, *Coming of Age in the Great Depression: The Civilian Conservation Corps in New Mexico, 1933-1942* (2000), follows this style of using testimonials and other materials from CCC enrollees, but covers the CCC in only one state.⁴² *Nature's New Deal: The Civilian Conservation Corps and the Roots of the American Environmental Movement* (2008) by Neil M. Maher is an example of a new approach to analyzing the CCC.⁴³ Maher provides a broad overview of the agency while discussing how the CCC and its work was an important episode in the environmental history of the U.S.

Studies that deal with issues of race and gender as related to environmental issues, and how all three intersect with nationalism, are also limited in number. This is a topic that lends itself readily to examinations of the CCC. *Youth in the CCC* (1942), is a report based on a five year study of the CCC prepared for The American Youth Commission (AYC) by the American Council on Education. This report addresses the efficacy of the agency "as a work-training and character-building organization as well as an agency created to meet an emergency employment situation and a need for conserving and developing American natural resources."⁴⁴ An earlier report, *Youth Work Programs: Problems and Policies* (1941) also examines the CCC, as well as the Works Progress Administration (WPA) and the National Youth Administration (NYA).⁴⁵ The report supports the conclusion that the CCC was an important instrument in improving the health, physical fitness, education, and vocational training of the nation's youth. There are a few articles on the issue of race in the CCC, and a full-length study by Olen Cole, *The African-*

⁴¹ Leslie Alexander Lacy, *The Soil Soldiers: The Civilian Conservation Corps in the Great Depression* (Radnor, PA.: Chilton Book Company, 1976.)

⁴² Richard Melzer, *Coming of Age in the Great Depression: The Civilian Conservation Corps Experience in New Mexico, 1933-1942* (Las Cruces, N.M.: Yucca Free Press, 2000).

⁴³ Neil M. Maher, *Nature's New Deal: The Civilian Conservation Corps and the Roots of the American Environmental Movement* (New York: Oxford University Press, 2008).

⁴⁴ Kenneth Holland and Frank Ernest Hill, *Youth in the CCC* (Washington, D.C.: American Council on Education, 1942), viii.

⁴⁵ Lewis L. Lorwin, *Youth Work Programs*, Prepared for the American Youth Commission (Washington, D.C.: American Council on Education, 1941).

American Experience in the Civilian Conservation Corps (1999).⁴⁶ Melzer's *Coming of Age in the Great Depression* covers racial conflicts between enrollees in the camps and between enrollees and locals and, to a limited degree, addresses masculinity.⁴⁷ The work relies heavily on interviews with Hispanic enrollees, but is not a critical race study. Neil M. Maher discusses both race and gender in *Nature's New Deal*, and Bryant Simon has a chapter entitled "'New Men in Body and Soul': The Civilian Conservation Corps and the Transformation of Male Bodies and the Body Politic" in *Seeing Nature through Gender* (2003).⁴⁸ The remaining literature on the CCC tends to follow the testimonial format of Lacy and Melzer, or is non-scholarly work written by enrollees or their descendants.⁴⁹

This project uses a transnational, regional approach as seen in Samuel Truett's "Neighbors by Nature: Rethinking Region, Nation, and Environmental History in the U.S. – Mexico Borderlands" (1997) and *Fugitive Landscapes: The Forgotten History of the U.S. – Mexico Borderlands* (2006). Truett argues that the American West and northern Mexico comprise a discrete transnational region connected by economics, culture, and a shared environment. In his work *Fugitive Landscapes* the unit of study is a sierra (range of hills or mountains) containing copper and silver mines. The study illustrates important cross-border connections ignored by U.S. historians trapped in the nation-state model, a methodology that

⁴⁶ Olen Cole, Jr., *The African-American Experience in the Civilian Conservation Corps* (Gainesville: University Press of Florida, 1999).

⁴⁷ For the CCC and race see also John A. Salmond, "The Civilian Conservation Corps and the Negro." *The Journal of American History* Vol. 52, No. 1 (June 1965): 75-88; Donald L. Parmon "The Indian and the Civilian Conservation Corps." *Pacific Historical Review* Vol. 40, No. 1 (Feb. 1971): 39-56; Olen Cole Jr., "African-American Youth in the Program of the Civilian Corps in California, 1933-42: An Ambivalent Legacy." *Forest & Conservation History* Vol. 35, No. 3 (Jul., 1991): 121-127.

⁴⁸ Bryant Simon, "'New Men in Body and Soul': The Civilian Conservation Corps and the Transformation of Male Bodies and the Body Politic," in *Seeing Nature through Gender*, ed. Virginia J. Scharff, 80-102 (Lawrence: University of Kansas Press, 2003)

⁴⁹ For example Ray Hoyt, *We Can Take It: A Short Story of the CCC* (Cincinnati, Ohio: American Book Company, 1935); James McEntee, *Now They Are Men: The Story of the CCC* (Washington, D.C.: National Home Library Foundation, 1940).

fails to recognize a true “American” history does not stop at the borders of Mexico and Canada. Truett’s study also examines irrigation as an integral component of economic, political, and environmental history, as does Stephen Bogener in *Ditches across the Desert: Irrigation in the Lower Pecos Valley* (2003), which covers irrigation projects in the period 1880-1925.⁵⁰ Although the Rio Grande Rectification Project and the associated USBR and CCC projects were quite different from these examples, the construction project that straightened the river and built levees to control flooding in the El Paso/Juárez Valley is an important case of two federal governments exerting their power to control the natural world and improve the lives of local people. When examining the CCC the present study follows the model of Peter M. Beattie in *The Tribute of Blood: Army, Honor, Race, and Nation in Brazil, 1864-1945* (2001).⁵¹ Beattie examines the symbiotic relationship between the military and society in defining race, masculinity, and nationality. The CCC was a ‘quasi’ military force, modeled on the organization of the U.S. Army. During World War II, CCC enrollees, who had already attained mythic hero status, gained the reputation of being the most qualified men to enlist in the U.S. military and defend the nation.

Chapter One begins with the ecology of the Rio Grande in the El Paso/Juárez area. The discussion covers how climate and geology created the river and dictated its behavior. Drought, flooding, and soil compositions impacted the formation of river channels and the Rio Grande’s flow rate. The abiotic components of the environment, such as the soil and its nutrients, temperature, and precipitation supported a finite biotic community of flora and fauna. Humans had the choice of either adapting to the extant ecosystems along the river or attempt to alter

⁵⁰ Stephen Bogener, *Ditches Across the Desert: Irrigation in the Lower Pecos Valley* (Lubbock: Texas Tech University Press, 2003).

⁵¹ Peter M. Beattie, *The Tribute of Blood: Army, Honor, Race, and Nation in Brazil, 1864-1945* (Durham, N.C.: Duke University Press, 2001).

them. The chapter examines how humans used water, as well as the introduction of alien cultigens, from the pre-historic era through Spanish settlement and into the Mexican era. The chapter also covers the development of Spanish water law that regulates irrigation. The discussion addresses the establishment of constructed irrigation works in the El Paso/Juárez region, agricultural development, and a history of flooding and the meandering river prior to 1848.

Chapter Two turns to the construction of political borders and social boundaries, the establishment of the Rio Grande as the border between the U.S. and Mexico, and how the people in the El Paso/Juárez region viewed, and used, the river after it became the border. The chapter covers urban growth, the post-1848 development of irrigation systems in the El Paso/Juárez valley, international and local negotiations over claims to the water in the Rio Grande, and the International Boundary Commission's surveys and recommendations regarding dams and rectification. The chapter also shows how racial constructs contributed to the United States' acquisition of the American Southwest and how these views impacted legal battles over water. The combined problems of drought, flooding, and an uncertain boundary line led to intensive pleas from local residents to their respective governments for federal intervention from the 1890s through the 1920s.

Chapter Three examines how people in the U.S. and Mexico during the late nineteenth and early twentieth centuries constructed their ideas about nature and how humans should interact with the environment. The discussion then turns to the development of reclamation, conservation, and water policies in the U.S. and Mexico, as well as international, U.S., and Mexican water law. These topics illustrate how in both the U.S. and Mexico the federal governments began to take control of water projects for economic development and social

progress. The discussion also covers local conditions regarding sovereignty, proposed solutions to the problems of flooding, water apportionment, and sustainability, as well as how climate and nature created acute environmental conditions that led to the Rio Grande Rectification Project. International conferences and studies of irrigation, as well as water, soil, and forest conservation in the early twentieth century highlight the growing recognition across the globe that environments in a geographic area do not stop at the borders between nations and that shared problems require cooperative solutions.

Chapters Four and Five divide the Rectification Project into two parts. Chapter Four investigates the negotiations over the “Convention of 1933 – Rectification of the Rio Grande” and the physical construction of the project by the U.S. and Mexican sectors of the International Boundary Commission. The chapter demonstrates the centralization of federal power over the environment in both nations, due to a veneration of engineering and science as instruments of progress. The Depression caused both governments to commit to funding the project for economic development. The discussion also covers how U.S. policies regarding the deportation and repatriation of ethnic Mexicans increased the population in northern Mexico, which then contributed to Mexico’s greater focus on irrigation along the border in that nation. Relief spending and hiring practices based on race are covered as well. Chapter Five discusses the work overseen by the USBR and the CCC as part of the Rectification Project and associated work along the Rio Grande. This section covers the links between conservation and nationalism, and how gender constructs in the U.S. during the 1930s impacted ideas about the environment. The chapter demonstrates how state formation developed in the 1930s when conservation became a means to control not only the environment, but also to direct the development of young men. The

Rio Grande Rectification Project was not just an example of advancements in construction and building techniques, it was also an example of social engineering.

Chapter Six examines the results of the project in the El Paso/Juárez Valley, in particular the environmental and political impacts, which is another gap in the literature. The stabilization of the water supply also changed agriculture, as cotton production expanded and pecan farming began, which increased salinity in the soil, the river water, and the bolson El Paso and Juárez share. Rectification and its associated projects changed the morphology and location of the river and accelerated the process of changing the river from a natural formation into a constructed one. Modern water projects in the valley are still ongoing, overseen by the International Boundary and Water Commission (IBWC), U.S. Sector, and the Comisión de Limites y Aguas (CILA), Mexican Sector. The chapter also covers renewed bi-national efforts to address sustainability and water planning in the El Paso/Juárez Valley. The study concludes with a brief discussion of the current work on flood control after the significant flood episode that took place in 2006, and the environmental and political disruption caused by building the border fence along the river.

The Rio Grande in the El Paso/Juárez Valley is an important symbol of both division and unity. It is the political boundary that separates two nations. The river is also a source of water for people living in a shared space, and both El Paso and Juárez depend on it for development. Human activity has changed the river itself and created something completely new, an environment that is no longer natural but constructed. Political and social formations changed the river into a dividing line, but nature itself dictated that cooperation between two nations was the only path to solving destructive flooding and meeting water supply demands. Physical construction achieved these ends, but the science of engineering led to environmental degradation and sustainability problems. The Rio Grande Rectification Project assured the

survival and growth of agriculture and development in the El Paso/Juárez Valley, but forever changed the landscape in this region of the Borderlands.

Chapter 1: Rio Grande Ecology, Human Settlement, and Water Law to 1848

When Alvar Núñez Cabeza de Vaca and his three companions who had survived the Pánfilo Narváez expedition to Florida set out from the area where they had been shipwrecked near Galveston, Texas, in 1534, they began a remarkable journey across the landscape of the Borderlands. Cabeza de Vaca's account of their journey is rich in ethnographic details regarding the indigenous people the Spaniards encountered and a few tantalizing tidbits about the environment they traversed. Although scholars cannot agree on their exact route, the generally accepted path the four men took was from San Antonio Bay on the Gulf Coast west to the Brazos River and then to the Río Colorado.⁵² They traveled from there to the northwest across the lower Pecos River, crossing the Rio Grande where it meets the Río Conchos near present day Presidio, Texas, and Ojinaga, Chihuahua. Cabeza de Vaca describes the Pecos as "a great river coming from the north" and that when they reached the confluence of the Rio Grande and the Río Conchos "we forded a very great river, the water coming up to our breasts." After traveling for approximately one month on foot to the northwest, they reached "the river which ran between some ridges" somewhere near present day San Elizario, Texas.⁵³ The party re-crossed the Rio Grande farther upstream where they encountered people living in "fixed dwellings of civilization" and existing on beans, varieties of squash, and stored maize. When the Spaniards asked why they were not cultivating maize the natives replied that the rains had failed for the

⁵² Even Cabeza de Vaca's contemporaries recognized that the travelers were lost and had no idea where they were, therefore exact locations would be difficult if not impossible to pinpoint. See a comment by chronicler Gonzalo Fernández de Oviedo, who spoke with Cabeza de Vaca and noted the Spaniards could not know "in what longitude or latitude they roamed." As found in David J. Weber, *The Spanish Frontier in North America* (New Haven: Yale University Press, 1992), 44, re-translated by Weber from Basil C. Hedrick and Carroll L. Riley, eds. and trans., *The Journey of the Vaca Party: The Account of the Narváez Expedition, 1528-1536, as Related by Gonzalo Fernández de Oviedo y Valdés* (Carbondale: University Museum, Southern Illinois University, 1974), 72, 155.

⁵³ Frederick W. Hodge, ed., *The Narrative of Alvar Núñez Cabeza de Vaca, in Spanish Explorers in the Southern United States, 1528-1543* (Austin, Texas: The Texas State Historical Association, 1990), 98-100, 102, 104. The township of San Elizario is 15 miles southeast of downtown El Paso, situated on the north, or left, bank of the Rio Grande, and is part of the El Paso Metropolitan Statistical Area.

past two years. Thirty-five days later, while heading towards the southwest seeking the Southern Sea (Sea of Cortez/Gulf of California), the party arrived at the “houses of maize” near either the Río Casas Grandes or the Río Bavispe, thankful to have found an area where the natives practiced sedentary agriculture.⁵⁴

Cabeza de Vaca’s accounts of the precious stones and large towns he observed during his travels had the effect of spurring on Spanish exploration of what is now referred to as the American Southwest, in particular modern day New Mexico. Numerous *entradas* (entrances) into New Mexico took place in the sixteenth century, but none went through the El Paso/Juárez area. In 1595, Don Juan Pérez de Oñate y Salazar received a royal *cédula* (contract) making him governor and captain general charged with exploring and pacifying New Mexico in order to Christianize the natives. Oñate embarked from Santa Bárbara, Mexico, in January, 1598, with 129 soldiers, their families, livestock, and ten Franciscans. Oñate and his party, having marched across the Chihuahuan desert from Santa Bárbara in northern Mexico, arrived at the river they named the Río del Norte near present day San Elizario on April 20, 1598.⁵⁵ A description of the river at that time is far different than Cabeza de Vaca’s almost offhand remark. According to an observer in the Oñate party,

“This is a larger river than the Conchas [sic], and carries even more water than the Nazas, although its bed is not as large. At this place it is sluggish and muddy because it flows over loose soil. It has much vegetation and trees, abundant fish, such as bagre, mochote, róbalo, armado, apujas, and a white fish almost half a yard long that resembles jurel and matalote. There are willows, large and small mesquites, thick brambles, and some salines of excellent salt like those of the Guadalquivir, which the Río del Norte resembles very much. The

⁵⁴ Rolena Adorno and Patrick Charles Pautz, *Alvar Núñez Cabeza de Vaca: His Account, His Life, and the Expedition of Pánfilo de Narváez; Relación y Comentarios Alvar Núñez Cabeza de Vaca*. English & Spanish. (Lincoln: University of Nebraska Press, 1999), 315, 326-328, 330.

⁵⁵ Although it is impossible to locate the exact spot where Oñate first camped when his party reached the Río Grande, locals believe he arrived at the present-day location of San Elizario at a spot on the right bank of the river in 1598. There is an annual re-enactment of the celebration the Spaniards conducted upon reaching the river, which is held in the San Elizario Plaza in front of the San Elizario Presidio Chapel. See Darren Meritz, “First Thanksgiving: Oñate Legacy Shadows San Eli Celebration,” *El Paso Times* (El Paso, Texas) 29 April, 2007, B 1.

river flows from the north; that is how it gets its name. It turns toward the east, being called Río Bravo where the Conchos and others join it.”⁵⁶

On April 30, 1598, Oñate took possession of New Mexico in the name of King Philip II and on May 4 he and his party followed the river upstream and crossed at the ford the Manso Indians showed them.⁵⁷ Oñate named the ford El Paso del Río del Norte, but the Spaniards commonly called the spot for crossing the river Los Puertos.

The Rio Grande River that transects the cities of El Paso, Texas, and Ciudad Juárez, Chihuahua, has had many names and is distinctively different according to location and season as it flows the 1,250 miles from its headwaters in the San Juan Mountains in southwest Colorado through different soils, elevations, and climates to empty into the Gulf of Mexico at Brownsville, Texas, and Matamoros, Tamaulipas. The various names bequeathed upon the river reflect how distinctive the river appears depending upon one’s point of reference. The first naming took place in 1519 when Captain Alonzo Alvarez de Pineda sailed to the river’s delta in the Gulf of

⁵⁶ George P. Hammond, *Don Juan de Oñate: Colonizer of New Mexico, 1595-1628* (Albuquerque: The University of New Mexico Press, 1953), 314. The account is translated from Joaquín F. Pacheco, Francisco de Cárdenas, Luis Torres de Mendoza, eds. “Itinerario,” XVI, 228-276, *Colección de Documentos Inéditos Relativos al Descubrimiento, Conquista y Organización de las Antiguas Posesiones de América y Oceanía*, Madrid, 1864-1865, 42 vols. After consulting with specialists on Medieval Spain and Colonial Mexico as well as the Texas State Aquarium I have only been able to translate the following: bagre = catfish, róbalo = bass, jurel = mackerel, matalote = suckerfish. I have not been able to translate mochote, armado, or apujas. In a later account from 1782, Fray Juan Agustín de Morfi described matalote as “a species of barbel...very bony,” and “bagre, a rock fish like sea bream and of its large size, without more bones than those serving as ribs.” He went on to write about catfish as a separate species that “does not have scales nor bones but in place of these a long nerve from the head to the mouth, ending in a pyramidal point like three fingers.” In Alfred Barnaby Thomas, ed. and trans., *Forgotten Frontiers: A Study of the Spanish Indian Policy of Don Juan Bautista de Anza Governor of New Mexico, 1777-1787, From the Original Documents in the Archives of Spain, Mexico, and New Mexico* (Norman: University of Oklahoma Press, 1932), 112.

⁵⁷ The exact site of the celebration and crossing that took place on May 4, 1598, is unknown. Some locals believe the ford is near the present day Hacienda Café off Paisano Street, but the reality is that the exact spot may never be determined due to the Rio Grande Rectification Project, which changed the path of the Rio Grande. See Leon Metz, “Hacienda Café on a Major Historical Site,” *El Paso Times* (El Paso, Texas) 5 March, 2007, B 3. Marc Simmons states in *The Last Conquistador: Juan de Oñate and the Settling of the Far Southwest* (Norman: University of Oklahoma Press, 1991), “On May 4, Oñate encamped at what he called ‘the pass of the river and the ford.’ He was now in the extreme upper end of the valley, just above the downtown area of modern El Paso. The Rio Grande, flowing from the north, cut through a narrow wall of mountains here to form its pass and then turned in a southeasterly direction through the pleasant valley that the Spaniards had been ascending the previous week.” Simmons, 101. According to the Spanish, the natives’ “first words were *manxo*, *manxo*, *micos*, *micos*, which they took to mean ‘peaceful ones’ or ‘friends.’” Hammond, 315.

Mexico and named the river Río de las Palmas after the trees lining the shore.⁵⁸ In the late summer of 1540, Captain Hernándo de Alvarado, leading Francisco Vázquez Coronado's advance scouting party and taking a northeastern route from present day Sonora, Mexico, stopped at the Acoma Pueblo in New Mexico and continued on to Laguna on the Río San Jose, then marched southeast to the Rio Grande and named the river Nuestra Señora. In 1580, Francisco Sánchez Chamuscada's unlicensed *entrada* into the *tierra adentro* (interior territory) traveled from Santa Bárbara along the Río Conchos to the Rio Grande, and named it the Río Guadalquivir because it reminded the explorers, as it did Oñate's companion quoted above, of the large river by that name in Spain. From there they marched upriver to present-day San Marcial, New Mexico, and named the pueblo they found there San Felipe. This expedition named the portion of the river from San Marcial north to Taos in New Mexico the Río Abajo (lower river), and the river north of Taos the Río Arriba (upper river).⁵⁹

Due to the fact that the river travels through so many different ecosystems and is quite large in some locations but not in others, the varied names and divisions persist even today. In New Mexico the area from the headwaters to Los Alamos, just north of Santa Fe, is referred to as the Upper Basin or Upper Valley, while the stretch from that point to Elephant Butte Dam is the Middle Basin or Middle Valley, and the portion that runs from below the dam to Fort Quitman, 80 miles south of El Paso, is the Lower Basin or Lower Valley.⁶⁰ In the El Paso area locals call the lands along the river that begin at the border of New Mexico and Texas and end in the middle

⁵⁸ Jerry E. Mueller, *Restless River: International Law and the Behavior of the Rio Grande* (El Paso, Texas: Texas Western Press, The University of Texas at El Paso, 1975), 9.

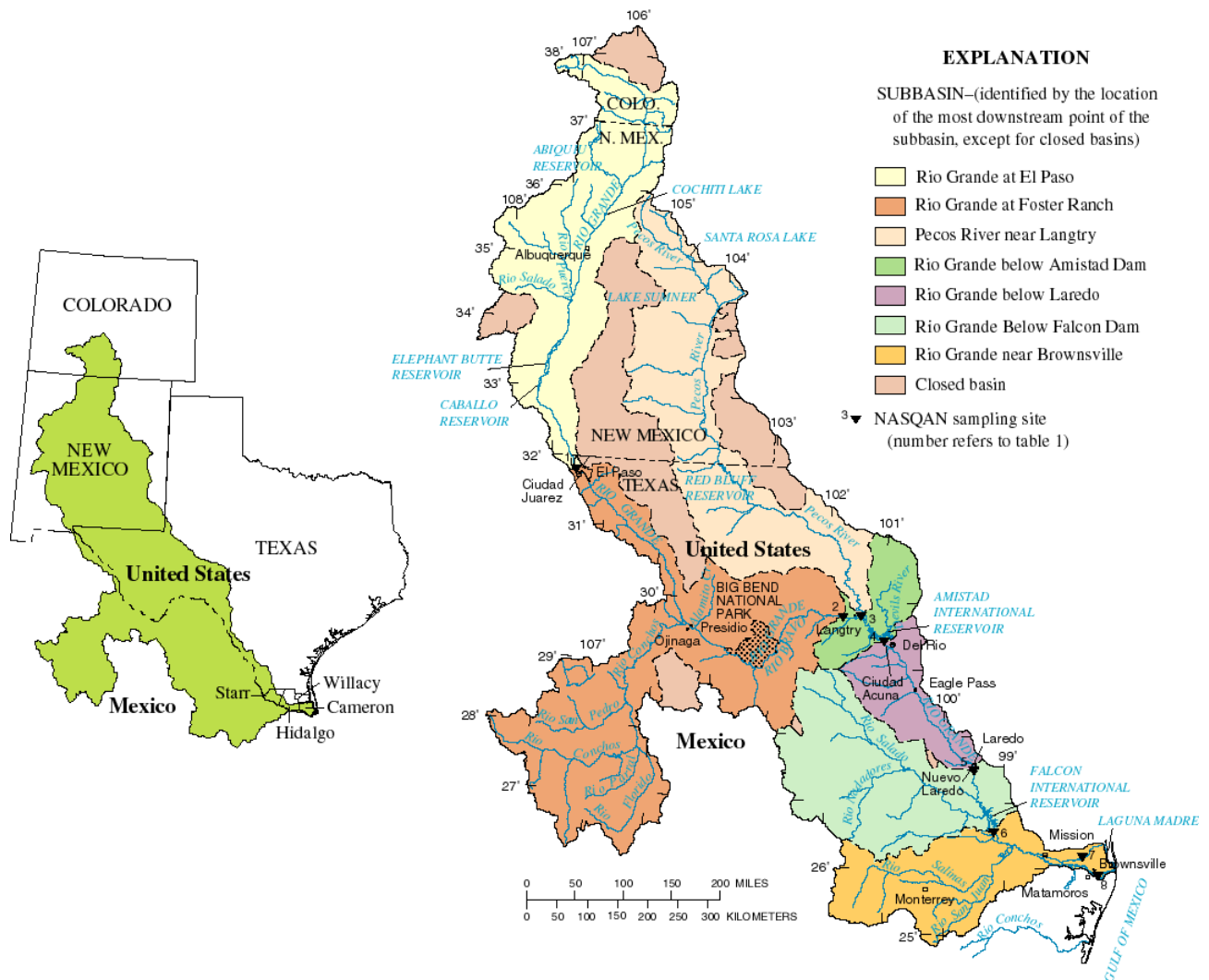
⁵⁹ Joseph P. Sánchez, *The Rio Abajo Frontier, 1540-1692: A History of Early Colonial New Mexico* (Albuquerque, New Mexico: The Albuquerque Museum, 1987), 1, 3, 29; Dan Scurlock, *From the Rio to the Sierra: An Environmental History of the Middle Rio Grande Basin*. RMRS-GTR-5. (Fort Collins, Colorado: United States Department of Agriculture, Forest Service, Rocky Mountain Research Station, General Technical Report, May 1998), 5.

⁶⁰ Scurlock, 2-3; Frank E. Wozniak, *Irrigation in the Rio Grande Valley, New Mexico: A Study and Annotated Bibliography of the Development of Irrigation Systems*. RMRS-P-2. (Fort Collins, Colorado: United States Department of Agriculture, Forest Service, Rocky Mountain Research Station, September 1997), 2-5.

of the city El Paso the Upper Valley and the lands from there to the southeast the Lower Valley. The entire river is now called Rio Grande in the United States and Río Bravo del Norte in Mexico.⁶¹ When considering the river as a whole, the canyon at Fort Quitman marks the point where the river is divided into two main upper and lower basins. The upper basin has tributaries solely in the U.S., the lower basin is fed by tributaries in both countries, primarily the Pecos in the U.S., but the Conchos, Salado, and San Juan rivers originating in Mexico provide water at a 3.5 to 1 ratio to that of the U.S. tributaries. In the upper basin the river depends mainly on snowmelt in Colorado's San Juan Mountains and, to a lesser extent, meltwater from the Sangre de Cristo Mountains in New Mexico, while the Mexican tributaries that feed the Rio Grande in the lower basin create a much larger river with a greater cubic feet per second (cfs) flow rate. The section of the river from Fort Quitman to Presidio is often called the "Forgotten River" because it receives very little water from upstream, has no tributaries, and seems to be "hydrologically disconnected " from the river below Presidio where the Río Conchos joins the Rio Grande.⁶²

⁶¹ For the purposes of this study the river will be referred to as the Rio Grande and the Upper and Lower Valleys will mean the El Paso/Juárez region, unless otherwise noted.

⁶² Michael E. Landis, "The 'Forgotten River' of the Rio Grande/Rio Bravo: Investigation into the Reclamation of an Arid Riparian Ecosystem," M.S. thesis, The University of Texas at El Paso, 2001, 1.



Rio Grande Basin and Sub-basins
<http://water.usgs.gov/nasqan/docs/riogrndfact/image/fig.1>

The Rio Grande is a young river, not becoming complete until the Pliocene Period (5.3-2.6 million years ago) and into the Pleistocene Period (2.6 million to 11,700 years ago). The portion of the upper Rio Grande that runs almost due south from the San Juan Mountains to El Paso flows through the Rio Grande rift, which formed 10 to 20 million years ago after volcanic activity ceased and the elevated earth's crust began to cool, sink, and spread out. The rift channels the snowmelt and rain runoff rather than allowing it to spread in a dissipated pattern. The upper Rio Grande developed due to three major elements. First, the uplifts of the San Juan,

Jemez, and Sangre de Cristo Mountains captured winter storms and accumulated substantial snowpack. Second, during glacial periods these mountains built up the necessary water that scoured the river's channels during pluvial periods. And three, gravity determined the through drainage that occurred as the glaciers melted and water flowed from higher to lower elevations along the path of the natural depression between the uplifts. The basin and bolson reservoirs that formed in the volcanic rock of the San Juan and Jemez Mountains overflowed and merged to form the head of the river.⁶³ Approximately 10 million years ago the Rio Chama joined the Rio Grande near Española, located in the southern part of Rio Arriba County 24 miles north of Santa Fe in New Mexico, then pushed southward reaching Albuquerque 3 million years later and the Mesilla Valley 5 million years after that.⁶⁴ The river became an inland delta near El Paso and fed the ancient lakes of northwestern Chihuahua.⁶⁵ A lake formed in the El Paso area and the river sands that remained after the lake dried up became repositories for the groundwater that supplies the majority of the drinking water to the modern-day cities of El Paso and Ciudad Juárez.⁶⁶ The Hueco-Mesilla Bolsons cover 1,370 square miles, and although the two are connected very little water flows between them. The Mesilla Bolson is 2,000 ft. thick and the Hueco Bolson is 9,000 ft. thick. The water in the both is fresh to slightly saline, but becomes more saline as the water level drops. The Rio Grande and rainwater runoff from the Franklin Mountains recharge the Hueco Bolson.⁶⁷

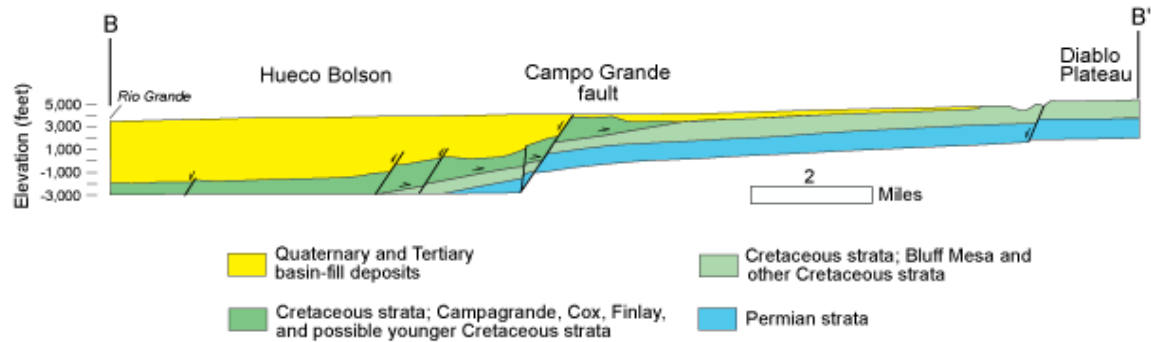
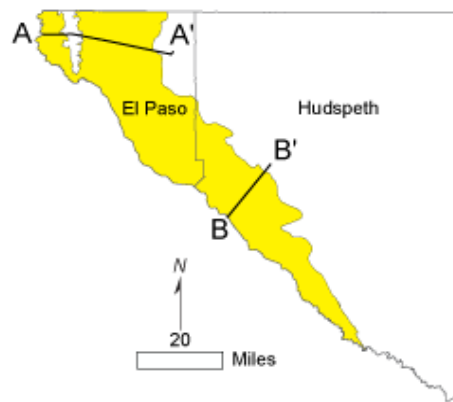
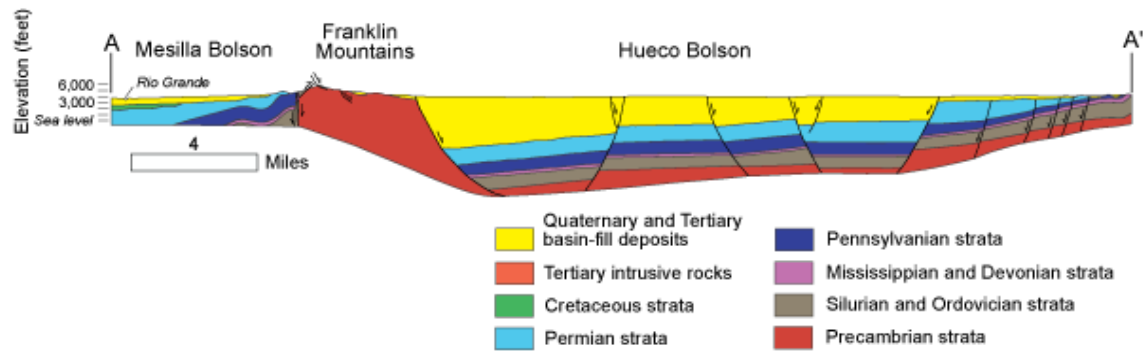
⁶³ Frank E. Kottlowski, "Geologic History of the Rio Grande near El Paso." Reprint of *West Texas Geological Society Guidebook*, 1958 Field Trip, Franklin and Hueco Mountains, Texas, November 1958, 48, as found in State Bureau of Mines and Mineral Resources, New Mexico Institute of Mining and Technology, Campus Station, Socorro, New Mexico, 46; Fred M. Phillips, G. Emlen Hall, and Mary E. Black, *Reining in the Rio Grande: People Land and Water* (Albuquerque: University of New Mexico Press, 2011), 17-19.

⁶⁴ Phillips, et. al., *Ibid.*, 15-17.

⁶⁵ Mueller, 2; Earl M.P. Lovejoy, *El Paso's Geologic Past* (El Paso: Texas Western Press, 1996), 9; Kottlowski, 46.

⁶⁶ Lovejoy, 9.

⁶⁷ "Hueco-Mesilla Bolson Aquifer Summary," Texas Water Development Board, <http://www.twdb.texas.gov/groundwater/aquifer/majors/hueco-mesilla-bolsons.asp> (Accessed Feb. 14, 2016).



Note: True fault geometries were not determined for both cross sections.

Modified from Collins and Raney, 2000, 2002

Mesilla and Hueco Bolsons, www.twdb.gov

Bolson is Spanish for “large purse” and refers to a flat valley or basin surrounded by mountains in a semi-arid climate. An aquifer is an underground layer of gravel, sand, silt, broken rocks or water-permeable rocks that absorb and hold water. This groundwater can be extracted using wells. The Hueco-Mesilla Bolsons are composed of silt, sand, gravel, and clay.

Frank E. Kottlowski explains how the Rio Grande, which receives little to no water from tributaries or snowmelt for the more than 400 miles between the Río Puerco in New Mexico where it merges with the Río Conchos, became the continuous river connected to the Gulf of Mexico that exists today:

Small arroyos that drained the southwest slopes of the Franklin Mountains and the northern part of the Juarez Mountains cut around and through bedrock hills at Cerro del Muleros [now known as Mount/Sierra Cristo Rey], they headed on to La Mesa (altitude 4,130 feet) and drained eastward down to the western end of the Hueco bolson. At first as a trickle, then almost in a flash the floodwaters roared down the 18 foot-per-mile grade, northwestern Chihuahua was pirated of 75,000 acre-feet of water annually, and the eventual junction of the upper Rio Grande, the Rio Conchos, and the Pecos River was assured. The lowest part of the surface of the Hueco bolson before the piracy of the Rio Grande appears to have been in the vicinity of El Paso, suggesting ponding of the Rio's floodwaters there until overflow cut through the edge of the Quitman Mountains southeast of Fort Quitman.⁶⁸

The river began to cut through from the Mesilla Valley about 2.25 million years ago and slowly made its way to meet the Conchos. Radiocarbon-dating of the soils found in the floodplain in the El Paso/Juárez area indicate that the cumulic soil present today began to form 2,500 to 1,000 years ago while areas away from the meander zones of the river channels have surface deposits that are primarily brown, silty clays.⁶⁹ Carbon-dated alluvial channel deposits from the three main channels of the Rio Grande reveal that the Río Viejo del Bracito and the Río Viejo de San Elizario channels are approximately 2,360 years old while the present main channel of the Rio Grande formed 3,330+ years ago and meandered laterally within a 2,000 ft. wide zone. Below the channel deposits, there are eolian sands, composed of fine and very fine ground quartz, in deposits that have been dated to 7,000 to 1,000 years ago.⁷⁰ The gravelly and sandy

⁶⁸ Kottlowski, 48.

⁶⁹ Cumulic soil is common in alluvial plains and in arid, semi-arid, and mountainous regions. It is primarily regosolic, meaning it is generally composed of loose minerals, broken rocks, and sands.

⁷⁰ Eolian is Greek for "windblown;" these sands are created by the abrasion that occurs when light particulate matter is moved about by winds and through the process is aggraded or ground down. Eolian sands commonly form sand

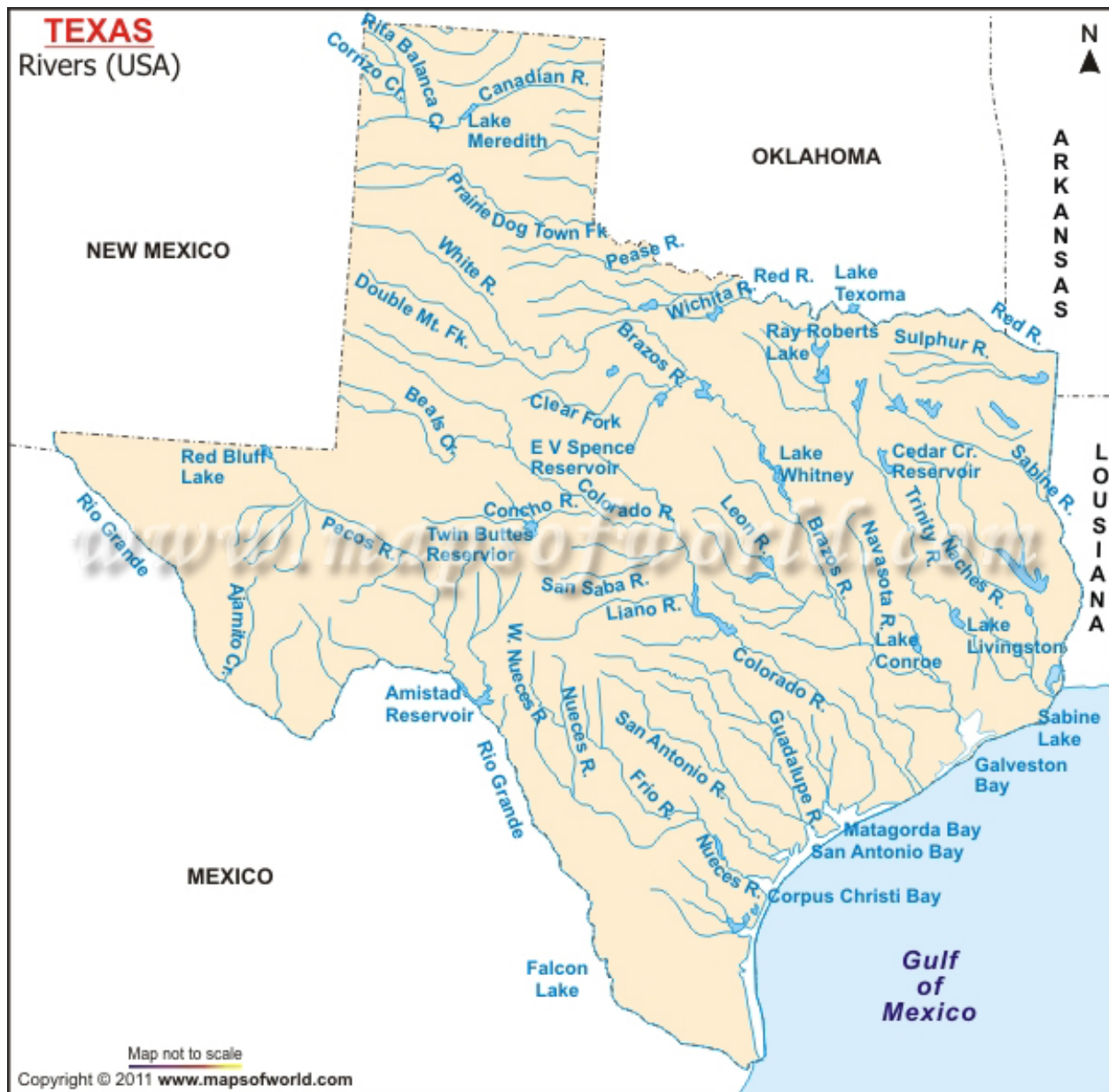
soil is a critical factor in both the channeling of the river and the development of the floodplain. Stephen A. Hall concludes that the floodplain soils show that 2,300 to 2,500 years ago all three channels were active and relatively stable in location but that frequent, sustained flooding due to high precipitation took place until rainfall significantly decreased 1,000 years ago. The southern Great Plains experienced an increased inflow of moist air from the Gulf of Mexico 2,000 to 1,000 years ago and between 2,400 to 950 years ago meltwater from glaciation in the Front Range of Colorado during the Audubon period may also have contributed to high levels of water reaching the El Paso/Juárez valley.⁷¹

dunes, but as water is more powerful than wind in terra forming, Hall's survey (see following note) indicates the river cut through the dunes. Another study of the Rio Puerco River indicates that in that region the most intense period of channel and arroyo cutting took place in the Holocene period, which began 12,000 years ago. See Charles French, Richard Periman, Linda Scott Cummings, Stephen Hall, Melissa Goodman-Elgar, and Julie Boreham, "Holocene Alluvial Sequences, Cumulic Soils and Fire Signatures in the Middle Rio Puerco Basin at Guadalupe Ruin, New Mexico" *Geoarchaeology: An International Journal*, Vol. 24, No. 5, (2009): 638–676, Wiley Periodicals, Inc. Published online in Wiley Interscience (www.interscience.wiley.com). DOI:10.1002/gea.20278, accessed April 25, 2012.

⁷¹ Stephan A. Hall, "Surficial Geology of the Lower Valley," in John Peterson, *Mission Trail Project: Archeological Studies for the Mission Trail Enhancement ISTEPA Program, El Paso, Texas* (El Paso: The University of Texas at El Paso, 1996), 9, 16, 21-24, 30-31.



Major Rivers in New Mexico
<http://www.mapsofworld.com/usa/states/new-mexico/new-mexico-river-map.html>



Major Rivers in Texas

<http://www.mapsofworld.com/usa/states/texas/texas-river-map.html>

El Paso, Texas, Ciudad Juárez, Chihuahua, and numerous downstream communities are located in the El Paso/Juárez Valley between the Franklin, Hueco, Sierra San Ignacio, and Juárez mountains and, although part of the Upper Rio Grande Basin, are in that portion of the river that

was late in forming and dependent on downstream flows from Colorado and New Mexico.⁷² Winter storms in the elevated peaks of the San Juan Mountains are the largest source of water in the upper basin, while the more southern Sangre de Cristo Mountains receive less and the San Andreas and Black Mountains even less than that.⁷³ The amount of water in the river in the El Paso/Juárez Valley is not predicated on local precipitation. The El Paso/Juárez Valley is in the hot desert biome of the Chihuahua Desert and has low precipitation due to subtropical high pressure, unlike the lower basin from Del Rio to the delta where the high pressure dissipates and moist air from the Gulf is drawn inland, particularly during summer's high temperatures. The climate of the Chihuahua Desert is also subject to the orographic barriers of the Sierra Madre Occidental, which runs along the Mexican west coast and the Sierra Madre Oriental that is parallel to the east coast of Mexico. These two mountain ranges serve as uplifts to moist air flowing from either direction, meaning that moisture often evaporates before it can reach the ground.⁷⁴ Hot deserts are typified by wide swings in temperature due to low humidity that fails to block or dissipate daylight solar rays and allows heat to radiate away at night. Between 1981 and 2010, the record high in the El Paso/Juárez area was 114° F/46° C, the average high was 78° F/25 ° C, the average low was 51° F/10° C, the record low was -8° F/-22° C. The hottest months are May, June, July, and August; the coldest months are November, December, January and February. Destructive, desiccating winds that trigger dust and sand storms typically occur in the spring. The cities of El Paso and Ciudad Juárez are at an elevation of 3,800 ft./1,200 m. and can experience snow, although precipitation in winter is very low when present, while summer rains

⁷² Unless otherwise noted, the term "El Paso" means the present day Metropolitan Statistical Area, which includes the downstream communities and townships of Ysleta, Socorro, San Elizario, Fabens, Clint, and Tornillo, while "Ciudad Juárez" or "Juárez" represents that incorporated city and attached settlements.

⁷³ Philips, et. al., 19.

⁷⁴ John A. Peterson, "The Lower Valley Environment," in *Mission Trail Project: Archeological Studies for the Mission Trail Enhancement ISTEPA Program, El Paso, Texas* (The University of Texas at El Paso, 1996), 4.

can be intense and violent but are usually short in duration. Records from 1981-2010 show average precipitation was 9.7 in./246 mm., average snowfall was 4.9 in./12.4 mm., with an average of 53 rainy and 2.3 snowy days.⁷⁵ During the winter, precipitation is the result of inflowing Pacific moist air; the summer rains are the result of limited amounts of moist air originating in the Gulf of Mexico that penetrate the region, but very little if any precipitation from local rain or snowmelt reaches the Rio Grande. Most of the water is absorbed by the *bajadas* in the nearby mountains.⁷⁶

However, historically precipitation levels in the El Paso/Juárez are far from static. In a study of annual precipitation in El Paso, James A. Reynolds found a direct correlation between moderate to strong El Niño Southern Oscillation (ENSO) events and seasonal precipitation in both the autumn of an ENSO onset year and the following spring. The study examines precipitation from 1899 through 1984. Summer and winter precipitation levels did not change, but autumn and spring precipitation showed increases that ranged from 130-200% of normal.⁷⁷ Another study examined tree ring chronologies dating from A.D. 622 to 1995. In order to reconstruct precipitation patterns, the study sampled trees dependent upon rainfall, including ponderosa pine, Douglas-fir, southwestern white pine, and Colorado pinyon in the southern New Mexico/Rio Grande Basin area, using living trees, remnant wood, and archeological materials at Fort Bliss, White Sands Missile Range, and Holloman Air Force Base. The tree rings indicated that a severe drought was in effect from A.D. 940-1040, followed by the wettest long-term period in the reconstruction, which took place 1040-1210. Yet within that extremely wet period

⁷⁵ National Oceanic and Atmospheric Administration, <http://www.nws.noaa.gov/climate/> Accessed 4/25/2012. For more recent climate data see http://www.srh.noaa.gov/epz/?n=elpaso_extreme_weather

⁷⁶ Peterson, 4. Bajada is from the Spanish “descent; slope,” and is a physical geography term for the consecutive series of alluvial fans cut by streaming water and containing large quantities of debris that form along the edge of linear mountain ranges in arid climates.

⁷⁷ James A. Reynolds, “El Paso, TX., Precipitation and Its Relationship to the El Niño/Southern Oscillation (ENSO)”, National Weather Service Forecast Office, http://www.srh.noaa.gov/epz/?n=research_papers_jarelnino Accessed 4/25/2012.

there was also a drought cycle from 1125-1140. Another long-term drought occurred 1210-1305, with the most severe drought years 1270-1295, followed by a wet period from 1485-1545 and then another drought from 1560-1600. The 1600s saw above average rainfall, shifting to below average in the 1700s until another wet period began in 1780 that lasted until 1840. From 1840 to 1890 it was very dry, then from the 1890s to ca. 1940 rainfall again reached above average levels. Another severe drought period took place 1946-1965, returning to above average precipitation 1976-1995.⁷⁸

The modern climate formed between 7,500-6,000 B.C., changing from the prior pattern of cool dry summers and mild winters with substantial rainfall. When the desert climate formed, plants requiring low amounts of water proliferated, including several species of cacti, yucca, scrubby mesquite, creosote, bunch grass and various other herbaceous desert plant species. Willows and cottonwood grew up along the river, as did cattails, with some cottonwoods in the arroyos as well as scrub oak and pine. It is generally agreed upon that people were living in the El Paso/Juárez area as early as 9,000 B.C. During the Paleo-Indian Period (9,000-6,000 B.C) humans lived in the desert basins and mountains in small encampments and there is ample evidence of hunting but little indication of how these groups used plants. In the Archaic Period (6,000 B.C–A.D. 200) archeological remains indicate seasonal occupation of sites, an increase in population, and some evidence of domesticated corn toward the end of the period. The last prehistoric phase, the Formative Period (A.D. 200-1450), consists of several phases defined by pottery and dwelling types: the Mesilla Phase or Pithouse Period (A.D. 200-1050), the transitional early Pueblo or Doña Ana Phase (A.D. 1050-1200), and the El Paso Phase or Pueblo

⁷⁸ Henri D. Grissino-Mayer, Christopher H. Baisan, and Thomas W. Swetnam, “A 1,373 Year Reconstruction of Annual Precipitation for the Southern Rio Grande Basin,” Submitted November 10, 1997 to the Directorate of Environment, Natural Resources Division, Fort Bliss, Texas, for the Legacy Program, <http://web.utk.edu/~grissino/downloads/Legacy%20Final%20Report.pdf> Accessed 4/25/2012.

Period (A.D. 1050-1450). During the Mesilla Phase sedentary behavior increased and villages located along the *bajadas* of the Franklin Mountains became more common. In the El Paso Phase occupation sites were not only situated along these alluvial fans, but also along the Rio Grande, and for the first time evidence of man-made reservoirs designed to collect rainfall runoff from the mountains appears. Although dependence on agriculture increased in this period, it is unclear to what degree these prehistoric people relied on cultivation to augment hunting and gathering.⁷⁹

Human activity in the El Paso/Juárez area during the Proto-historic Period (A.D 1450-1581) is even less well understood. After 1400 the archeological record diminishes, and by 1450 traces of human occupation in the El Paso area disappear. The period 1450-1581 is often referred to as the “abandonment,” but scholars do not agree on what happened. Theories for abandonment include “epidemic disease, warfare, malnutrition, climatic change (erosion or drought), overcrowding, poor sanitary conditions...or encroachment by Athapascan Indians.” Some scholars suggest that the native peoples simply returned to a hunting and gathering lifestyle, thereby leaving no permanent markers of habitation.⁸⁰ Prior to 1450 the peoples of the El Paso/Juárez Valley were part of the Mogollon culture, specifically the Jornada Mogollon. Desert Jornada Mogollon pottery designs common in the El Paso area have been found on ceremonial objects spread as far west as the Hopi villages in Arizona and north into the Upper Rio Grande Valley, suggesting these people dispersed but did not disappear after 1450. When the Spanish arrived, they encountered Mansos living to the north of the Rio Grande and Sumas to the south, with a small territorial overlap in the area of modern day El Paso. It is not clear if these two groups had remained in the area after 1450, were descendants of the original inhabitants who had

⁷⁹ Mark Thomas Bentley, “Preliterate Native Americans in the El Paso Del Norte Region,” M.A. thesis (The University of Texas at El Paso, May 1992), 11-12, 14-15, 17-18, 20, 22-23, 34-35.

⁸⁰ Bill Lockhart, “Protohistoric Confusion: A Cultural Comparison of the Manso, Suma, and Jumano Indians of the Paso del Norte Region,” *Journal of the Southwest*, Vol. 39, No. 1 (Spring, 1997): 114-115.

returned at some point, or were completely new cultural groups who had moved into the area at some point before the Spanish arrived.⁸¹ Both groups were well established when the Spanish encountered them in 1581, marking the beginning of the historic period.⁸²

It is arguable to what degree climate change, the wet cycles and periods of drought discussed above, shaped human behavior in the El Paso region. Archeologists and anthropologists studying prehistoric societies in the American Southwest and northern Mexico do not all agree on how culture, power fields, and environmental factors intersect and impact each other. Cultural ecologists take the view that human biology and social formations adapt to environmental challenges. An example of this viewpoint is the geographic determinism model found in Jared Diamond's *Guns, Germs, and Steel: The Fates of Human Societies* (1997).⁸³ Political ecologists examine "the consequences of power relationships on a large spatial scale in understanding how humans use the environment."⁸⁴ Another, newer, interdisciplinary model is to merge the natural and social sciences and utilize as much quantitative evidence as possible, a possibility now that computer modeling is more refined.⁸⁵ The most extensive studies, of any of these three types of models, in the general region considered in this study have been of the

⁸¹ Lockhart, *Ibid.*, discusses the difficulties in understanding the cultural origins of the Mansos and Sumas due to the fact the Spanish tended to see these peoples as one culture and did not note many differences in their linguistic or cultural practices.

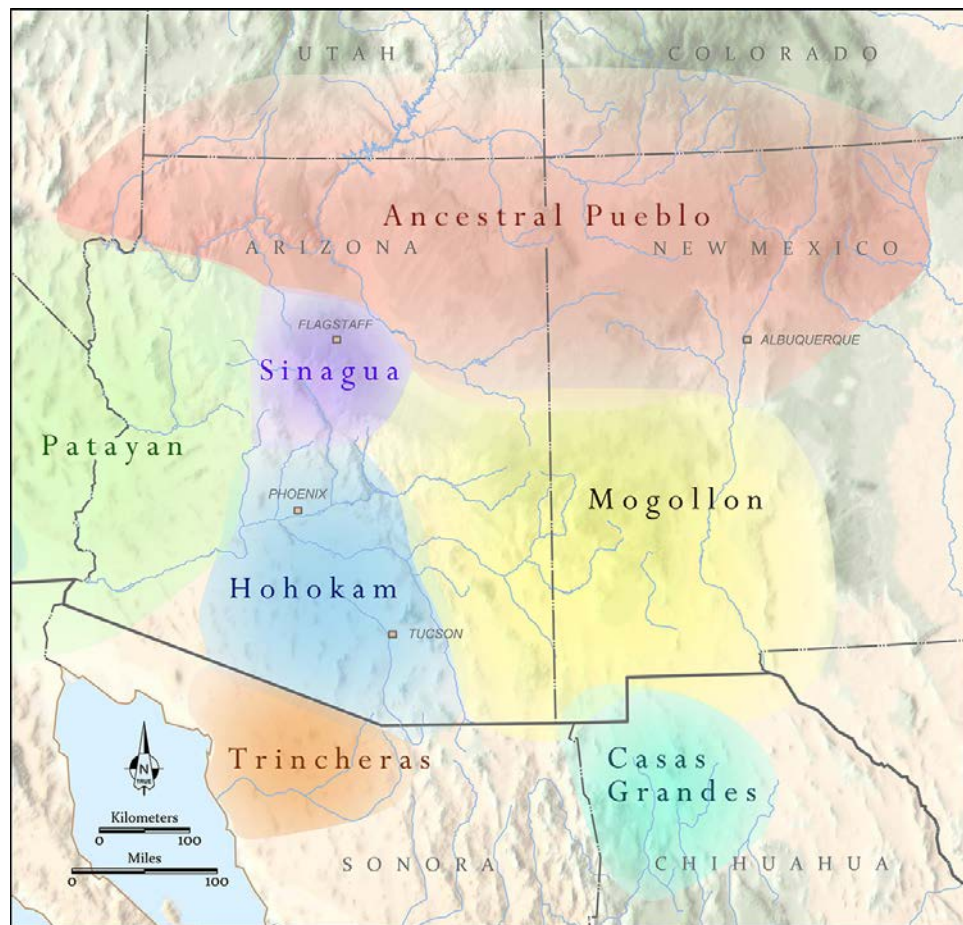
⁸² The marker 1581 is commonly chosen as the beginning of the historic period as it is the year Fray Augustin Rodriguez, Fray Francisco Lopez, and Fray Juan de Santa Maria, as part of the Francisco Sanchez Chamuscada *entrada*, marched from Santa Barbara up the Conchos to the Rio Grande and from there proceeded upriver to the Pass of the North. Although it is clear Cabeza de Vaca was there first, in 1581 the Spaniards knew where they were and have left more reliable accounts. W.H. Timmons, *El Paso: A Borderlands History* (El Paso: Texas Western Press, 1990), 7.

⁸³ Jared Diamond, *Guns, Germs, and Steel: The Fates of Human Societies* (New York: W.W. Norton & Company, 1997). This approach can also be seen in Alfred W. Crosby's *The Colombian Exchange: Biological and Cultural Consequences of 1492* (Westport, Connecticut: Greenwood Press, 1972), and *Ecological Imperialism: The Biological Expansion of Europe* (Cambridge: Cambridge University Press, 1986).

⁸⁴ Two important works that demonstrate this approach are Eric Wolf's *Europe and the People Without History* (Berkeley: University of California Press, 1982), and Mike Davis' *Late Victorian Holocausts: El Niño Famines and the Making of the Third World* (London: Verso, 2001).

⁸⁵ George J. Gummerman, "The Resurgence of the Co-evolution of Human and Natural Landscape Studies in the American Southwest," in *Environmental Change and Human Adaptation in the Ancient American Southwest*, David E. Doyel and Jeffrey S. Dean, eds. (Salt Lake City: The University of Utah Press, 2006), 282-286.

Anasazi in northern New Mexico and the Four Corners region as well as the Hohokam in southern and western Arizona.⁸⁶



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Grissino-Mayer, et. al., used field sampling, laboratory analysis, and computer models to link precipitation levels to cultural developments among the Mogollon. From A.D. 1040 to 1125

⁸⁶ There are multiple studies of Hohokam irrigation and agricultural practices. See Michael C. Meyer, *El agua en el Suroeste hispanico: Una historia social y legal 1550-1850* (Jiutepec, Morelos: Instituto Mexicano de Tecnología del Agua, 1997); Donald A. Graybill, David A. Gregory, Gary S. Funkhouser, and Fred L. Nials, "Long-Term Streamflow Reconstructions, River Channel Morphology, and Aboriginal Irrigation Systems along the Salt and Gila Rivers," in *Environmental Change and Human Adaptation in the Ancient American Southwest*, op.cit., 69-123; Suzanne K. Fish and Paul Fish, "Prehistoric Environment and Agriculture in the Hohokam of Southern Arizona," in *Native Peoples of the Southwest: Negotiating Land, Water, and Ethnicities*, Laurie Weinstein, ed. (Westport, Conn.: Bergin & Garvey, 2001), 25-48; Michael F. Logan, *Desert Cities: The Environmental History of Phoenix and Tucson* (Pittsburgh: The University of Pittsburgh Press, 2006).

rainfall was higher than average and between 1100-1120 even higher, averaging 11 inches per year. In 1150 the Mimbres culture collapsed and the authors conclude that the increased rainfall had resulted in population growth and a reliance on riparian farming that could not be sustained when a drought cycle occurred 1125-1140.⁸⁷ After 1150 the Mimbres culture began to interact more with the Casas Grandes culture in northwestern Mexico in the present-day state of Chihuahua, and by 1300 the Mimbres had left New Mexico. According to the authors, a drought cycle from 1210-1305 “*contributed* [sic] to the Mimbres collapse, whether from depopulation to outlying areas or assimilation into the Casas Grandes culture.”⁸⁸ As seen above, in the El Paso Del Norte region sedentary agriculture and water management practices also took place during the period 1050-1450, but how the climate influenced these practices is unclear. It is interesting to note, however, that Grissino-Mayer’s dendochronology study indicates that the entire fifteenth century experienced below average rainfall, and both the Hohokam and Casas Grandes civilizations declined markedly around 1450, the point at which human activity in the El Paso del Norte area also becomes extremely hard to examine due to a lack of evidence.⁸⁹ Both the Hohokam and Casas Grandes groups were irrigators and it is unclear if flooding, drought, overpopulation, changes in the social hierarchy, religious factors, or pressures from hostile indigenous peoples to the west influenced their decline.⁹⁰

⁸⁷ The Mimbres culture of southwestern New Mexico is a subset of the Mogollon culture.

⁸⁸ Grissino-Mayer, et.al., 22-25.

⁸⁹ Timmons, *El Paso*, 4. According to Timmons, native peoples in the El Paso/Juárez valley may have left the area due to “a too heavy reliance on agriculture, or the decline of the trade center of Casas Grandes about this time, or perhaps a combination of the two.” He does not mention the role climate change may have played. However, Bentley concludes that a serious drought in A.D. 1300 throughout the American Southwest and northern Mexico caused emigration from Casas Grandes to the Rio Grande. The increase in population coupled with the decrease in precipitation strained the carrying capacity of the region and the El Paso Phase villagers (A.D. 1050-1450) left the area, abandoned agriculture, and returned to hunting and gathering. Bentley, 35-36, 70.

⁹⁰ Michael E. Whalen and Todd Pitezel, “Settlement Patterns of the Casas Grandes Area,” in *Ancient Paquimé and the Casas Grandes World*, eds. Paul E. Minnis and Michael Whalen, 103-125 (Tucson: University of Arizona Press, 2015).

What is clear is that water was a crucial element for survival and that early indigenous populations coped with its lack by migrating to locations that had a water supply. From about A.D. 1-1,000, the Formative Period, the three great cultures of the Southwest, the Anasazi/Puebloan, Mogollon, and Hohokam began to develop and refine water usage techniques. In these early cultures Anasazi and Mogollon peoples relied on precipitation for dryland farming, while the Mimbres Mogollon planted in canyon bottoms or in *bajadas* to exploit runoff or floodplain water. The Hohokam and Zuni have left evidence of true irrigation because they dug canals and built diversion dams. In the Pueblo II period (A.D. 900-1100) the pueblo peoples of New Mexico came to rely on a combination of dryland and floodplain farming that exploited runoff and containment of rainfall. But they did not divert water from streams or rivers and were not irrigators,⁹¹ with the possible exception of the Chacoan Anasazi.⁹² In the El Paso/Juárez area indigenous peoples shifted from dryland farming to floodplain terraced farming in the *bajadas* and along the river 1050-1450.⁹³ Reports from Spaniards after 1581, as well as physical remains, indicate that the indigenous peoples they initially encountered in the El Paso/Juárez area were either not practicing agriculture at all, or not using very advanced agricultural techniques.⁹⁴ Some scholars believe that the Mansos and Sumas the Spanish interacted with were practicing some agriculture, but the “maize” Espejo reported may have been bartered from other Indians.

⁹¹ Phillips, et.al., 26-30.

⁹² Michael C. Meyer states that the Hohokam built more than 200 km. of canals along the Salt River in Arizona and that the Anasazi built canals and water control systems that allowed them to sustain a population of almost 10,000 people in *El agua en el Suroeste hispánico: una historia social y legal 1550-1850* (Centro de Investigaciones y Estudios Superiores en Antropología Social, Mexico City, D.F., Primera edición The University of Arizona Press, 1984, Primera edición en español, 1997) 23, n. 11, n. 12. Wozniak, 6, disputes the claim that the Anasazi were irrigators and the canals in archaeological reports are more likely of Hispanic origin, although there is evidence of water conservation systems.

⁹³ Bentley, 59.

⁹⁴ According to the “Declaration of Pedro de Bustamante, 1582,” the “Brief and True Account of the Exploration of New Mexico, 1583, Narrative of Escalante and Barrado,” and “Account of the Journey to the provinces and Settlements of New Mexico, 1583, Narrative of Antonio Espejo,” as found in Herbert Eugene Bolton, ed., *Spanish Exploration in the Southwest, 1542-1706: Original Narratives of Early American History* (New York: Barnes and Noble, Inc., 1908, reprint 1967), 142-150, 154-157, 168-192.

The archeological record is also not clear regarding whether the native peoples resided in shallow pithouses or pueblos, which may have been built in an earlier period, but the Spanish reported the Mansos had "no houses in which to dwell, but live under the trees," as "dwelling in *rancherias* [small, humble villages] and straw houses," or as "living in huts of reeds and of boughs." The Sumas lived in "very frail abodes," in "brush *jacales* [huts] . . . which in winter were sometimes crudely covered with skins," or "in straw shacks like wild animals, exposed to the sun, wind, and cold." When Oñate arrived in 1598 his chroniclers reported the natives had no fixed abodes and lived on fish, game, and the roots, seeds, and fruits they gathered.⁹⁵ Native peoples certainly used the river as a source of water, food, and a place to hunt birds and animals, but in 1598 the Spanish did not ascertain that the Indians were using the Rio Grande in the El Paso/Juárez area for irrigation.

It is important to note at this point that true irrigation for the purpose of agriculture in the American Southwest and northern Mexico is primarily a European practice and not a widespread indigenous method of farming. Exactly how much irrigation, or other types of water control systems, predated the Spanish is a matter of debate. In the early twentieth century, Herbert Eugene Bolton's (1870-1953) work in translating Spanish reports of their early explorations throughout the Southwest became the basis for modern conceptions of how native peoples lived in the sixteenth century and earlier. In an article published in 1928, Wells A. Hutchins claimed that the *acequia*, a canal that is owned and operated communally, has origins not just in Spanish but also in Indian cultures. He arrived at this conclusion because some Spanish accounts mention indigenous irrigation ditches, which he compared to late nineteenth century archeological studies of irrigation ditches in Arizona and pueblos in New Mexico. For most of the twentieth century

⁹⁵ Lockhart, 123-124.

scholars have maintained the view that pueblo peoples were irrigators.⁹⁶ On the other hand, Frank E. Wozniak points out that there is a vast difference between water conservation techniques and water diversion systems and that many sites that appear to modern observers to be archaic indigenous irrigation systems are more likely early Spanish *acequias*. In his analysis of reports from the Coronado (1540-1541), Ibarra (1563-1564), Rodriguez-Chamuscado (1581), Espejo (1582-1583), and Sosa (1590 and 1591) expeditions, Wozniak states that because the early Spanish explorers were concerned about how viable the region would be for settlement and economic exploitation they were extremely interested in the availability of water and inclined to report extant water management systems whenever they observed them. They often reported an abundance of crops but did not always record any water management systems in conjunction with them. Wozniak concludes that this indicates these water management systems must not have existed everywhere the Spanish went. Wozniak argues that floodwater and dryland farming were the prevalent forms of agriculture prior to the arrival of the Spanish and that any true irrigation took place along Rio Grande tributaries where lower water levels would have presented fewer engineering problems.⁹⁷ Therefore it is entirely plausible that when the Spanish arrived in the El Paso/Juárez Valley any agriculture would have taken place in the floodplain and might not be recognized as a purposeful use of the floodwater zones; the Spaniards certainly did not note any diversion dams or ditches.

When the Spanish arrived at the Rio Grande and proceeded northward to found settlements in 1598, they brought with them their own “portmanteau biota,” their germs, animals,

⁹⁶ Wells A. Hutchins, “The Community Acequia: Its Origin and Development,” *The Southwestern Historical Quarterly*, Vol. 31, No. 3 (Jan., 1928), 261-262, n. 2, 5, 6.

⁹⁷ Wozniak, 1, 6-10.

and plants, and their customary expectations of how to interact with the environment.⁹⁸ They also carried with them their legal and social notions about water rights and irrigation. Water is a precious resource in any environment, but especially so in an arid climate. Custom and practice regarding irrigation began in Spain after the Moors invaded in A.D. 711 and introduced their engineering techniques to bring water from streams and rivers to crops in arid lands. When King Alfonso X el Sabio (1221-1284) commissioned *Las Siete Partidas*, Spanish customs regarding water rights became encoded in law. These laws were based primarily on the Roman collection of laws in the sixth century A.D. *Corpus Iuris Civilis*, which was Emperor Justinian's effort to compile the ideas of jurists and the tenets and principles found in the fifth century A.D. *Codex Theodosianus*. In the *Codex*, the basic principles of water rights are clarified. Traveling armies were not to foul the common river waters and cause harm downstream. Anyone illegally diverting streams from reaching the Nile was to be sentenced to death by burning. Title II concerning Public Works has nine edicts prohibiting diverting water from aqueducts. But the most important principle in Title II, and one repeated in the *Siete Partidas* is Edict Seven, states,

We decree that ancient water rights that are established by long ownership shall remain the property of the several citizens and not be disturbed by any innovation. Thus each man shall obtain the amount that he has received by ancient right and by custom lasting to the present day. The punishment shall remain which was provided for persons who wrongfully use secret channels of water for the irrigation of their fields or for the beautification of their gardens. (November 1, 397 A.D.)⁹⁹

⁹⁸ Portmanteau biota is the term famously coined by Alfred Crosby in *Ecological Imperialism*, 89. Crosby, among others, discusses the fact that the European conquest of the western hemisphere was contingent upon changing the ecological niches they encountered to suit their own preferences and tastes, which had the effect of displacing native peoples as well as plant and animal species. See also Elinor G.K. Melville, *A Plague of Sheep: Environmental Consequences of the Conquest of Mexico* (Cambridge, U.K.: Cambridge University Press, 1994). Melville argues that the introduction of sheep by the Spanish in Valle del Mezquital in the 16th c. was a biological tool of conquest that significantly altered Indian social organization and economic activities. Expropriation of land, over-grazing, deforestation, and burning underbrush caused erosion, vegetation change, and impacted access to water, meaning that Indian agricultural output decreased and they were forced in growing numbers to submit to the hacienda system to survive, losing status and economic autonomy. The introduction of ungulates changed the entire ecology of region and is an example of environmental as well as social change.

⁹⁹ Edicts 7-1-13; 9-23-1; 15-2-1, 2, 3, 4, 5, 6, 7, 8, 9. As found in Clyde Pharr, trans., *The Theodosian Code and Novels and the Sirmondian Constitution* (Union, New Jersey: The Lawbook Exchange, Ltd., First Edition 2001, Third Edition 2003), 157, 249, 430-431.

However, Spanish law is not only Roman in origin but also consists of Germanic customs introduced by the Visigoths who occupied the Iberian peninsula from the 5th to the 8th century. One important principle is the idea of *bannum*, exemptions from standing edicts granted by the king that evolved into the *fueros*, or special privileges. *Fueros* were an important component of frontier life during the early centuries of the *Reconquista* as these exceptions incentivized settlement of frontier areas.¹⁰⁰ Over time, the *fueros* evolved into a blend of town charters and municipal law codes, a combination that is the foundation of the Spanish law that eventually came to the American Southwest at the end of the sixteenth century.¹⁰¹ Water laws had their origin in overarching principles of equity, but were promulgated by the king and over time became much more specific. For example, in the *Forum Conche de Cuenca*, dated ca. 1177-1214, irrigators who did not return water to the canal or river could be fined ten *aurei* and anyone who deprived another person of water would have to pay two *aurei*. Anyone diverting water had to allow it to reach adjacent properties and ensure it returned to a stream.¹⁰²

This combination of generality and specificity, and the idea that the king was the grantor of rights, is even more apparent in the water laws in the *Siete Partidas*. In Part III, Title XXVIII, which deals with property rights, Law III states that “the air, the rain-water, and the sea and its shores” are commonly owned and Law VI continues “rivers, harbors, and public highways” are as well, specifying that the banks of rivers are “the property of those whose lands include them...nevertheless, every man has a right to use them.” Law VIII states no “structure whatever can be erected by any man, in a river where men travel with their vessels...by means of which its

¹⁰⁰ The *Reconquista*, or reconquest of Spain, refers to the period between the Moorish invasion of Spain in 711 and the fall of Granada in 1492.

¹⁰¹ James F. Powers, trans., *The Code of Cuenca: Municipal Law on the Twelfth-Century Castilian Frontier* (Philadelphia: University of Pennsylvania Press, 2000), 1. See also Heath Dillard, *Daughters of the Reconquest: Women in Castilian Town Society, 1100-1300* (Cambridge: Cambridge University Press, 1984).

¹⁰² Powers, *Ibid.*, 19, 50-51.

common use may be interfered with.” Recognizing that disputes over property arising from flooding and meanders occurred frequently, Law XXVI decrees that alluvial deposits washed away to another person’s property can not be claimed by the owner damaged by the flood, and that if trees washed away take root elsewhere the new owner may keep them but should compensate the original owner. Law XXVII deals with the equitable division of islands that may arise in a river, detailing how the newly formed land should be measured and divided by people on both sides of the river, while Law XXVIII covers the exception that if a river causes a person’s entire property to become an island it is not to be divided. Laws IV and V illustrate the Roman principle of “servitude” and ancient, or prior, rights to water. Law IV specifies that when a canal must pass through one person’s property the owner is responsible for its upkeep so as not to deprive others of water, echoing the edict in the *Codex Theodosianus* mandating the same responsibility for those who had aqueducts passing through their land. Law V states that if a man has obtained irrigation rights to spring water and said spring is on the property of someone else, the owner of the spring can not grant additional irrigation rights to a third party without the permission of the second party, unless “the water is so abundant it will be sufficient for the land of both of them.” Liability is also covered. In Part III Title XXXII, Law XIII decrees that man-made structures which lead to water damage, prevent access to water, or reduce irrigation do accrue liability, while Law XIV absolves persons upstream or on higher ground from damages below them caused by natural disasters. The rights to groundwater do not follow the same principles as for surface water. Part III, Title XXXII, Law XIX states an owner may take unlimited water from springs and drill wells, even if doing so causes injury to other parties, unless taking the groundwater serves no purpose or is a purposeful attempt to harm others.¹⁰³ All

¹⁰³ Samuel Parsons Scott, trans., and Robert I. Burns, S.J., ed., *Las Siete Partidas, Volume Three, Medieval Law: Lawyers and Their Work* (Philadelphia: University of Pennsylvania Press, 2001), 820-822, 827, 828, 856, 871-872,

of these legal principles would affect the later development of water law in Mexico and those parts of the U.S. that formerly belonged to Spain and Mexico.

When Don Juan de Oñate delivered *La Toma*, the formal declaration of possession to the native peoples he encountered near San Elizario on April 30, 1598, he not only claimed what would later become New Mexico and the westernmost tip of Texas for King Phillip II of Spain, he imposed centuries of European water law upon those areas with the proviso that Indian water customs would continue as well. After the Spanish arrived in the Americas they quickly realized they needed to design law codes to deal with the native peoples. The *Leyes de Burgos* (Laws of Burgos), issued in 1512, encouraged the good treatment of Indians and instructed the Spaniards to settle them in new towns, allowing them to keep any customs that did not contradict Christian tenets. The latter rule was repeated in 1542 in the *Leyes Nuevas* (New Laws).¹⁰⁴ In 1680, the *Recopilación de Leyes los Reynos de las Indias* (Collection of Laws of the Kingdoms of the Indies) reiterated the rule concerning retention of Indian practices and this edict extended to irrigation customs because they were similar to Spanish practices.

“The Laws of the Indies provide that all waters in the Indies shall be common to all inhabitants (lib.iv, tit. xvii, ley 5); that the viceroys shall inform themselves concerning irrigable lands and cause them to be sown in wheat and not grazed by cattle (lib. Iv, tit. Xii, ley 13); that the distribution of lands and waters to settlers shall be made on the advice of the village councils (lib. iv, tit. xii, ley 5); that the Indian rules governing water distribution shall be maintained among Spaniards to whom the lands have been assigned, each to be given the water in turn (lib. iv, tit. xvii, ley 11); distinguish between irrigable and non-irrigable lands in the laws on colonization (lib. iv, tit. vii, ley 14); and direct the viceroys and the courts to make provisions regarding the waters and other public things in order best to promote the public welfare (lib. iv, tit. xvii, ley 9).”¹⁰⁵

873. The Edict in the *Theodosian Code* concerning maintenance of aqueducts is 15.2.1.

¹⁰⁴ Woodrow Borah, *Justice by Insurance: The General Indian Court of Colonial Mexico and the Legal Aides of the Half-Real* (Berkeley: University of California Press, 1983), 20-21, 34.

¹⁰⁵ From the *Recopilación de Leyes los Reynos de las Indias*, as found in Hutchins, 265.

The Plan de Pitic, the founding charter for Hermosillo, Sonoro, in 1786, provided officials with specific instructions on water rights adjudication and mandated that these provisions should be applied to all of the provinces.¹⁰⁶

After the Conquest land grants in the Americas originated with the Spanish sovereign, as did rights to water if the land was adjacent to a river or stream. As the laws above indicate, Indian lands were steadily granted to Spaniards resulting in native peoples losing access to water. An unencumbered grant of, or clear title to, land is still the prevailing legal principal in Texas affecting rights to surface water, and is also the standard in Mexico and New Mexico today.¹⁰⁷ Irrigators are only allowed to open headgates to divert water on certain days and only for an allotted time. In the Colonial (1598-1821) and Mexican (1821-1848)¹⁰⁸ periods all users were to participate equally in the upkeep of canals, diversion ditches, and dams, to be mindful of users downstream and, generally, prior users had first rights during times of drought or low flow.¹⁰⁹ However, prior use was not the absolute determinant of water rights. As Michael C. Meyer has pointed out, this aspect of Spanish law is often misunderstood. As he notes, the first principle was clear title or grant. Prior use ranked next, but that right could be determined by length of time. For example, a newer right to appropriation could prevail if that party recognized the right of the first user. This argument did not always work, but sometimes did. The next criteria was need, the recognition that water proportionality had to be based on the rights of landowners to

¹⁰⁶ Meyer, *El agua en el Suroeste hispánico*, 120.

¹⁰⁷ Charles R. Porter Jr., *Spanish Water, Anglo Water: Early Development in San Antonio* (College Station, TX.: Texas A&M University Press, 2009), 60, 55; n. 20 : “The ruling in the Valmont Plantations case in 1962 finally settled the nature of riparian rights in Texas as relating to use of irrigation water – Spanish and Republic of Mexico law, confirmed by Texas since 1840, required a specific grant to use water from streams for irrigation, hence the law of Texas must be the same,” 148. For a more complete discussion see Joseph W. McKnight, “The Spanish Watercourses of Texas,” in *Essays in Legal History in Honor of Felix Frankfurter* (New York: Bobbs-Merrill, 1966) and *Spanish Elements in Modern Texas Law* (booklet, Dallas, n.p. 1979). However, when the Anglo period began in 1848 English common law came into conflict with Spanish law regarding water rights, which will be discussed in the next chapter.

¹⁰⁸ For Texas 1821-1836.

¹⁰⁹ Porter, 61.

support themselves and their families. Injury to another party was considered next, then the idea of the least injury to another party. Finally, *acequia* officials examined the intent of the party's request for more access to water or their purpose for actually diverting water from a prior user.¹¹⁰

The first documented irrigation system established by Europeans in the El Paso/Juárez region began in 1659. A Franciscan missionary, Fray García de San Francisco de Zúñiga, transferred from his post at Senecú in New Mexico and went south to El Paso del Norte to convert the Sumas and Mansos living there. He founded the Mission Nuestra Señora de Guadalupe on the right bank of the river in what is now Ciudad Juárez.¹¹¹ As in other missions, Fray García's mandate was not only to save souls, but also to instruct the native peoples in Spanish culture, including agricultural practices to make the mission self-sustaining. Fray García and his neophytes dug a canal from the Rio Grande to provide water for a farm near the mission.¹¹² When the Pueblo Revolt began in 1680 in New Mexico, Governor Antonio de Otermín, the Spanish settlers, their Indian slaves, and inhabitants of four Piro pueblos seeking safety fled south to El Paso del Norte, a total of 1,946 refugees.¹¹³ Although scholars have argued that many different factors were instrumental in causing the revolt, the Spanish settlers in northern New Mexico noted a severe drought in 1641 and poor harvests and a prolonged drought in the 1660s, which led to serious famines in the 1670s. These droughts must have been fairly widespread as they triggered intense raiding by the Athapascan (Apache) peoples as they too were starving and began attacking the pueblos for their stored foodstuffs.¹¹⁴ Although the study by Henri D. Grissino-Mayer, et. al., noted above shows that the 1660s in the El Paso area in

¹¹⁰ Meyer, *El agua en el Suroeste hispánico*, 157-171.

¹¹¹ Right or left bank is determined by facing downstream.

¹¹² Charles Wilson Hackett, ed., *Historical Documents Relating to New Mexico, Nueva Vizcaya, and Approaches Thereto, to 1773* (Washington, D.C.: The Carnegie Institution of Washington, 1923), Vol. 3, 213.

¹¹³ Timmons, *El Paso*, 18.

¹¹⁴ Van Hastings Garner, "Did Pueblos Revolt to Save Their Lives?" in *What Caused the Pueblo Revolt of 1680?*, ed. David J. Weber (Boston: Bedford/St. Martin's, 1999), 66-69.

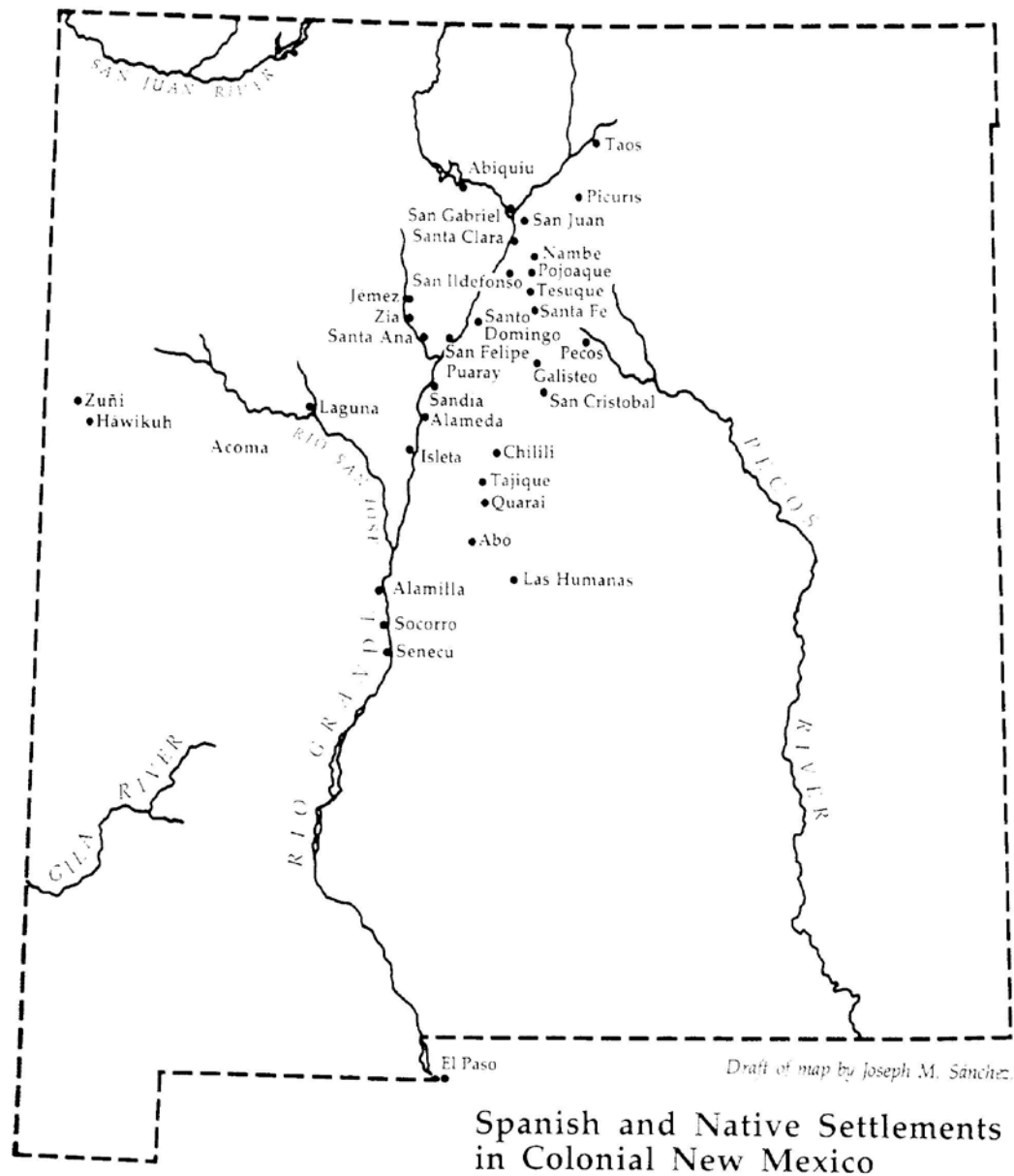
general had above average rainfall, drought in northern New Mexico would have affected the river flow in the El Paso/Juárez valley and Spanish reports do note drought for El Paso del Norte in specific years after 1680.¹¹⁵ It is unclear how many, if any, Spaniards settled near the Mission Nuestra Señora de Guadalupe prior to 1680, but by 1682 El Paso del Norte had become the base for operations to reclaim New Mexico with five settlements on the south bank of the river: El Paso Del Norte, San Lorenzo, Senecú, Socorro, and Isleta.¹¹⁶ Otermín settled the refugees and local Indians in the missions as follows:

Two leagues below that of Nuestra Señora de Guadalupe del Paso, with Piro and Tompiro Indians, the pueblo of Senecú; one and a half leagues to the east from this, the pueblo of Corpus Christi de la Isleta with Tigua Indians; twelve leagues from El Paso or seven and a half from Isleta, along the same Rio del Norte, he founded the third pueblo under the advocacy of Nuestra Señora de Socorro with Piro, Thano, and Jemez Indians.¹¹⁷

¹¹⁵ Between 1521-1821 Spanish observers recorded eighty-eight droughts in what is now the American Southwest, some lasting for only a few months and others for years, Meyer, op.cit., 60, referring to Enrique Florescano, "Una historia olvidada: La sequía in México," *Nexos* 32 (Aug. 1980): 9-18.

¹¹⁶ Anne E. Hughes in *The Beginnings of Spanish Settlement in the El Paso District* (reprint, University of California Press, 1914) 311, Charles W. Hackett, op. cit., 251, and Hubert H. Bancroft in *History of the North Mexican States and Texas, 1531-1800* Vol. I (San Francisco: A.L. Bancroft and Company, Publishers, 1884) 364-365, all discuss the presence of a Captain Andres Garcia, his family, and "certain others" that settled at El Paso del Norte ca. 1662, as cited in White, 8-10. However, White argues that the presence of this unknown number of Spaniards does not prove 1662 was the beginning of organized European-style agriculture outside the mission in El Paso del Norte. Felix D. Almaraz, Jr., "Franciscan Missions Along New Mexico's Rio Grande Corridor in the Seventeenth and Eighteenth Centuries," in *Memorias del Coloquio Internacional El Camino Real de Tierra Adentro*, eds. José de la Cruz Pacheco and Joseph P. Sánchez (México, D.F.: Instituto Nacional de Antropología Historia, 2000), 120-121.

¹¹⁷ Carlos E. Casteneda, *Our Catholic Heritage in Texas, 1731-1761, Vol. III* (Austin: Von Boeckmann-Jones Company, 1936), 263-264, as found in White, op. cit., 14. A league is approximately 3 miles or 5.556 kilometers.



Map found in Joseph P. Sánchez, *The Rio Abajo Frontier, 1540-1692: A History of Early Colonial New Mexico* (Albuquerque, New Mexico: The Albuquerque Museum, 1987), 3.



Map found in Henry Putney Beers, *Spanish Records of the American Southwest* (Tucson, Arizona: University of Arizona Press, 1979), 94.

In 1683, the new governor, Don Domingo Jironza Petrés de Cruzate, attempted to persuade the residents at San Lorenzo to move closer to the Guadalupe mission and to entice them he offered to widen the canal there built by Fray García and his converts in 1659. Although the San Lorenzens declined, this episode illustrates the importance of irrigation to the Spanish. A drought lasting for two years in 1684 and 1685 almost wiped out the struggling settlements. The drought and an uprising of the local Manso Indians drove the Spanish settlers to demand either relief or removal, and the Junta General decided to provide money to aid them. Governor Don Diego de Vargas conducted a census in December 1692 and January 1693, which prompted him to describe the settlers' poverty, noting they lacked "the bare necessities of life."¹¹⁸

By 1720, economic conditions had markedly improved. According to Rick Hendricks, this was due to El Paso Del Norte's strategic location along the Camino Real and the volume of agricultural products and livestock the area was able to export both south to Chihuahua and north to Santa Fe. Viticulture was the primary form of agriculture and the leading exports were wine, *aguardiente* (brandy), vinegar, and raisins. Grape vines thrive in temperate climates in either maritime regions that are next to a large body of water or river that limits wide ranges in temperature, or continental regions that are dry and sunny. In temperate continental regions, such as El Paso Del Norte, grape vines can tolerate a day-to-night temperature variation of 34° F/19° C, require approximately 12 hours of sunshine, and a top humidity level of 56%. In a continental setting the wide day-to-night temperature variation means that cooler nights slow the development of the fruit and that, plus a longer growing season, results in grapes with more flavor. Grapes do require water, but because the vines are highly susceptible to rot, low rainfall and soils that drain well are required. Clay soils remain cool and retain water, and brown, silty clays, as discussed above, are widespread in the Rio Grande floodplain, with gravelly, loose soils

¹¹⁸ White, 15-17.

that drain well on top. Additionally, successful viticulture requires soils with low fertility because in rich soils the vines produce more leaves and less fruit, and the grapes are of low quality.¹¹⁹ After viticulture, maize exports were a close second with wheat coming in third. Ranchers raised cattle, sheep, and horses for sale. There was also a small export business in cotton and wool.¹²⁰ People cultivated vegetables and fruits, such as peaches, pears, figs, apples, quinces, and apricots, as well but these were not important export commodities.¹²¹ In his *Geographical Description of New Mexico* published in 1782, Fray Augustín de Morfi reported:

“Of these only El Paso del Rio del Norte remains [of the eleven settlements that grew up after the Pueblo Revolt in 1680]...Some families of Spaniards have been added to them and because of the facility of irrigation, the village pushed down to the river so that today the place occupies two leagues of maize, beans and vegetables, especially grapes, which the owners pick and, having made wine, sell profitably in Chiguagua [sic, meaning Chihuahua] and Sonora.”¹²²

Viticulture dominated agricultural activity throughout the entire eighteenth century as Juan de Pagazaurtundúa, member of the Spanish Royal Corps of Engineers, noted in 1797 “there are

¹¹⁹ Susan Keevil, et.al., *Wines of the World* (New York: DK Publishing, 2004), 22-25.

¹²⁰ Rick Hendricks, “The Camino Real at The Pass: Economy and Political Structure of The Paso del Norte Area in the Eighteenth Century”, in *Memorias del Coloquio Internacional El Camino Real de Tierra Adentro*, eds. José de la Cruz Pacheco and Joseph P. Sánchez (México, D.F.: Instituto Nacional de Antropología Historia, 2000), 125-127. Hendricks examined an inventory of wine stock dated April 18, 1755 and found that about 125 acres were dedicated to viticulture, 127, n. 2. According to W.H. Timmons, “a list of the total number of barrels of wine and *aguardiente* (brandy) shipped to Chihuahua in the period from 1788 to 1796 ran to some twenty-two pages of manuscript,” *El Paso*, 27.

¹²¹ Nancy Lee Hammons, *A History of El Paso County, to 1900*, Master of Arts Thesis, The College of Mines and Metallurgy, El Paso, 1942 (The University of Texas at El Paso: Texas Western Press, 1983), 14.

¹²² Fray Juan Augustín de Morfi, “Geographical Description of New Mexico,” Mexico *Tratados Varios*. Add. Mss. 17,563, British Museum, in Alfred Barnaby Thomas, ed. and trans., *Forgotten Frontiers: A Study of the Spanish Indian Policy of Don Juan Bautista de Anza Governor of New Mexico, 1777-1787* (Norman: University of Oklahoma Press, 1932), 109. Morfi lists the following settlements appearing after 1680 in addition to Nuestra Señora de Guadalupe: La Socorro of Piro Indians; San Francisco of Zumas Indians; Sacramento of the Teguas; San Antonio Zenecú, Piro and Tompiros Indians; Santa Gertrudis of Sumas Indians; Soledad, Xanos Indians; San Lorenzo Real, Spanish; San Pedro Alcantara, Spanish; San José, Spanish; El Pueblo Viejo de la Ysleta, Spanish; Santa María Magdalena, Yumas. In 1707, Santa María Magdalena, Yumas; later Santa María de las Caldas, unnamed Indians, later dispersed. At the time of his visit, Morfi described El Paso del Rio del Norte as the only one remaining from the original eleven settlements, but it is not clear if he meant that name to also include the settlements of San Lorenzo Real, Senecú, Ysleta (Isleta Corpus Christi), Socorro, and Tiburcios (San Elizario after 1789).

some shortages of fruit, but despite this, in El Paso del Norte, in Nueva Vizcaya, wine and *aguardiente* are made, and they provide one of the principal branches of commerce there.”¹²³

During the eighteenth century multiple observers noted the steady increase in irrigation in the valley as settlers continued to build *acequias*, dams, and headgates. As per Spanish custom and law, local residents were responsible for repairing the irrigation structures that served their properties. The canals, or ditches, were generally four feet deep and five feet wide and each settlement had its own diversion dam to feed the canals. Building and maintenance of the irrigation systems were extremely labor-intensive enterprises and required a great deal of community cooperation. Irrigators used wooden spades to dig the canals and removed the dirt “on rawhides drawn by a yoke of oxen or suspended by poles carried by two men.” The fall of the water could only be estimated and builders had to release water frequently into the canal to test the grade. Canals were rarely straight because the builders went around impediments rather than removing them. Ditches that stemmed from the main canals did not always have diversion dams, which were often simple temporary mounds of brush and earth employed only when the river was low. Larger diversion dams had rocks in addition to the earth and brush, but had to be rebuilt after every flood as did the wingdams that diverted water into canals. Headgates were made of wood and also needed frequent replacing.¹²⁴ Every spring before the anticipated rise of the river the canals would have to be scraped and cleared of debris or brush. Around the mid-eighteenth century the settlers in the El Paso/Juárez valley built the *Acequia Madre* that

¹²³ Janet R. Fireman, “Description of the Interior Provinces of New Spain [Letter to His Excellency, Mr. Luis Huet, from Juan de Pagazaurtundú, 1797],” in *The Spanish Royal Corps of Engineers in the Western Borderlands: Instrument of Bourbon Reform, 1764-1815* (Glendale, California: The Arthur H. Clark Company, 1977). Appendix H, 228. The Bourbon Reforms created the Spanish Royal Corps of Engineers, military officers in a special unit responsible for strengthening frontier defenses. As part of their mission, they drew maps, described the terrain, and reported on economic conditions.

¹²⁴ Hutchins, 274-275.

connected all of the settlements in the valley to a diversion dam located north of El Paso del Norte.¹²⁵

In 1760, the Bishop of Durango, Pedro Tamarón y Romeral, visited El Paso del Norte and commented on a large irrigation ditch “which took about half of the river’s water,” referring to the *Acequia Madre*.¹²⁶ He also noted the annual flooding problem that destroyed the diversion dam at the head of the *acequia*. According to W.H. Timmons, Spanish officials had been pressing for a more substantial dam since the 1750s due to the danger flooding presented to the missions and surrounding communities.¹²⁷ Governor Tomás Vélez Capuchín agreed to levy a special tax on all of the Spaniards and Indians of four *reales* per every hundred grape vines under cultivation to fund the project, but they resisted payment and by 1764 there was still no substantial dam.¹²⁸ Governor Capuchín then ordered that a large ditch lined with branches be built to channel floodwaters into the fields and protect the settlements. He also repeated his order that a better dam be built; by 1766, according to a map drawn by José de Urrutia, such a dam was in place. His map also indicates that the Spanish had access to the *Acequia Madre* and the Indians now had a second branch, the *Acequia de los Indios*, fed by two floodgates in the *Acequia Madre*.¹²⁹ Also in 1766, a new settlement, Los Tiburcios, located seven leagues downstream from El Paso del Norte appears in an engineering report.¹³⁰ Clearly this settlement predates 1765, as a census report for 1765 includes Hacienda de Tiburcios and indicates that the six settlements along the river had a population of 4,750 that included citizens, soldiers,

¹²⁵ Timmons, *El Paso*, op. cit., 26.

¹²⁶ White, 18.

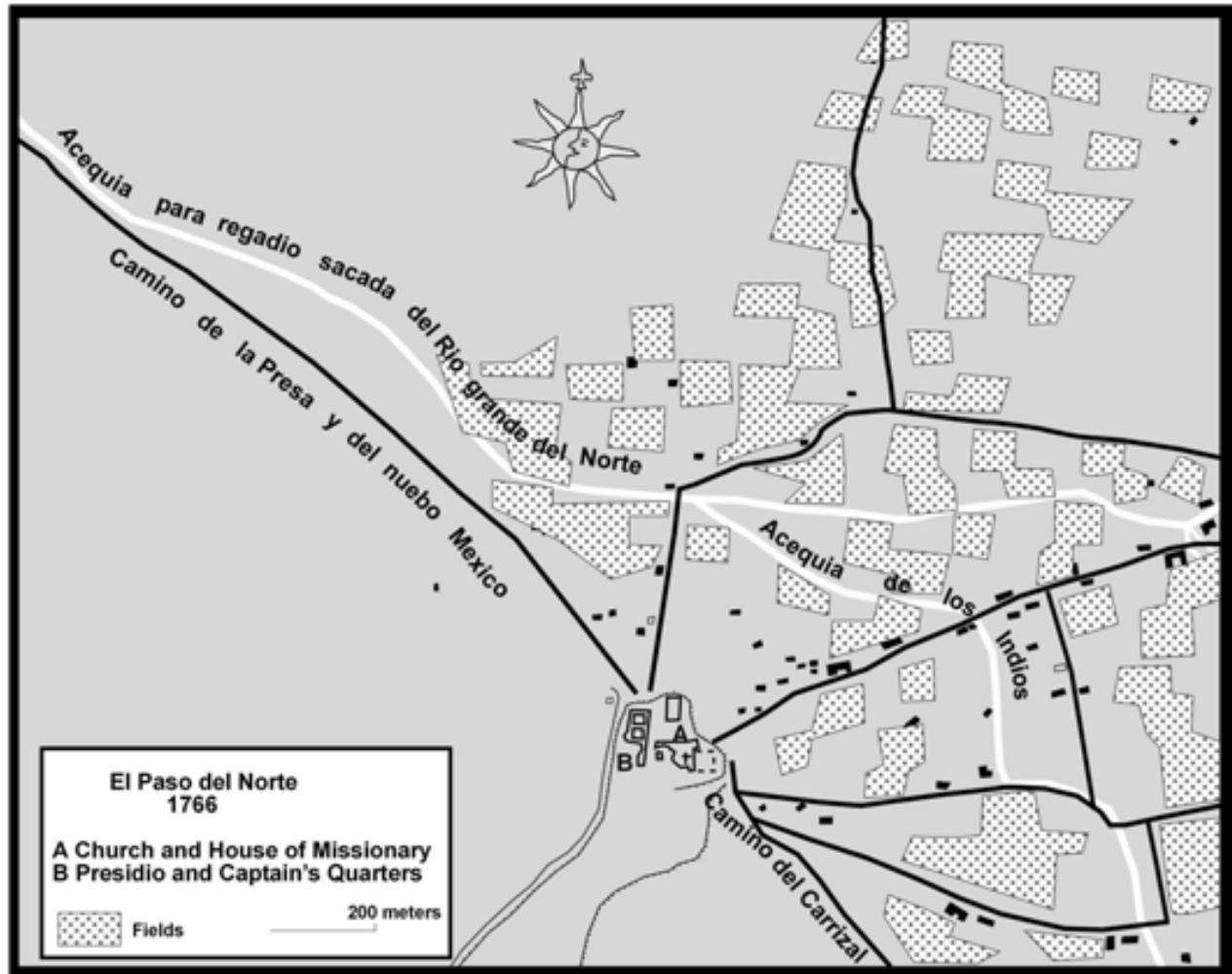
¹²⁷ The Rio Grande flooded in 1740 and destroyed the Ysleta Mission, which was rebuilt by 1744 on higher ground.

¹²⁸ Meyer, *El agua en el Suroeste hispánico*, 71.

¹²⁹ Timmons, *El Paso*, 39-42.

¹³⁰ White, 21. According to local historian Leon Metz, La Hacienda de los Tiburcios was founded between 1730 and 1750 and later became San Elizario. Leon C. Metz, *El Paso Chronicles: A Record of Historical Events in El Paso, Texas* (El Paso, Texas: Mangan Books, 1993).

genízaros, and Indians.¹³¹ Unfortunately, a smallpox epidemic broke out in 1773 resulting in the extinction of the Manso Indians.



Joseph de Urrutia Map, 1766, as found in “El Camino Real de Tierra Adentro: Through the Pass of the North,” Part II, By George D. Torok, *Password* 51, No. 1, Spring 2005.

¹³¹ Timmons, *El Paso*, 43. *Genízaros* are usually the Hispanicized children of Indian captives who were servants in Spanish households, but occasionally were sold as slaves. See Brooks, James F. *Captives and Cousins: Slavery, Kinship and Community in the Southwest Borderlands*. Chapel Hill: University of North Carolina Press, 2002. This work uses the political economy of captivity (slavery) to examine exchange systems in the southwest Borderlands from 1540 to 1900. Although the author focuses primarily on New Mexico, he shows how networks reaching south into northern Mexico, north to Montana, west to California, and as far as eastern Texas comprised an exchange system wherein both native peoples and Euro-Americans used captives as objects of assimilation or exploitation, thereby creating both hierarchies of power and opportunities for cultural blending.

Colonial Spanish society was extremely class conscious and operated under a social structure based on racial constructs called *calidad*.¹³² However, this structure was far more flexible and permeable in frontier areas, as many scholars have shown.¹³³ Water was such an important resource that its equitable distribution and the upkeep of irrigation systems were monitored by the *alcalde de aguas*, a government post. Michael C. Meyer, Charles R. Cutter, and Daniel Tyler have pointed out magistrates on the frontier tended to seek compromise and ignore class when settling disputes, especially in regards to water.¹³⁴ All three authors also point out that most disputes over land usually occurred due to arguments over access to water. In the Spanish racial hierarchy, persons who claimed European ancestry were at the top of the social order. This view influenced the racial perceptions Anglo settlers had of Mexicans when they arrived later in what became the American Southwest. When Anglos and Mexicans began to compete for water, the newcomers eventually adopted the idea that Mexicans were mixed race people and, therefore, lower class. This perception meant that ignoring class, as the Spanish *alcaldes* had attempted when apportioning water, no longer happened. As will be discussed in later chapters, racial prejudice precluded fair and equitable sharing of the waters of the Rio Grande.

¹³² The people at the top of the social ladder were the *Peninsulares/Cariblanco*s or people with “white faces” from the Iberian peninsula; next were the *Criollos*, people born in New Spain with at least one parent from Spain and therefore considered to be white; next were the *Indios* who were racially pure, but without honor. Below these three ranked the *Castas*, or mixed race people. The *Castas* were also ranked. At the top were the *Mestizos*, people with Indian and European ancestry; then the *Mullattos*, of African and European ancestry; then the *Zambos*, people with Indian and African ancestry, and finally the *Pardos*, a mix of Indian, African, and European ancestry. At the bottom of the social ladder were the African slaves and free blacks, although free blacks could achieve enough wealth and status to be considered at the same level as *Castas*.

¹³³ See, among others, Susan M. Deeds, *Defiance and Deference in Mexico's Colonial North: Indians Under Spanish Rule in Nueva Vizcaya* (Austin: University of Texas Press, 2003); Cheryl English Martin, *Governance and Society in Colonial Mexico: Chihuahua in the Eighteenth Century* (Stanford: Stanford University Press, 1996); Ross Frank, *From Settler to Citizen: New Mexican Economic Development and the Creation of Vecino Society, 1750-1820* (Berkeley: University of California Press, 2000).

¹³⁴ In works cited above.

In 1789, soldiers from Jiménez, Chihuahua, moved to the Valle de San Elzeario [sic] on the Rio Grande, and then relocated to Tiburcios in 1789 and began work on a presidio. By 1792, the presidio and surrounding community became known as San Elizario.¹³⁵ By 1799, the communities along the right bank of the Rio Grande had continued to flourish, with a total population of 4,943 Spaniards and 637 Indians.¹³⁶ Wine continued to be the principal export, traveling the Camino Real all the way to Mexico City and from there to Spain. In the nineteenth century visitors to the area continued to remark on the importance of irrigation for agriculture in the El Paso del Norte area. And, in the early nineteenth century, these visitors were increasingly Anglo Americans. In 1807, Zebulon M. Pike, captured by the Spanish while exploring the Arkansas River, arrived in the valley and spent some time in San Elizario. He observed the importance of El Paso to shipping along the Camino Real. Pike also noted a large canal five miles above El Paso Del Norte protected by walls on both sides, which allowed for “as finely cultivated fields of wheat and other small grain as I ever saw, and also numerous vineyards from which were produced the finest wine ever drank [sic] in the country, which was celebrated throughout all the province and was the only wine used on the table of the Commandant General.”¹³⁷ James O. Pattie also wrote about the abundance of grapes, wheat, and the superior wines of El Paso Del Norte in 1826, a place he described as “a kind of continuous village, extending eight miles on the river....The land is exceedingly rich and its fertility increased by irrigation.”¹³⁸

¹³⁵ Timmons, *El Paso*, 56.

¹³⁶ Hammons, 14.

¹³⁷ Zebulon M. Pike, *Exploratory Travels Through the Western Territories of North America* (London: Longman, Hurst, Res, Orne, and Brown, 1811), 334-336.

¹³⁸ James O. Pattie, *The Personal Narrative of James O. Pattie*, in *Early Western Travels, 1748-1846*, ed. R. G. Thwaite (Cleveland, Ohio: Arthur H. Clark Co., 1905), 156.

Yet the impermanence of the water supply was still a reality, even if not always apparent to visitors. Baron Heinrich von Humboldt, who published his travelogue in 1811, mentioned an incident that occurred in 1752 about which El Paso del Norte locals still spoke during his visit:

The whole bed of the river...became dry all of a sudden, for more than thirty leagues above and twenty leagues below the Paso: and the water of the river precipitated itself into a newly formed chasm, and only made its reappearance near the *Presidio* of San Eleazeario [sic]....At length, after the lapse of several weeks, the water resumed its course, no doubt because the chasm and the subterraneous conductors had filled up.¹³⁹

Josiah Gregg included Humboldt's story in his own account of his travels across the plains to New Mexico and on the Santa Fe Trail between 1831 and 1840. Gregg noted "during very great droughts this river [the Rio Grande] is said to have entirely disappeared into the sand between San *Elceario* [sic] and the Presidio del Norte."¹⁴⁰ But he also commented on the difficulty his party encountered trying to cross the river in their wagons in September of 1837 due to the lack of ferries because, as he pragmatically related, "Why, during three-fourths of the year it is everywhere fordable, and when the freshet season comes on, each has to remain on his own side or swim, for canoes even are very rare." Gregg also recorded that when he was traveling through El Paso del Norte the population had increased to about 4,000 inhabitants, now settled along the river for a distance of between 10 and 12 miles. Other than the growth in the population, very little had changed in the areas of agricultural practices and irrigation engineering since the mid-1700s. According to Gregg,

"These settlements are so thickly interspersed with vineyards, orchards, and cornfields, as to present more the appearance of a series of plantations than a town; in fact, only a small portion at the head of the valley, where the *plaza*

¹³⁹ Friedrich Heinrich Alexander von Humboldt, (*Essai politique sur le royaume de la Nouvelle-Espagne* 5 vols. (Paris: F. Schoelle, 1811) as found in Josiah Gregg, *Commerce of the Prairies*, ed. Max L. Moorehead (Norman: University of Oklahoma Press, 1954), 99-100. There are numerous spellings of San Elizario and the one Humboldt chose is not unusual.

¹⁴⁰ Gregg, *Ibid.*, 100. Here is yet another spelling of San Elizario; the Presidio del Norte was at present-day Ojinaga, opposite present-day Presidio, Texas, at the confluence of the Conchos and Rio Grande Rivers.

publicá and parochial church are located, would seem to merit this title. Two or three miles above the *plaza* there is a dam of stone and brush across the river, the purpose of which is to turn the current into a dike or canal, which conveys nearly half the water of the stream, during a low stage, through this well cultivated valley, for the irrigation of the soil. Here we are regaled with the finest fruits of the season: the grapes especially were of the most exquisite flavor. From these the inhabitants manufacture a very pleasant wine, somewhat resembling Malaga. A species of *aguardiente* (brandy) is also distilled from the same fruit, which, although weak, is of a very agreeable flavor. These liquors are known among Americans as 'Pass wine' and 'Pass whiskey,' and constitute a profitable article of trade, supplying the markets of Chihuahua and New Mexico."¹⁴¹

Gregg also described the plant life around El Paso del Norte, which consisted of cottonwoods, mesquite, *tornillo* (screw-wood), and *lechuguilla* (agave) whose "blades, which resemble those of the palmilla, being mashed, scraped and washed, afford very strong fibers like the common Manilla seagrass, and equally serviceable for the manufacture of ropes, and other purposes."¹⁴² George W. Kendall, historian of the Santa Fe Expedition, waxed even more eloquent about his visit in 1841 to the "beautiful and fertile valley" with its cool dry air, wide and airy thoroughfares that had "on either side...a cool rippling stream of transparent water brought from the Rio Grande by means of irrigation" to water the vineyards and fields that produced delicious wines and abundant grains. His idyllic description included the observation that "these delicious streams are shaded by rows of large and overarching trees planted with great regularity, while the plain but neat dwellings of the inhabitants are, many of them, built among clusters of apples and other fruit trees."¹⁴³

These temporary sojourners in the El Paso/Juárez Valley evidently missed, or were not told about, the frequent shifts in the river bed and the meanders that destroyed canals and

¹⁴¹ Gregg, *Ibid.*, 273. Gregg also mentions traveling from Chihuahua in 1839 and encountering a party of *Paseños* journeying from El Paso Del Norte to Chihuahua transporting apples, pears, grapes, wine, *aguardiente*, and raisins.

¹⁴² *Ibid.*, 274. Mesquite is *Prosopis pubescens*, *tornillo* is *Prosopis pubescens*, *lechuguilla* is *Agave lechuguilla*.

¹⁴³ George W. Kendall, *Narrative of an Expedition Across the Great Southwest Prairies From Texas to Santa Fe, II.* (London: David Bogue, 1845), 28-47.

relocated not only parcels of property, but also entire settlements. When the Spanish first began to develop the El Paso/Juárez Valley all of the settlements and farms were on the right bank of the river, in what is now Mexico. By the 1790s, the military commandant of El Paso, Don Francisco García had received a grant seven miles northwest of El Paso Del Norte, called Santa Teresa. This ranch, on the right bank because the river flows due south at that point, eventually failed due to repeated Apache raiding. By 1816, Juan Antonio García de Noriega obtained a grant located thirty-three miles north of El Paso Del Norte in a horseshoe bend of the Rio Grande. Apache raids also drove him back south. A later attempt to move northward occurred with the Canutillo grant when settlers moved to land located sixteen miles northwest of El Paso Del Norte on the left bank of the river between 1824 and 1833, but once again Apache attacks drove the residents off the land. Permanent settlement on the left bank did not occur until 1827, when Juan María Ponce de Leon received a land grant; however a flood destroyed his house in 1830 and he then rebuilt on higher ground.¹⁴⁴ Between 1829 and 1831, recurrent flooding in the valley destroyed the Ysleta and Socorro missions while the river cut a new channel that placed the settlements of Ysleta, Socorro, and San Elizario on an island 20 miles long and two to four miles wide in the middle of the river.¹⁴⁵

Climate and geology determined the morphology of the Rio Grande in the El Paso/Juárez Valley. The indigenous settlers adapted to the fact that at times the river provided water and at other times did not. The Spanish, and later the Mexicans and Anglos, attempted to use the river as a permanent source of water, even though the river's water supply was never reliable. Engineering techniques, social practices, and legal notions about water shaped settlement because people thought they could equitably share and use the water supply. As a result, the El

¹⁴⁴ U.S. Department of State. *Proceedings of the International Boundary Commission, United States and Mexico, I*, 62-64.

¹⁴⁵ Timmons, *El Paso*, 74.

Paso/Juárez Valley began to develop as a population center based on agricultural productivity. However, periodic droughts and the dual problems of meandering and flooding were always a problem settlers faced. When the Rio Grande became the international boundary line in 1848 the erratic behavior of the river would exacerbate tensions between the two nations as people on both sides of the river competed for access to water. Due to the fact that prior to the Rectification Project of the 1930s the Rio Grande in the El Paso/Juárez Valley had no permanent location, competing claims for water would complicate legal understandings of how a natural formation and precious resource could be shared between two nations while at the same time representing the political division between them.

Chapter 2: Rio Grande Flooding, Meandering, and an Uncertain International Boundary Line

In modern discourse, the terms “border” and “international boundary” reference a political dividing line between nation states, demarcating the limits of their territorial and jurisdictional sovereignty. In the pre-modern world, walls and artificial barriers often served as both a method of marking a limit of controlled territory as well as a means of defense, such as the Amorite Wall of ca. 2034 B.C. in the Sumerian Empire, the Athenian Long Walls built ca. 461 B.C., Hadrian’s Wall erected ca. 122 A.D., and the Great Wall of China begun ca. 3rd century B.C. and enlarged in the 14-17th centuries A.D. Border walls are not uncommon in the modern era, for example the Berlin Wall erected in 1961 and currently the fences along the U.S.-Mexico border. More commonly, so-called natural barriers such as mountain ranges and rivers have marked territorial limits. This was fairly common in Europe, and Europeans continued this practice in the Americas. An early example of the natural formation as border is the 843 A.D. Treaty of Verdun, which marked Charlemagne’s empire as limited by the rivers Rhône, Saône, Meuse, and Scheldt. Lucien Febvre has pointed out that these sorts of natural boundaries were “easy to refer to and easy to show on maps,” as opposed to less precise and difficult to illustrate feudal authority over vassals and subjects.¹⁴⁶ Peter Sahlin has noted that political nationalism developed in the latter half of the nineteenth century based on a “national consciousness consolidated within the political framework of a centralized state” and that clearly defined borders were an important component of that nationalism as they “became political symbols over which nations went to war and for which citizens fought and died.”¹⁴⁷ This “national

¹⁴⁶ Lucien Febvre, “*Frontière: the word and the concept*,” in *A New Kind of History: From the Writings of Febvre*, ed. Peter Burke, 208-218 (New York: Harper & Row, 1973), 215-216.

¹⁴⁷ Peter Sahlin, *Boundaries: The Making of France and Spain in the Pyrenees* (Berkeley: University of California Press, 1989), 3, 5, 7.

consciousness” or, as Benedict Anderson has argued, an “imagined community” of people with an allegiance to a shared identity, requires a clearly defined space marked by lines between “us” and “them” to define the limits of national power and control.¹⁴⁸

In the case of the U.S.-Mexico international boundary, the border now runs through an area colonized by Spain that later became the sovereign nation of Mexico. Ironically, the U.S. had no legitimate claim to the Rio Grande as the border between the two nations. In the U.S. political nationalism, expansionism, the belief by many in the U.S. that Mexicans were racially inferior, and disagreements with Mexico over territorial limits led to war. The end result was the creation of the border between the two nations, a border that relied on a preference for natural barriers, in this case rivers. This would prove to be a poor resolution to determining territorial sovereignty in the El Paso/Juárez Valley because the Rio Grande was too shallow for most of the year to be a barrier of any sort and prior to rectification had no permanent location. Although Washington D.C. and Mexico City may have recognized the Rio Grande in the El Paso/Juárez Valley as a division between the two nations in 1848, the people living in the valley still shared the same ecosystem and continued to rely on the river for survival and development. However, the U.S. acquisition of the Southwest meant the Rio Grande upstream from the El Paso/Juárez Valley was entirely within the territorial U.S., and settlement and irrigation upstream in New Mexico and Colorado after 1848 reduced the amount of water reaching the valley, impacting residents on both sides of the border. During the latter half of the nineteenth century, local residents were more concerned over access to water than the exact location of the border, but determining legal rights to water were increasingly complicated by the fact that the portion of the Rio Grande that marked the border was governed by international law. The mobile nature of the

¹⁴⁸ Benedict Anderson, *Imagined Communities: Reflections on the Origins and Spread of Nationalism* (London: Verso Books, 1983), 15-16.

river, and therefore the border, made land titles unclear and exacerbated illegal activities. By the 1920s, El Pasoans were calling upon their federal government to establish a definitive and controlled border, and enforce their land and water rights. Juárez residents were also demanding their federal government support their claims to land and water. It became clear by 1930 that rectification to establish a permanent boundary was necessary. As a result, the Rio Grande Rectification Project of the 1930s, an example of engineering and federal intervention on the part of both the U.S. and Mexico, began the process of converting the natural river into the unnatural, constructed river running between fences, levees, and within the concrete canals that delineate the border today.

Establishing the Rio Grande as the border between the U.S. and Mexico began in 1846 when the U.S. and Mexico went to war against each other, due to a variety of circumstances. The relentless push westward in the U.S. based on the idea of Manifest Destiny had led to encroachment into Mexican territories for decades. Mexicans harbored deep resentment over losing Texas in 1836 and then having to watch the U.S. admit the republic as a state in 1845. Diplomatic relations became strained due, in part, to Mexico being forced to pay U.S. businesses for losses they incurred during the frequent uprisings and turmoil in Mexico during the nineteenth century plus damages accrued during the Texan Revolution in 1836. There was a widely held bias in the U.S. against Catholics and racist ideas that prevailed in the U.S. concerning Mexicans who were “tainted” with Indian blood.¹⁴⁹ But the flashpoint that started the war was a dispute over the location of the border between Texas and Mexico, a question that would not be settled in the El Paso/Juárez Valley until the twentieth century.

¹⁴⁹ Ernesto Chávez, *The U.S. War with Mexico* (Boston: Bedford St. Martins, 2008), 1-33.

The root of the arguments regarding the border location was the lack of clarity concerning the limits of the Louisiana Purchase. Hernando De Soto was the first European to pass through what is now Louisiana in 1541, but Spain did not colonize the area De Soto explored. Robert La Salle claimed the territory of Louisiana for France in 1682 and, reacting to information that he was exploring the area, Spain sent missionaries across the lower Rio Grande in 1690 to gain control of Texas and also established a fort at Pensacola, Florida. Realistically, France had a better claim to the area from 1699 to 1762 because they had more settlers, traders and forts in the area than the Spanish did, as well as possession of the city of New Orleans. Spain attempted to contain French expansion by continuing to build missions and forts in what are now east Texas and west Florida. French Louisiana grew very slowly, only reaching a population of 2,000 Europeans and 3,800 black slaves by 1731, and 4,000 Europeans and 5,000 black slaves by 1760.¹⁵⁰ At the conclusion of the Seven Years War, the 1763 Treaty of Paris divided Louisiana down the Mississippi River, giving the eastern territory to Britain and the western section plus the city of New Orleans to France. However, earlier in 1762 France had already ceded the entire Mississippi River basin to Spain in the secret Treaty of Fontainebleau, including in the cession all the land between the Appalachian and Rocky Mountains. Spain was not able to exert governmental control in Louisiana until 1769, and only then in the southern areas surrounding New Orleans and the settlements extending west to the Sabine River that now forms part of the border between the present-day U.S. states of Texas and Louisiana.

¹⁵⁰ David J. Weber, *The Spanish Frontier in North America* (New Haven: Yale University Press, 1992), 151-159, 184.



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<http://texasalmanac.com/topics/environment/rivers>

In 1799, Napoleon Bonaparte came to power in France and began pressing for the return of Louisiana and that Spain also turn over west Florida. By 1800, Louisiana had the highest population of any Spanish colony in what is now the U.S., reaching a total of 50,000 non-Indians, but that total included more French, Germans, British, and Americans than Spaniards.¹⁵¹ Spain would not give up any part of Florida, but in yet another secret treaty privately gave Louisiana back to France in 1800 while continuing to publicly govern the area. Napoleon Bonaparte gave up his dreams of an empire in the western hemisphere when France was unable to put down the Haitian Revolution, which began in 1791 and ultimately prevailed in 1804, and subsequently sold Louisiana to the U.S. in 1803 for 15 million dollars. The U.S. government claimed that the Louisiana Purchase included the entire western basin of the Mississippi River

¹⁵¹ Weber, *The Spanish Frontier in North America*, 274.

and what is now Texas and eastern New Mexico south and west to the Rio Grande.¹⁵² Spain asserted that Napoleon had no legal right to sell Louisiana to a third party, which made the land transfer invalid. Although the western boundary of Louisiana had never been clearly defined by either Spain or France, Manuel Godoy, chief advisor to King Carlos IV of Spain, insisted the western boundary was the settlement of Natchitoches on the Red River.¹⁵³ U.S. President Thomas Jefferson ignored Spain's protests and immediately after buying Louisiana sent Meriwether Lewis and William Clark to explore the area beginning in 1804.¹⁵⁴ Disputes over the boundary of Louisiana and possession of Florida continued between the two nations as Anglo-American settlement in both areas expanded. In 1819, the U.S. and Spain signed the Adams-Onís Treaty that gave the U.S. Florida and attempted to permanently establish the boundary of the Louisiana Purchase.

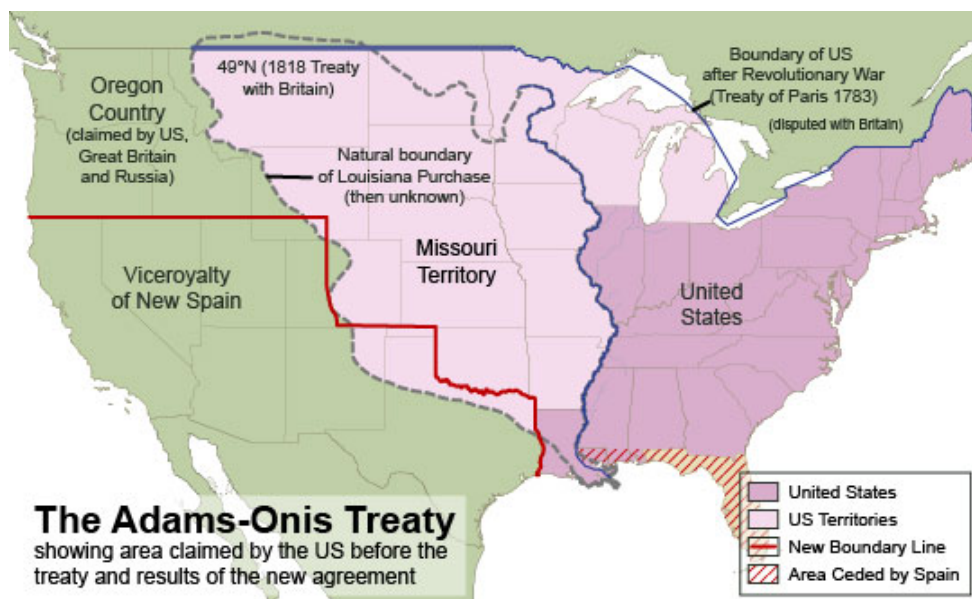
Negotiations over the Adams-Onís Treaty were neither brief nor uncomplicated. U.S. Presidents Thomas Jefferson, James Madison, and James Monroe all pursued expansionist agendas that included adding Florida and Texas to the U.S. A complete discussion of Jefferson's maneuverings to acquire the Louisiana Purchase and Madison's use of agents and filibusters to undermine Spanish authorities in Florida and Texas 1810-1813 are beyond the scope of this study, but although the term "Manifest Destiny" was not coined until 1845, the idea of westward expansion was deeply ingrained in U.S. thought and political policy well before the nineteenth century. Beginning in late 1808, an opportunity for the U.S. to acquire Spanish territory

¹⁵² This assertion stemmed from Robert La Salle's claim of everything north and east of the Río de las Palmas, the name given by the Spanish to the Rio Grande where it empties into the Gulf of Mexico, for the Crown of France in 1682. France represented this as the western boundary of Louisiana in 1802, as did U.S. presidents Jefferson in 1803 and Monroe in 1811. Horgan, 780-781.

¹⁵³ In 1716 Captain Domingo Ramón of Spain was steadily moving through east Texas and established four missions as part of Spain's campaign to hold the area. French Governor Antoine de la Mothe Cadillac ordered that a fort be built at Natchitoches to halt the Spanish advance, and Captain Ramón went no further east. Weber, *The Spanish Frontier in North America*, 162.

¹⁵⁴ Weber, *Ibid.*, 291-292.

presented itself. Napoleon invaded Spain, captured Seville, and drove the government out of Cádiz, disrupting commerce to and from the Spanish colonies. Fearing that Spain would fall and already holding grievances against Spain's grip on their internal and external trade, in 1810 Spanish colonies in the Americas began to declare independence. Spain had never been able to effectively populate and hold east Texas, and in 1815 a few Anglo-Americans started permanent settlements along the Red River. The U.S. seized the opportunity of the Spanish colonies' rebellions and the steady encroachment of Anglo-American settlers into Spanish territories to press for a settlement of the boundary line between the two powers. Spain initially refused to negotiate any grants or sales of territory and would not recognize U.S. settlers' claims to land technically belonging to Spain. Multiple attempts by the U.S. to acquire Spanish holdings using both backchannel and formal diplomacy went on for years. Finally, after 1815 when it became clear that Spain was losing the Wars of Independence in Latin America, Spain agreed to negotiate with the U.S. The U.S. acquired Florida and Oregon, although Britain and Russia also claimed the Northwest Territory.



The Adams-Onís Treaty
<http://www.aventalearning.com>

As part of the 1819 Adams-Onís Treaty the U.S. gave up claims to Texas and both parties agreed to set the boundary between the U.S. and the Spanish colonies in the Southwest, which became part of Mexico in 1821, at the Sabine River up to the Red and Arkansas Rivers and then due west along the 42nd parallel to the Pacific coast. Rather than insisting on the Rio Grande as the border, U.S. President Madison's policy as early as 1810 was to recognize the Sabine River boundary as a bargaining chip in order to secure east and west Florida and, hopefully, be able to exert influence over Cuba should the island become independent. By 1816, Madison still preferred to secure the Northwest Territory and a route to the Pacific rather than haggle over the boundaries of Texas. Part of the reasoning behind his position was that Republican sympathizers in Texas were too few and too weak to successfully break from Spain, having been defeated by Royalists after rebellions in both 1811 and 1813. After Mexico became independent in 1821, critics in the U.S. complained that ceding away Texas was a mistake, although anti-slavery proponents saw it as a victory. Annexing Texas became a goal for many subsequent U.S. Presidents, primarily Andrew Jackson and James K. Polk.¹⁵⁵

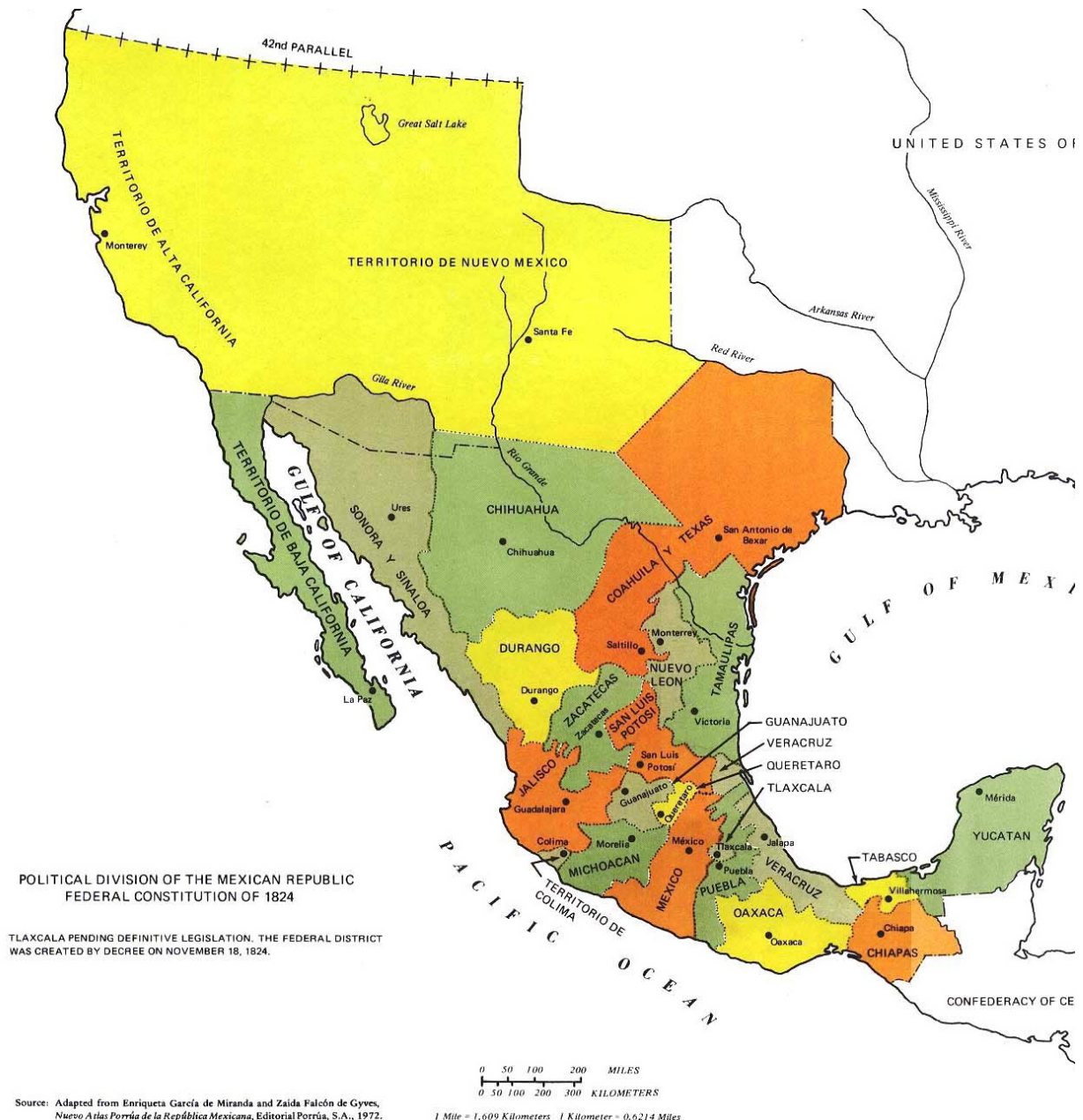
However, in 1821 the sequence of events leading to Texas becoming part of the U.S. began in earnest. Moses Austin obtained the endorsement of Governor Antonio de Martínez to establish a colony of Anglo-American settlers in the Mexican state of Tejas.¹⁵⁶ Moses died soon afterward, and his son Stephen F. Austin took up the task of recruiting colonists. By 1824, Austin had given out 272 titles to land. He then licensed more titles in 1827 and 1828 for a total of 297, seven of which were later forfeited. Due to the low population in Tejas, in 1824 the Mexican

¹⁵⁵ J.C.A. Stagg, *Borderlines in Borderlands: James Madison and the Spanish-American Frontier, 1776-1821* (New Haven: Yale University Press, 2009), 3, 13, 51, 137, 207, 209.

¹⁵⁶ A note on terms: Prior to 1848 I refer to non-ethnic Mexican settlers as Anglo-Americans even though not all were of English descent or even spoke English. Texas, for example, had a very large population of German immigrants. In order to assist the reader with location I use the term Texas, but when referencing the area as it was called prior to 1836 by Mexico, I use the term Tejas. Tejanos are the ethnic Mexicans living in Texas, and after 1836, although many still used this term to identify themselves, Anglo-Americans referred to them as Mexicans.

Congress passed a federal act that combined the states of Coahuila and Tejas and located the capitol of the new state in Saltillo. This was one of the many grievances that later led to the Tejas rebellion in 1835 as both Anglo-American colonists and native Tejanos objected to the loss of their autonomy, the fact that Coahuila had more representation in the legislature due to higher population, and the inconvenience of traveling to the new capitol to conduct business before the courts.¹⁵⁷

¹⁵⁷ *The Texas Declaration of Independence, March 2, 1836.* From *Laws of the Republic of Texas* (Printed by Order of the Secretary of State, 2 vols.; Houston, 1838), Vol. I, 3-7. “It [the government of Mexico] hath sacrificed our welfare to the state of Coahuila by which our interests have been continually depressed through a jealous and partial course of legislation, carried on by a far distant seat of government, by a hostile majority, in an unknown tongue, and this too, notwithstanding we have petitioned in the humblest terms for the establishment of a separate state government, and have, in accordance with the provisions of the national constitution, presented to the general congress a republican constitution, which was, without a just cause, contemptuously rejected.” (Paragraph 7)

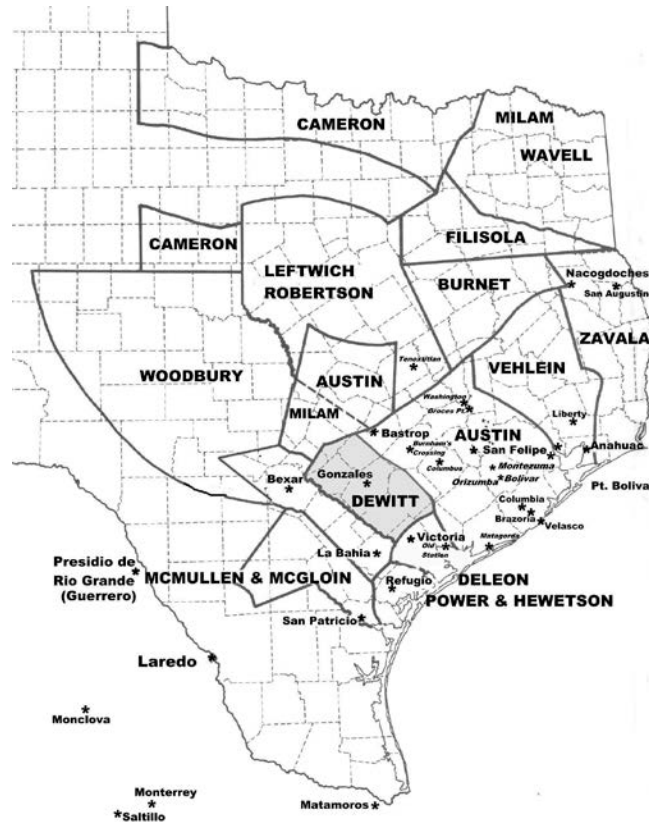


Political Division of the Mexican Republic, Federal Constitution of 1824
Adapted from Enriqueta García de Miranda and Zaida Falcón de Gyves, *Nuevo Atlas Porrúa de Republica Mexicana*, Editorial Porrúa, S.A., 1972.
http://www.emersonkent.com/map_archive/mexico_1824.htm

In addition to Austin, other *empresarios* obtained grants to establish colonies and issued so many land titles that Anglo-Americans soon outnumbered Tejanos. In 1829, General José Manuel Rafael Simeón de Mier y Terán warned the Mexican Congress that because of this

disturbing trend Texas would soon “be lost forever.” By 1830 Anglo-Americans outnumbered Tejanos 5 to 1 and most had entered and settled illegally. The Mexican Congress decreed on April 6, 1830, “Citizens of foreign countries lying adjacent to the Mexican territory are prohibited from settling colonists in the states or territories of the Republic adjoining such countries.” Mexico attempted to settle Mexicans and Europeans in Texas, but had little success and repealed the 1830 Act in 1833 because the Mexican Congress decided it kept out desirable citizens and did little to stem the tide of illegal immigrants. By 1835 Anglo-Americans outnumbered Tejanos seven to one. Anglo-American titles to land in 1835 were mainly east of the Guadalupe River and south of the road from Nacogdoches to San Antonio, but many Anglo-Americans had also settled between the Sabine and Nueces Rivers.¹⁵⁸ There were no empresario land grants in the vicinity of El Paso Del Norte or along the Rio Grande.

¹⁵⁸ Marisa Alecia, “The Latino Immigration Experience: The Case of Mexicanos, Puertorriqueños, and Cubanos,” in *Handbook of Hispanic Cultures in the United States: Sociology*, ed. Félix Padilla, (Houston: Arté Publico Press, 1994), 36; Mary Beth Norton, et. al., *A People and a Nation, Vol. 1: To 1877*, 9th ed. (Boston: Cengage Wadsworth, 2008), 376; Rupert N. Richardson, et. al., *Texas, The Lone Star State*, 4th ed. (New Jersey: Prentice Hall, Inc., 1981), 62-70.



Empresario Land Grants, Coahuila y Tejas, 1825-1832, © 1997-2001
<http://www.tamu.edu/faculty/ccbn/dewitt/allgrantmap.htm>

On October 2, 1835, Texas began an open rebellion against the Mexican government and declared independence on March 2, 1836. Texas became an independent republic on May 14, 1836, under the Treaty of Velasco after Anglo-Americans and Tejanos defeated Santa Anna at the Battle of San Jacinto. Santa Anna signed two treaties, one private and one public, agreeing in the public treaty to cease hostilities, exchange prisoners, and withdraw the Mexican army across the Rio Grande. In the secret treaty, which guaranteed his release and safe transport to Mexico after traveling to Washington D.C. to surrender Texas, he also promised that Mexico would formally recognize an independent Texas. Santa Anna did not go to Washington D.C.; instead the Texas government transported him to Veracruz, Mexico. When he returned to Mexico City the Mexican Congress refused to comply with the treaty terms and Santa Anna assured them he

had signed the treaty under duress while a prisoner of war, rendering it invalid anyway.¹⁵⁹ Although Mexican troops had withdrawn across the Rio Grande as part of the armistice, Mexicans believed the real boundary of Texas was the Nueces River. In 1718, Spain had drawn the boundary separating the colonies of Tejas and Coahuila between the San Antonio and Medina Rivers, later changing the Tejas boundary to the Nueces River in maps drawn in 1767. Stephen F. Austin's land-grant maps drawn in 1829, 1833, and 1836 also set the boundary of Tejas at the Nueces River.¹⁶⁰ The Mexican Congress never ratified the Treaty of Velasco and vowed to recover Texas. However, the political and economic turmoil at the time caused by conflicts between Mexican Centralists and Federalists and Mexico's growing foreign debt impeded that effort. Recovering Texas would also have risked war with the U.S., which had recognized the Republic of Texas in 1837. Pursuant to that recognition, Texas began lobbying the U.S. for annexation.

As if the de facto loss of Texas was not egregious enough for Mexico, Texans continued to push efforts to expand the Republic's territory. Immigration into Texas exploded after 1837; the estimated population in 1836 was 34,470 whites (Anglo-American and other persons of European ancestry, as well as ethnic Mexicans), and 5,000 slaves; by 1840 whites numbered an estimated 102,961, with 38,753 slaves and 295 free blacks for a total of 142,009 non-Indians.¹⁶¹ Few settlers ventured into the area between the Nueces River and the Rio Grande though, because the Nueces Strip was a "no-man's land" controlled by hostile Indians.¹⁶² In 1841, President Mirabeau Bonaparte Lamar, second president of the Republic of Texas, decided to act

¹⁵⁹ Michael C. Meyer, William L. Sherman, and Susan M. Deeds, *The Course of Mexican History, Sixth Edition* (Oxford: Oxford University Press, 1999), 238.

¹⁶⁰ Richard Griswold Del Castillo, *The Treaty of Guadalupe Hidalgo: A Legacy of Conflict* (Norman: University of Oklahoma Press, 1990), 10-11.

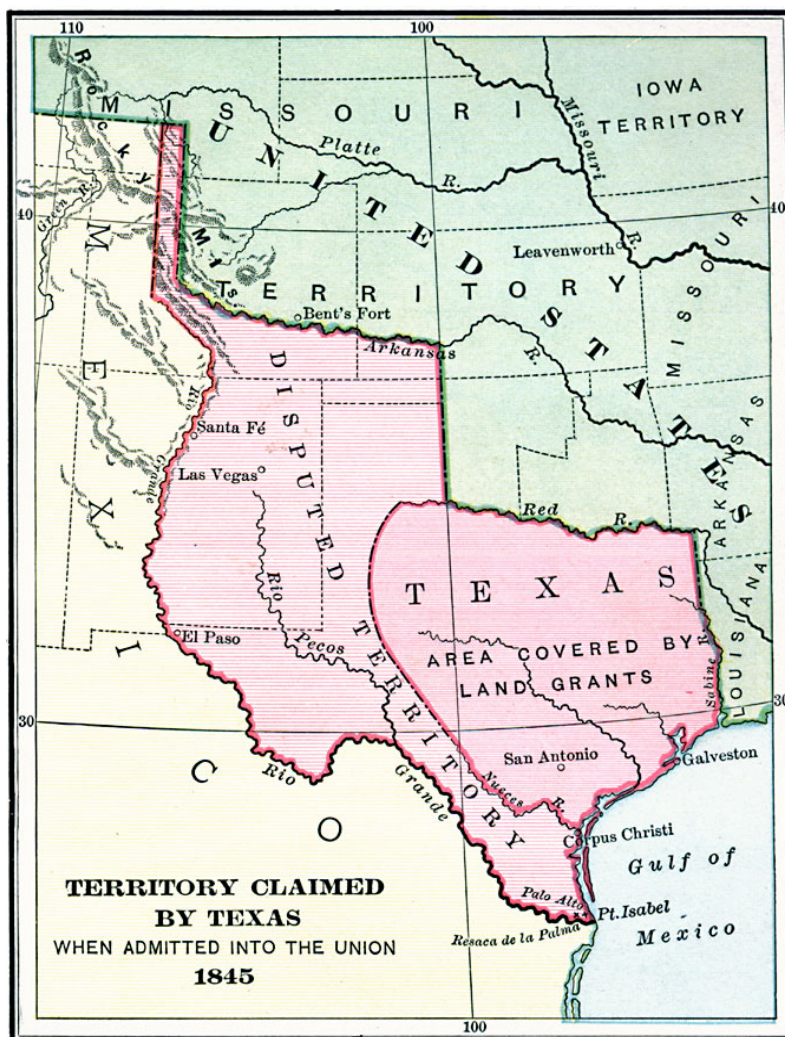
¹⁶¹ Richardson, *op.cit.*, 142.

¹⁶² David Montejano, *Anglos and Mexicans in the Making of Texas, 1836-1986* (Austin: University of Texas Press, 1987), 30.

on reports that Anglo-Americans living on the east side of the upper Rio Grande in the Mexican territory of New Mexico wanted to be included in Texas' territory. He persuaded the Texas legislature to fund the Santa Fe Expedition to take the area by force. The attempt failed and prompted Santa Anna to retaliate and invade Texas in 1842 in order to recover the breakaway republic. He was also unsuccessful and by 1845 the loss of Texas to the U.S. appeared inevitable.

The Texas legislature had specified the Rio Grande as the southern and western boundary of the Republic of Texas and Mexico compounded this claim by withdrawing south of the Rio Grande, rather than stopping at the Nueces River, after every military defeat. When the U.S. annexed Texas in 1845 President Polk renounced the Adams-Onís Treaty as a “mistake” and agreed that Texas extended south to the Rio Grande, west to El Paso del Norte, and north along the Rio Grande past Santa Fe. The U.S. made this claim based on the idea that the Louisiana Purchase extended all the way to the Rio Grande, therefore the 1819 Adams-Onís Treaty with Spain and the 1831 Treaty of Limits with Mexico that had set the border at the Sabine River were invalid because the Louisiana Purchase predated both. Mexico would not agree to the loss of the profitable Camino Real and continued to insist the southern border of Texas was the Nueces River. Historian David Montejano points out that it was not just the lure of controlling Santa Fe and the Camino Real that caused Texans to set the boundary along a line of territory they had never controlled nor settled; it was also the economic importance of the possibility of using the Rio Grande to ship trade goods.¹⁶³

¹⁶³ Montejano, 19-20.



Territory Claimed by Texas When Admitted into the Union, 1845
 Charles Kendall Adams, *A History of the United States* (Boston, MA: Allyn and Bacon, 1909), 296.
 Courtesy the private collection of Roy Winkelman.
<http://etc.usf.edu/maps/pages/800/804/804.jpg>

As part of his presidential campaign, James Knox Polk insisted on what he termed “the reoccupation of Oregon and re-annexation of Texas” but the day before he entered office on March 2, 1845, outgoing president John Tyler signed the Joint Resolution of the U.S. Congress that authorized the annexation of Texas. Polk encouraged Texans to continue insisting the entire Rio Grande was the border and suggested they establish settlements in the Nueces Strip. In what appears to be a completely antagonistic move, Polk ordered U.S. troops led by General Zachary Taylor to Corpus Christi where they encamped in August of 1845. At the same time, Polk was

attempting to negotiate with Mexico by sending Minister John Slidell to Mexico, the first time to settle the Texas boundary dispute and the second time to negotiate the sale of the Southwest to the U.S., offering 30 million dollars for California and New Mexico. Foreign Minister Manuel Peña de la Peña, on behalf of the José Herrera government, refused to receive Slidell because Mexico had severed diplomatic relations when the U.S. annexed Texas. President Herrera ordered Major General Mariano Paredes y Arrillaga to march the Mexican army to the Rio Grande, but instead Paredes took the army to Mexico City and ousted Herrera from office. In his January 2, 1846, inaugural address President Paredes vowed to hold all of the territory of Mexico, including Texas to the Sabine River.¹⁶⁴ Although not all Americans agreed that the Southwest should be taken by force, anti-Mexican sentiment in the U.S. was fairly high, especially after reports of the annihilation of the Anglo-Americans at the Battle of the Alamo and the slaughter of Anglo-American prisoners of war at Goliad in 1836. On February 3, 1846, General Zachary Taylor received orders to proceed across the Nueces River to the Rio Grande and establish a fort opposite Matamoros, prompting Mexico to declare a defensive war against the U.S. on April 23, 1846. On April 25, a contingent of the Mexican army crossed the Rio Grande and a small skirmish took place at Rancho de Carricitos. During the fighting eleven U.S. soldiers were killed, five wounded, and forty-seven men taken prisoner. Polk asked the U.S. Congress for a Declaration of War on May 9 because “Mexico...has invaded our territory and shed American blood upon the American soil. She has proclaimed that hostilities have commenced, and that the two nations are at war.”¹⁶⁵ Congress complied on May 11. The fighting lasted until August 22, 1847, when both sides agreed to an armistice. The Mexican Congress

¹⁶⁴ K. Jack Bauer, *The Mexican War, 1846-1848* (Lincoln: University of Nebraska Press, 1974), 7, 11, 25-26.

¹⁶⁵ *Messages and Papers of the Presidents*, V, 2287-93, as found in K. Jack Bauer, *The Mexican War, 1846-1848* (Lincoln: University of Nebraska Press, 1974), 67-68.

ratified the Treaty of Guadalupe Hidalgo on May 19, 1848, transferring present-day California, Nevada, Arizona, New Mexico, Utah and parts of Wyoming and Colorado to the U.S.¹⁶⁶



Territory Ceded by Mexico, 1848 and 1853

Charles Kendall Adams, *A History of the United States* (Boston, MA: Allyn and Bacon, 1909), 303. Courtesy the private collection of Roy Winkelman.
<http://etc.usf.edu/maps/pages/800/805/805.htm>

Article V of the Treaty of Guadalupe Hidalgo established the border between Mexico and Texas as follows:

“The Boundary line between the two Republics shall commence in the Gulf of Mexico, three leagues from land, opposite the mouth of the Rio Grande, otherwise called Rio Bravo del Norte, or opposite the mouth of its deepest branch, if it should have more than one branch emptying directly into the sea; from thence, up the middle of that river, following the deepest channel, where it has more than one to the point where it strikes the Southern Boundary of New Mexico; thence, westwardly [sic] along the whole Southern Boundary of New

¹⁶⁶ A note on terms: Article IX of the Treaty of Guadalupe granted Mexicans living in the territory of the U.S. full citizenship and property rights. As they were citizens, and therefore “Americans,” the term Anglo-American will no longer be used in this study when discussing persons or events after 1848. I will use the accepted, although erroneous, term Anglo to refer to persons of European descent who are not Spanish or Mexican. Ethnic Mexicans will be the term for persons of Mexican descent living in the U.S., which I will use until discussing the 1930s when the term Mexican-American became popular. Mexicans means the people in Mexico, unless otherwise noted.

Mexico (which runs north of the town called *Paso* [sic]) to its western termination; thence, northward, along the western line of New Mexico, until it intersects the first branch of the river Gila; (or if it should not intersect any branch of that river, then, to the point on the said line nearest to such branch, and thence in a direct line to the same); thence down the middle of the said ranch and of the same river, until it empties into the Rio Colorado; thence, across the Rio Colorado, following the division line between Upper and Lower California, to the Pacific Ocean.”¹⁶⁷

As part of Article V, both Mexico and the U.S. agreed to form a joint Boundary Commission to survey the location of the border line, to consist of one commissioner and one surveyor from each nation, each assisted by their own engineers. The work proceeded slowly, due to the turnover in commissioners and surveyors, the sheer length of the boundary, inhospitable terrain, intermittent Indian raids resulting in the loss of mules and horses, and less than adequate funding from both nations’ congresses. Another problem was the inaccuracy in existing maps, most notably the J. Disturnell map of Mexico.¹⁶⁸ U.S. Secretary of State James Buchanan had provided a copy of this map to Commissioner Nicholas Trist, appointed to negotiate the Treaty of Guadalupe Hidalgo with Mexico in August, 1847, and as part of Article V both nations agreed to use it as the primary boundary map of the Mexican states. The map divided Alta and Baja California south of San Diego and although Secretary Buchanan pressed for the inclusion of Baja California in the territory the U.S. wanted, Mexico would not agree. The U.S. threatened to renew hostilities if a compromise could not be reached and by January 1848, the two parties agreed the boundary would run from a point south of San Diego Bay east to the mouth of the Gila River, east along the 32nd parallel to the Rio Grande, and from there east and

¹⁶⁷ Charles I. Bevans, ed., *Treaties and Other International Agreements of the United States of America, 1776-1949*, Vol. 9 (Washington, D.C.: Department of State, 1972), 791-806, as found in Richard Griswold Del Castillo, *The Treaty of Guadalupe Hidalgo: A Legacy of Conflict* (Norman: University of Oklahoma Press, 1990), 187.

¹⁶⁸ *Map of the United Mexican States, as organized and defined by various acts of the Congress of said Republic and constructed according to the best authorities. Revised edition. Published in New York in 1847 by J. Disturnell. Mapa de los Estados Unidos de Méjico [sic], según lo organizado y definido por las varias actas del congreso de dicha república; construida por las mejores autoridades. Lo publican J. Disturnell. Rev. ed. Nueva York, J. Disturnell, 1847* (Map Division, Library of Congress, Washington D.C.).

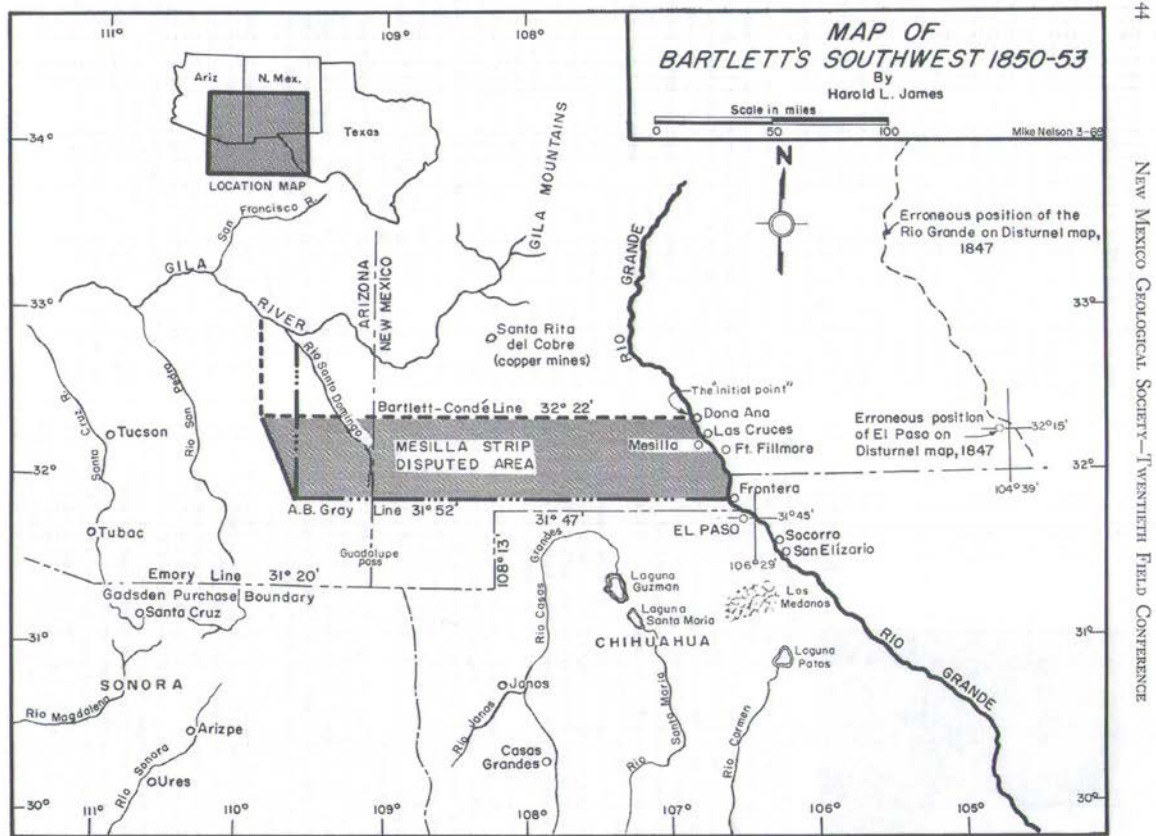
south along the river to its mouth in the Gulf of Mexico.¹⁶⁹ The provisions of the Compromise of 1850 in the U.S. settled the western and northern boundaries of the state of Texas, but the southern border from El Paso Del Norte west to the Pacific Ocean was less clear cut.

The Disturnell map, which placed El Paso del Norte at 32 deg., 15 min. north latitude was in error; the settlement was actually at 31 deg., 45 min. north latitude. The longitude was also incorrect and meant that the boundary going west from El Paso Del Norte would be 42 miles above the actual settlement. Boundary Commissioner John Bartlett discovered this error in 1850 and he and his Mexican counterpart, Pedro García Conde, agreed to compromise by setting the boundary going west from the Rio Grande at 32 deg. 22 min. and having the line extended to the west into present-day Arizona for 175.28 miles (3 deg. longitude). Bartlett evidently did not realize he had bargained away the optimal route for a transcontinental railroad in the U.S., as had become clear from Major William Hemsley Emory's surveys. In 1851, U.S. Boundary Surveyor Andrew Gray, who had not signed off on the Bartlett-Conde boundary map due to being in Washington, refused to authorize the Bartlett-Conde Compromise. Emory replaced Gray in 1851, and shortly thereafter Commissioner García Conde died. Although U.S. Secretary of the Interior Alexander H.H. Stuart had ordered Emory to sign the map, Emory was reluctant to give up the route for the railroad and only witnessed the document. Emory, who became the unofficial U.S. Boundary Commissioner in 1852 due to Bartlett's extended absence, resumed surveys along the Rio Grande from the Gulf of Mexico to present-day El Paso. U.S. President Pierce then sent Minister James Gadsden to negotiate with Mexico to obtain a boundary that included the Mesilla Valley north of El Paso del Norte. Gadsden made several offers to buy the desired land, with the

¹⁶⁹ Joseph Richard Werne, *The Imaginary Line: A History of the United States and Mexico Boundary Survey, 1848-1857* (Fort Worth, Texas: Texas Christian University Press, 2007), 6, 11. Werne discusses the fact that Buchanan knew the Disturnell map was inaccurate prior to giving it to Trist, as per the correspondence Robert Greenhow to Buchanan, 14 Mar. 1848, Series I Buchanan Papers, 222, n. 7, 231.

implied threat of occupation if Mexico would not agree to sell. Mexico, wracked by debt, capitulated in 1853 and agreed to shift the boundary south in exchange for 15 million dollars, but the U.S. Congress added several amendments to the deal and lowered the payment to 10 million dollars. The Gadsden Purchase of 1854 set the boundary west of the Rio Grande in the El Paso/Juárez Valley at 31 deg., 47 min. north latitude.¹⁷⁰ El Paso Del Norte would remain in Mexico, but any settlements north of the Rio Grande in the El Paso/Juárez Valley would be in Texas; settlements west of the river above the new line would also be in U.S. territory. These changes to the location of the border meant that the portion of the Rio Grande, the section that was not always filled with water and did not follow a permanent path, would mark the international boundary between El Paso Del Norte and the future city of El Paso and attached, outlying communities.

¹⁷⁰ Mueller, 23-27.



Map of Bartlett's Southwest, 1850-53¹⁷¹

http://nmgs.nmt.edu/publications/guidebooks/downloads/20/20_p0040_p0055.pdf

Article V of the Treaty of Guadalupe Hidalgo had designated the Rio Grande as the boundary between Texas and Mexico, specifically “up the middle of that river, following the deepest channel.”¹⁷² According to Jerry Mueller, this is understood as “the Principle of Thalweg,” thalweg being a German term for “valley way, down way, or down valley.” As a geological term it means the line connecting the lowest points in a valley. International law

¹⁷¹ Harold L. James, “History of the United States-Mexican Boundary Survey-1848-1995,” in *The Border Region (Chihuahua, Mexico, & USA)*, D.A. Cordoba, S.A. Wengert and J.W. Shomaker, eds., 40-55 (New Mexico Geological Society 20th Annual Fall Field Conference Guidebook, 1969), 44.

¹⁷² Griswold Del Castillo, text reprinted from Bevans, 791-806.

concerning boundaries recognizes thalweg as the river channel that is most conducive for navigation, but in an alluvial river such as the Rio Grande the deepest channel can frequently change course. Mueller raises the questions, “was the boundary as designated by the treaty fixed in time and place, or in neither? Would the river remain the boundary in the event of a meander cutoff?” The treaty itself was not specific on these points.¹⁷³

When designating a river as an international boundary the question of where to set the dividing line is determined by whether or not the river is navigable. If any part of the river is deemed navigable, then the entire river is categorized as such. When Mexico and the U.S. negotiated the treaty, the U.S. was hopeful that navigating the river was feasible because a U.S. Army ship had successfully sailed from the Gulf of Mexico to Laredo in 1846. The idea remained popular after the treaty went into effect and a smaller vessel made it upriver to Presidio in 1850. Frederick Olmsted, a journalist, recommended in 1855 building special steamboats and dredging a deeper channel to make the river accessible as far as the Pecos River.¹⁷⁴ Clearly the Rio Grande in the El Paso/Juárez Valley was never suited for ships, but because sections of the Upper Rio Grande were floatable and the Lower Rio Grande below the confluence of the Rio Grande and the Río Conchos was navigable, Article VII of the Treaty of Guadalupe Hidalgo states,

“The river Gila, and part of the Rio Bravo del Norte lying below the southern boundary of New Mexico, being, agreeably to the fifth Article, divided in the middle between the two Republics, the navigation of the Gila and of the Bravo below said boundary shall be free and common to the vessels and citizens of both countries; and neither shall, without the consent of the other, construct any work that may impede or interrupt, in whole or in part, the exercise of this right: not even for the purpose of favoring new methods

¹⁷³ Mueller, 19-20, 31.

¹⁷⁴ Montejano, 19-20.

of navigation.”¹⁷⁵

By labeling the Rio Grande as a navigable river, international law recognized the boundary as the middle of the thalweg channel rather than a point equidistant from both banks. Either way, the portion of the Rio Grande in the El Paso/Juárez Valley was not going to follow the rules of rivers in humid areas that tend to stay within set banks, although they too may overflow. The Rio Grande, an alluvial river whose bed and banks are loose deposits of soil, is subject to extreme, sudden channel changes and meanders. Furthermore, changes in flow rates affect the river's banks through the natural process of accretion, the slow building up of soil, and avulsion, the sudden erosion of soil or abandonment of a channel. When the U.S. and Mexico signed the Treaty of Guadalupe Hidalgo and set the boundary as the deepest channel in 1848, no one took these factors into consideration.

El Paso del Norte came under the control of the U.S. on August 22, 1846, due to the U.S.-Mexico War but at that time there was no settlement in the area north of the river that is now the city of El Paso. After the U.S.-Mexico War, in 1849 Franklin Coons bought Juan María Ponce de Leon's ranch on the site of what is now the Mills Building in the center of present-day El Paso; this became the village of Franklin, later named El Paso by Anson Mills in 1859.¹⁷⁶ According to Mills, “Franklin Coontz [sic] turned out an undesirable citizen, and it was suggested that I rename the city.”¹⁷⁷ Four other settlements also appeared north of the river in the year after the war: Frontera, a trading post eight miles north of the river; El Molino, or Hart's Mill, a flour mill and later a home that is now the present-day La Hacienda Café; Magoffinsville to the east of the

¹⁷⁵ Bevans, as found in Griswold Del Castillo, 189. The same principles appear in Article VI concerning the Colorado River below the confluence of the Gila River as well as the Gulf of California (188).

¹⁷⁶ Hammons, 34. The Mills Building is at 303 North Oregon Street opposite San Jacinto Plaza. Bryson, *The Land Where We Live*, 21, also situates Juan Maria Ponce de Leon's ranch near San Jacinto Plaza. There is some confusion surrounding Franklin Coons' name as that is the spelling used by Timmons, while Hammons and Mills use Coontz.

¹⁷⁷ Anson Mills, *My Story*, ed. C.H. Claudy (Published by the Author, 1st Edition 1918, Second Edition Washington, D.C.: Press of Byron S. Adams, 1921), 52, map 54-55.

Coons ranch, which quickly became the center of the area that is present-day El Paso; and Ascárate, later called Concordia, to the east of Magoffinsville. Six U.S. Army infantry companies arrived in September 1849, two stationed at San Elizario and four on the Coons ranch.¹⁷⁸ The discovery of gold in California on January 24, 1848 sparked the Gold Rush and Franklin became a stop for many taking the southern route from east to west to seek their fortunes. In 1850, cattle drives going west also added to the growing importance of the area as a hub for transporting goods, people, and livestock both west to California and north to Santa Fe. The first U.S. census for Texas took place in 1850, but the counts, especially of ethnic Mexicans, are hardly reliable because the census takers were Anglo Marshalls, tax assessors, and soldiers. A reasonable estimate concludes that approximately 2,500 Anglos and 18,000 ethnic Mexicans lived beyond the Nueces River.¹⁷⁹ By 1850, Franklin village had 200 residents; El Paso del Norte, renamed Ciudad Juárez in 1888, had 4,000; Socorro 300; and San Elizario 1,200.¹⁸⁰

John Russell Bartlett, perhaps not the most accomplished U.S. Boundary Commissioner but a remarkable observer of the lands through which he travelled, kept copious journals in the years 1850-1853. His descriptions of the El Paso area when he arrived in November of 1850 not only describe the geography, climate, agriculture, and economic conditions at the time, but also some of the innate prejudices and assumptions Anglos had toward ethnic Mexicans. When Bartlett arrived he noted that prices for provisions were high and the arrival of his party only sent them higher. He described a dam built a mile above the town to facilitate irrigation and that the fall in the river there powered two grist mills, one on each side of the river. The *Aquequia Madre* was fifteen feet wide, with numerous branching canals. The river itself was fordable at all points, except “where its current is deepened by being contracted within a very narrow space” and the

¹⁷⁸ Timmons, *El Paso*, 47-49.

¹⁷⁹ Montejano, 31.

¹⁸⁰ Hammons, 34; Anson Mills, 50.

“muddy and sluggish” river varied in width from 300 to 600 feet. There were no bridges. El Paso Del Norte was “compactly built for the space of half a mile near the plaza; and from there it extends five to ten miles along the rich bottom lands of the river, each house being surrounded by orchards, vineyards, and cultivated fields.” The alluvial soil allowed residents of the valley to grow wheat, maize, oats, alfalfa, onions, pumpkins, apples, pears, quinces, peaches, apricots, and grapes. Cottonwood trees and mesquite were abundant and used for fuel. Bartlett estimated the population of El Paso Del Norte to be about 5,000, but noted the actual population on the Mexican side of the river was actually higher when including “the many ranchos and haciendas below the town, which properly appertain to it.” He added that “about ten miles below El Paso is an island some twenty miles in length...one of the most fertile spots in the whole valley” with three settlements “Isleta [sic], Socorro, and San Eleazario [sic], chiefly inhabited by Mexicans...[and] contains many respectable Spanish families, and some few Americans.”¹⁸¹

Bartlett glowingly described the beauty and fertility of the valley, but also took care to note the inherent difficulties associated with using a river for irrigation in an arid region. His journal reflects the realities of irrigating in the El Paso/Juárez Valley, writing,

“It is true that where the cultivator can depend upon an ample supply of water at all seasons in the irrigating canals, he possesses an advantage over him who relies exclusively on nature. But the misfortune is, when water is most needed, the supply is the scantiest. In February and March there is always enough for the first irrigation. In April and May the quantity is much diminished; and if the rise, expected to take place the middle of May, fails, there is not enough to irrigate properly all the fields prepared for it. The consequence is, a partial failure of the crop. In 1851 many large tracts of land near El Paso, which were planted in the spring, and through which irrigating canals were dug at great cost, produced nothing; and I was told by a gentleman at San Eleazario [sic], twenty-five miles below El Paso, that the summer of 1852 was the first one in five years when there had been sufficient [water] to irrigate all the lands of that vicinity which had been put under cultivation. The value of lands

¹⁸¹ John Russell Bartlett, *Personal Narrative of Explorations and Incidents in Texas, New Mexico, California, Sonora, and Chihuahua, 1850-1853*, Vol. I, First Edition 1854 (Chicago: The Rio Grande Press, Inc., 1965), 144-145, 184-187, 192-193.

dependent on artificial irrigation is much lessened when this fact is known.”¹⁸²

None of the fruits and grains discussed above grown in the El Paso/Juárez Valley are native species; all were imported by settlers and were able to thrive in the arid climate only because of irrigation. The mild winters and rare late freezes meant that these cultigens could survive, but due to the low humidity and scant rainfall farmers had to supply more water than required in humid regions. The methods of constructing and maintaining irrigation canals, as well as adjudicating water rights, had not changed in the area for almost 200 years, limiting productivity. As discussed in Chapter One, the Rio Grande was never a totally reliable source of water because the flow rate was entirely dependent on upstream rain and snowfall. As the population increased in the El Paso/Juárez Valley, so too did water demand. This situation would be exacerbated by tensions that increasingly reflected racial prejudices.

Bartlett’s observations above seem merely descriptive but other journal entries are less neutral. According to Bartlett,

“Until the advent of the Americans after the Texan annexation and the Mexican War, the *Paseños* [sic] were a most primitive people. There was no town of any note nearer than Chihuahua, in Mexico, three hundred miles distant, and San Antonio, on the eastern side, six hundred and seventy miles off. Hence they saw few strangers, and enjoyed few of the luxuries of their civilized brethren....There are a few respectable old Spanish families at El Paso, who possess much intelligence, as well as that elegance and dignity of manner which characterized their ancestors.... But there is no great middle class, as in the United States and England. A vast gulf intervenes between these Castilians and the masses, who are a mixed breed, possessing none of the virtues of their European ancestors, but all their vices, with those of the aborigines superadded.”¹⁸³

Bartlett expressed in his journal a prevailing Anglo notion that there were two racially distinct classes of ethnic Mexicans. The elites were pure Spanish in their eyes and, as Europeans, merited some respect. The poorer population was mixed race and contaminated by the “indolent”

¹⁸² Ibid., 187-188.

¹⁸³ Ibid., 144-145, 184-187, 191.

characteristics of Indians. In 1827, Noah Smithwick settled in Texas and later stated “I looked on the Mexicans as scarce more than apes.” Charles Bent, an Anglo merchant in New Mexico during the 1830s and 1840s wrote “the Mexican character is made up of stupidity, obstinacy, ignorance, duplicity and vanity.”¹⁸⁴ Seemingly, the Anglos adopted Spanish notions of conflating social class with race. Not all elite Spaniards had pure Spanish blood but their wealth, position, and a determination to limit racial mixing through arranged marriages propagated the fiction that they were not *mestizo*. This led observers such as Bartlett to naively remark “Among these [respectable old Spanish families] may be found many names which are illustrious in Spanish history and literature.”¹⁸⁵ Bartlett also expressed the Anglo fascination with what they perceived as the exotic nature of Mexican women, and followed the trend of exempting them from disparaging remarks.¹⁸⁶ When attending an address by the Bishop of Durango in El Paso, Bartlett described the women in El Paso Del Norte as follows:

The women all wore dark *rebosos*, or scarfs [sic], around their heads and shoulders, and in general were gaily dressed. The more genteel appeared in black. Much attention is paid to costume, and the señoritas fully appreciate the effect of particular colors on the complexion; hence, one seldom sees in Mexico those delicate lilacs, pinks, and sky-blues which are so much worn by, and are so becoming to, the fair Anglo-Saxon. Bright colors are mostly worn, which set off the Mexican brunettes to great advantage.¹⁸⁷

Scholars have shown in numerous works how these prejudices and notions justified Anglo encroachment on Mexican territory. Jacques Derrida and Michel Foucault have both written extensively about how discourse creates its own reality. Pierre Bourdieu theorizes that language is not just a form of communication, but a form of power and domination because as

¹⁸⁴ David J. Weber, “‘Scarce more than apes.’ Historical Roots of Anglo-American Stereotypes of Mexicans.” In *New Spain’s Far Northern Frontier: Essays on Spain in the American West, 1540-1821*, ed. David J. Weber (Dallas: Southern Methodist University Press, 1979), 296.

¹⁸⁵ Bartlett, 191.

¹⁸⁶ Weber, “‘Scarce more than apes,’” 296-297.

¹⁸⁷ Bartlett, 147-148.

people are surrounded everyday by words that convey ideas they eventually internalize the logic behind those words. Edward Said describes how colonization takes place by feminizing and exoticizing the Other, in order to explain the right of the colonizer to dominate not only territory and people, but also the conquered people's own understanding of their identity and place in a society controlled by outsiders. Colonial and post-colonial studies demonstrate that subjugation is not accomplished by force alone, or even by controlling political and economic systems, but also through monopolization of the structures of thought and social realities under which people live. Chicano and Chicana-feminist historians have studied extensively how this process worked in the Southwest to reclassify the original inhabitants of the land through a discursive belittling that worked hand-in-hand with the steady erosion of their political rights and economic standing.¹⁸⁸ As will be discussed below, when Anglos began to settle in the lands that once belonged to Mexico, not only did the use of pejorative terms such as "greaser" become prevalent, but also the steady conflation of Mexican Americans with Mexican citizens. In the eyes of Anglos, there was no difference.

In his study of the origins of the American idea of Manifest Destiny, Anders Stephanson explains that in the U.S. "by the 1840s virtually all destinarian thought entailed implicit or explicit references to 'race.'" The study of race was becoming a science at that time and measurements of skull size and shape became a popular explanation of mental acuity.¹⁸⁹ The

¹⁸⁸ The body of work on these topics is far too large to enumerate here, some examples are Jacques Derrida, *Of Grammatology* (1974); Michel Foucault, *The Order of Things: An Archaeology of the Human Science* (1966); Pierre Bourdieu, *The Logic of Practice* (1980); Edward Said, *Orientalism* (1978); Laura Ann Stoler, *Race and the Education of Desire: Foucault's History of Sexuality and the Colonial Order of Things* (1995), Mahmood Mamdani, *Citizen and Subject: Contemporary Africa and the Legacy of Late Colonialism* (1996); Franz Fanon, *The Wretched of the Earth* (1963); Tzvetan Todorov, *The Conquest of America: The Question of the Other* (1984); José Rabasa, *Writing Violence on the Northern Frontier: The Historiography of Sixteenth-Century New Mexico and Florida and the Legacy of Conquest* (2000); Rodolfo Acuña, *Occupied America: The Chicano Struggle Toward Liberation* (1972); Emma Pérez, *The Decolonial Imaginary: Writing Chicanas into History* (1999).

¹⁸⁹ Anders Stephanson, *Manifest Destiny: American Expansion and the Empire of Right* (New York: Hill and Wang, 1995), 55.

Spanish had long held that blood defined race, and one's degree of *limpia de sangre* (clean blood, lacking contamination by miscegenation with Jews, Moors, blacks, or Indians) determined status in the social hierarchy of *calidad*. In the U.S., the same type of thought led to anti-miscegenation laws and the belief that Anglo-Saxons, of all the Europeans, had achieved the racial apex because Britain had managed by the early 1800s to dominate the world. Americans were even higher on the scale because, as they saw it, they had managed to throw off the rule of Britain and build a nation based on original Anglo-Saxon freedoms, free of the taint of Norman aristocracy. For Americans, "the contrast was clear...between the British colonial-aristocratic rule of Asia and the properly pure, American elimination of otherness in North America."¹⁹⁰ In the case of the inhabitants of the El Paso/Juárez Valley, as well as further upstream, discourse contributed to the racial constructs that led Anglos to believe that they had more rights to the land and the water than the Mexicans south of the river and, at times, the ethnic Mexicans living in their midst.

In the first decades after the conclusion of the U.S.-Mexico War, Anglos were the minority population in the El Paso/Juárez Valley, which colored their views of Mexican inhabitants. Anson Mills noted in 1858 that the Texas War of Independence, the U.S. Mexico War, and hostile Indians "forced most of the population and wealth to the Mexican side of the Rio Grande...[where there were] large, wealthy towns, with good society and well ordered governments" and "Paso del Norte [was] a city of thirteen thousand people controlled by well-to-do and educated Spaniards." According to Mills, the population of Franklin was "mostly Mexicans and their families, engaged in cultivating."¹⁹¹ It is interesting to note how both Mills and Bartlett distinguish between Spaniards and Mexicans, and classify elites as Spanish and

¹⁹⁰ Ibid., 55.

¹⁹¹ Anson Mills, 50.

farmers as Mexican. In another example of skewed perceptions, newcomers did not always seem to understand the climate and the nature of the river. The idyllic appearance of the valley disguised the fragile relationship between the population and their water supply, a fact that newcomers overlooked. Anson Mills' brother William Wallace Mills also wrote in his observations of the valley that agriculture flourished and "nearly all that portion of the village south of what are now known as San Francisco and San Antonio streets was cultivated in vineyards, fruit trees, fields of wheat, corn and gardens. There was plenty of water; El Paso was checkered with *acequias*."¹⁹²

As part of the Mexican state of Chihuahua, El Paso del Norte was the capital of a district that included the main settlement plus Real de San Lorenzo and Senecú as well as the downriver settlements of Ysleta, Socorro, and San Elizario. Flooding and new channel cutting was particularly intense from 1829 through 1831 resulting in serious land disputes and loss of tillable land. Intermittent flooding throughout the 1830s placed Ysleta, Socorro and San Elizario on an island in the middle of the Rio Grande by 1842.¹⁹³ The island, referred to locally as *La Isla* (The Island), was the most agriculturally productive location in the entire valley and in August of 1851 U.S. Boundary Commissioner Bartlett recommended surveying the Rio Grande from the astronomical observatory at Frontera down the river to the island as quickly as possible. The original channel ran above the island, placing it on the Mexican side of the river, but had gone dry. Bartlett feared that a long period of drought meant the annual rains would cause violent flooding, resulting in the river moving from the channel below the island back to the original channel above it and the loss of this valuable piece of land. According to Bartlett, "the

¹⁹² William Wallace Mills, *Forty Years at El Paso, 1858-1898*, 1st ed. 1901 (El Paso, Texas: Carl Hertzog, 2nd ed. 1962), 13.

¹⁹³ W.H. Timmons, *James Wiley Magoffin: Don Santiago – El Paso Pioneer* (The University of Texas at El Paso: Texas Western Press, 1999), 47; Helen McCarthy Orndorff, *History of the Development of Agriculture in the El Paso Valley* (M.A. thesis, The University of Texas at El Paso, 1957), 41.

inhabitants have long manifested much uneasiness, lest by delay they should be thrown under a foreign jurisdiction.”¹⁹⁴ This statement is a bit disingenuous, considering the fact that U.S. citizens were a distinct minority of the population in the three villages. However, even as a minority, Anglo settlers envisioned themselves as having the right to their own forms of government under the jurisdiction of the U.S. even though it was not yet clear exactly where the international boundary actually was. As early as 1850 Charles A. Hoppin, who had settled at San Elizario in 1849, wrote to Texas Governor Peter H. Bell to complain of a general lack of law and order there and the fact that an American citizen accused of rape was to be tried by the *alcalde* rather than receiving a jury trial in a U.S. court.¹⁹⁵

The Mexican Boundary Commission was equally anxious to secure the island for Mexico. In 1852, Mexican Boundary Commission surveyor José Salazar Ylarregui ordered engineer Agustín Díaz to survey the Rio Grande from the San Ignacio River working upriver until he met the rest of the Mexican team working downriver from La Mesilla. He told Díaz to take multiple soundings along his route, using special care to determine which channel around any islands was the deepest. Díaz and his team set out from San Ignacio, a settlement established in 1850 in what is now Juárez, on March 25, 1852, but the Rio Grande began heavy flooding in April. The Mexican Commission was hopeful that the rising waters would cut through the old channel to the north, but the southern channel was the only one to fill. The survey determined the southern channel was the deepest active one and Ysleta, Socorro, and San Elizario would be part of the U.S.¹⁹⁶ However, this did not answer the question as to who would be able to claim territory in the case of sudden directional changes in the deepest channel or even if the boundary

¹⁹⁴ U.S. Congress, Senate, *Report of the Secretary of War*, 32d Congress, 1st Session, 1852, Ex. Doc. 121, 186-188.

¹⁹⁵ Charles A. Hoppin to Peter H. Bell, 3 January 1850, Governor's Papers: Bell, as found in Timmons, *El Paso*, 117-118.

¹⁹⁶ Werne, 124-125.

would remain fixed if channels that were active at the time of the survey should go dry in the future.

Both the U.S. and Mexico agreed by treaty in 1855 to accept the surveys completed in 1853, but in 1856 James Wiley Magoffin, who had started a settlement north of the river, wrote to Major Emory, the U.S. Boundary Commissioner, warning him of an impending avulsive realignment of the river and inquiring if this would change the original survey. Emory sent the letter to U.S. Attorney General Caleb Cushing.¹⁹⁷ Cushing wrote that the boundary was of the arcifinuous type, defined by Grotius as a natural formation, such as rivers or mountains that serve as barriers.¹⁹⁸ He went on to explain that gradual erosion or accretion would not change the fact that the deepest channel would remain as the international boundary, even if these changes caused injury to either party. However, if the channel was to leave the original bed and cut a new channel, then even in the case of “the loss of territory greater than the benefit of retaining the natural river boundary...[the] boundary remains in the middle of the deserted river bed.” He reasoned that if a stone pillar were to demarcate a boundary it was not the stone itself that was the borderline but just a marker of a location, as was the surveyed course of the river even if the bed went dry. The ruling also assumed that most channel movement or changes in the banks would be the result of the barely visible processes of gradual erosion and accretion. Cushing supported this idea with a large body of early writings on international law, and then explained further that this was the principle laid down in Justinian’s *Institutiones*, later codified in the *Siete Partidas* (Partida III, tit. 28, ch. 14), the basis of Spanish and Mexican international and public law. English and then American international and public law also accepted this idea from the

¹⁹⁷ Mueller, 37.

¹⁹⁸ Hugo Grotius (1583-1645), was a Dutch jurist and philosopher. Drawing on the principles of natural law, he was the first to formulate the idea of a society of nations that submitted to mutually accepted laws rather than force to resolve disputes. He is considered to be the founder of the basic principles of international law.

Institutiones. For good measure, Cushing included opinions written by the international law jurists Don Antonio Riquelme (*Derecho Internacional*, tom. i, p. 83), Don Andres Bello (*Derecho Internacional*, p. 38), and Don José Maria de Pando (*Derecho Internacional*, p. 99) that supported his conclusion. Cushing also added the principle found in Spanish public law, “When the river changes its course, throwing itself on one of two contiguous states, it then comes to belong to the state through whose territory it runs, all community right in it so far ceasing” (*Derecho Publica*, tom. i, p. 199). Attorney General Cushing went on to suggest that precise language addressing gradual accretion and sudden avulsion be added to the Commission’s reports to make it clear that the river as originally surveyed was the perpetual boundary. Slight, gradual changes in the river’s location due to accretion or erosion would not matter; only a drastic avulsive shift in the main channel location would affect rights to use the river, but would not change the location of the boundary.¹⁹⁹

As settlement increased along the Rio Grande on the U.S. side, two things became apparent. First, declaring that a river that did not have channels fixed in place as the border meant the international boundary line, in practice if not in theory, was always moving. Second, W.W. Mills’ observation that “there was plenty of water” was proving to be untrue. In El Paso Del Norte, people continued to build *acequias*, including “the Pueblo, Del Barro, La Colorada, Del Charro, La Horcasiteña, La Leyveña, Del Cuervo, La Aranda, and Doblado *acequias*. So critical was the system of *acequias* President Benito Juárez ordered the restoration of the *acequias* in 1866.”²⁰⁰ In 1851, more Anglo settlers arrived in the San Luis Valley in southern Colorado and began to irrigate, and by 1890 almost 300,000 acres there were under cultivation.

¹⁹⁹ Caleb Cushing, “Acrifinious Boundaries,” in *Opinions of the Attorneys General*, Vol. 8, (Washington D.C.: Government Printing Office, 1872), 175-180.

²⁰⁰ Edward Burian, *The Architecture and Cities of Northern Mexico from Independence to the Present* (Austin: University of Texas Press, 2015), 129.

The same trend occurred further down the Rio Grande in the Territory of New Mexico, and by 1880 farmers in New Mexico used water from the Rio Grande to cultivate 183,000 acres.²⁰¹ As seen above, the population of El Paso del Norte was much larger than that of the settlements on the U.S. side of the river and was drawing more of the water from the river than their U.S. neighbors, water that was decreasing steadily over time due to upstream irrigation.

In May of 1873, El Paso, Texas, became an incorporated city and moved the county seat to San Elizario. The population on the U.S. side of the Rio Grande at that time had reached 3,700 with 10,000 on the Mexican side. The cultivated area was approximately 15 square miles above the river and south of the river it was 16 miles long varying in width from 6 to 10 miles. The majority of residents north of the river were still ethnic Mexicans. According to El Paso historian W.H. Timmons, “the Anglo commercial elite looked down on the Mexican-American as a mixed breed, an inferior whose principal traits were ignorance, indolence, and backwardness. By nature he was lazy, irresponsible, untrustworthy, and dirty – in a word, he was labeled ‘a greaser.’”²⁰² These underlying racial prejudices exacerbated the problem of a dwindling water supply in an area where Anglos were the minority. Norris Hundley asserts that the reduced supply of water inflamed racial tensions to the point that although access to the salt flats above San Elizario triggered the El Paso Salt War of 1877, access to water troubled local officials as potentially the cause of the next outbreak of violence. Indeed, the following year low precipitation in Colorado further reduced the flow rate and farmers in Texas threatened to destroy the Mexican Dam north of El Paso that fed the *Acequia Madre* to get more water.²⁰³ William W. Follett, Assistant

²⁰¹ Alvin T. Steinel, *History of Agriculture in Colorado, 1858-1926* (Ft. Collins, Colorado: State Agricultural College, 1926), 28, as found in Hundley, 19.

²⁰² Timmons, *El Paso*, 162, 164.

²⁰³ Hundley, 19-20. Salt beds near the Guadalupe Mountains had been used freely by the residents in the El Paso/Juárez Valley from the beginning of Spanish settlement. Ethnic Mexican merchants sold the salt throughout the area, including into Mexico. In 1877, Judge Charles Howard announced that the property belonged to him and he

Engineer for the U.S. Boundary Commission, reported the river was dry in New Mexico from Albuquerque downstream to Las Cruces from July to October in 1878. The limited information regarding precipitation at that time for the Upper Rio Grande basin indicates that in 1879 rainfall was six inches below average.²⁰⁴ Low precipitation in the Upper Rio Grande Basin, which seems to be caused by the El Niño/La Niña cycle, is common every seven years or less. In 1880, the citizens of San Elizario petitioned for relief from taxes due to failure of their crops because of a lack of water, and El Paso County Judge H.C. Cook referred the matter to Texas Governor O.M. Roberts who in turn wrote to the U.S. Secretary of State. The Minister of Mexico investigated and in 1884 replied that it was drought and not the diversion of water from the Mexican Dam that had caused the problem. A little over thirty years after the Treaty of Guadalupe Hidalgo, the river that supplied water to Colorado, New Mexico, Texas, and Mexico had become a bone of contention between people who were envisioning themselves as opponents rather than neighbors.

In addition to the problem of the river's inconsistent supply of water, El Paso and Juárez also had problems with drinking water. In 1881, the first private water company opened in El Paso because the river water was "unfit for human consumption." The El Paso Water Company filtered river water, but evidently not very efficiently. *The Lone Star* newspaper editor S.H. Newman wrote in 1888, "The El Paso Water Company distinguished itself yesterday by supplying the consumers with the filthiest liquid that has ever entered a man." Supplemental

would charge a fee to harvest the salt. Louis Cardis saw an opportunity to increase his political constituency and rallied to the cause of the Mexicans and Mexican Americans protesting Howard's actions. Howard murdered Cardis, which unleashed a mob of ethnic Mexicans from both sides of the border that in turn killed Howard, two of his associates, and then went on a rampage of looting and rape. The mob defeated a group of Texas Rangers attempting to restore order, killing two of them. A posse of thirty men from Silver City, New Mexico, further complicated the situation by coming in and killing people and destroying property in the lower valley towns. A U.S. Congressional investigation took place, but no one was ever tried or convicted. Montejano, 23; Timmons, *El Paso*, 165; "El Paso Trouble, Texas," 45th Cong., 2nd sess., H. Ex. Doc. 84 (May, 1878), 3-6; "El Paso Troubles in Texas," 45th Cong., 2nd sess., H. Ex. Doc. 93 (May, 1878), 18.

²⁰⁴ Charles A. Timm, *The International Boundary Commission United States and Mexico*, 178; National Resources Committee, *Regional Planning, Part IV – Upper Rio Grande*, 143-144; as found in Alice M. White, "History of the Development of Irrigation in El Paso Valley" (M.A. thesis, The University of Texas at El Paso, 1950), 35-37.

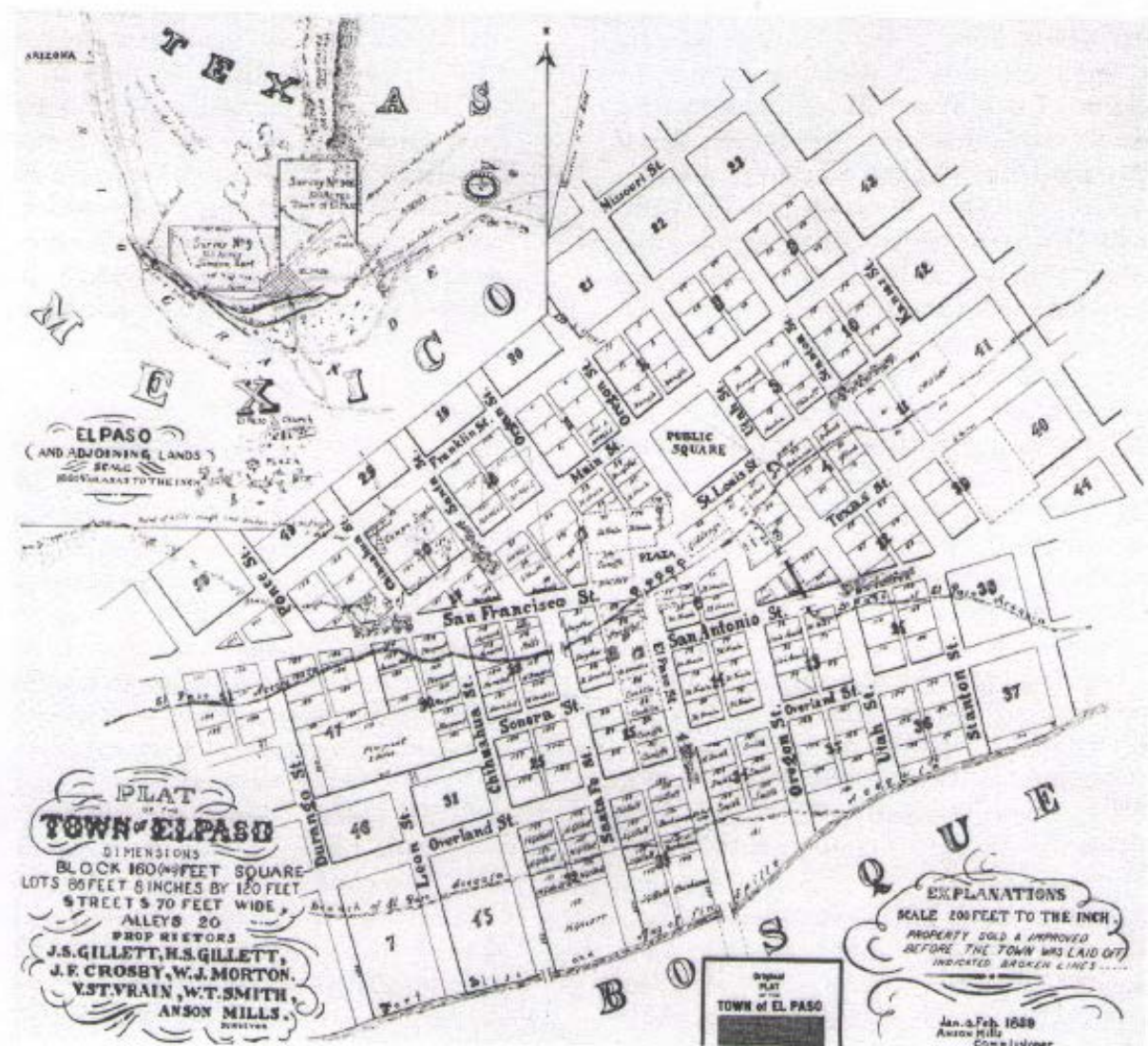
drinking water had to be brought in from Deming, New Mexico, and residents purchased water from wagons on the streets.²⁰⁵ In 1892, the city of El Paso dug wells on the east side of the Franklin Mountains, and more wells appeared as the El Paso metropolitan area grew. By 1904, the city was confident they had an “inexhaustible supply of water under the mesa” but it was not until 1912 that a water availability survey revealed that El Paso and Juárez shared the same aquifer, a fact not disclosed to Mexico.²⁰⁶

When El Paso incorporated in 1873 the city relied on two main canals, each with a branch (see Mills map below). The water was mainly used for irrigation, although some residents who did not have private wells also used river water for drinking. One of the first actions taken by the El Paso City Council in August of 1873, was to prohibit bathing in and throwing trash into the irrigation canals.²⁰⁷ They soon afterward passed an ordinance that required all those who used canal water for irrigation or for other purposes to perform maintenance on the canal in

²⁰⁵ Bryson, *The Land Where We Live*, 69.

²⁰⁶ Janet M. Tanski and C. Richard Bath, *Resolving Water Disputes Along the U.S.-Mexico Border: The Case of Paso del Norte* (New Mexico State University, Las Cruces: Border Research Institute, 1995), 6-7. The assertion that this information was kept from Mexico is made by Tanski and Bath.

²⁰⁷ Evidently the law against bathing in the canals was frequently ignored. Bryan W. Brown, describing his childhood in El Paso in the year 1903 reported, “The only place we had to swim was in the irrigation ditches or in the river. The *acequia*, the main irrigation ditch, came meandering out of the west from the head gates by Hart’s Mill. It came along the south side of San Francisco Street, crossing under a bridge at Santa Fe Street. It took a course to come out near the southwest corner of the intersection of El Paso and San Francisco streets back of the Sheldon Hotel (now San Jacinto Plaza) to a point back of what is now S.H. Kress & Co., thence east about a half a block south of St. Louis Street (now Mills) and over to Stanton where it turned and took a southeasterly course to a point about where the Mutual Federal Savings and Loan Association is located. From there it went directly east to the Magoffin Addition and the orchards in that area. There were other ditches in El Paso, but this was the principle ditch in the northern part of town. It served for irrigation until just before the turn of the century. The El Paso City Council was still asking the El Paso Irrigation Company to repair their bridges across the ditch as late as 1902; until 1903 remains of a bridge across the ditch at El Paso Street could be seen. Quicksand was everywhere, and parents not only warned their children not to go swimming but promised them severe punishment if they disobeyed. Too many people lost their lives either by drowning or being caught in quicksand.” Bryan W. Brown, *Boyhood in Early El Paso, 1903*, reprinted from *Password* (El Paso County Historical Society, 1970), 6.



THE MAP THAT MADE EL PASO.
 Drawn by Anson Mills in 1859, this widely
 circulated map became the hub from which
 El Paso spread from the downtown area to
 the City we know today.

Reproduced from Bryson, *The Land Where We Live: El Paso Del Norte*, 20.

proportion to the amount of water removed. All males over the age of eighteen not heads of households or engaged in farming had to work on the canals one day a year. In October of 1873, the El Paso City Council passed a tax to raise money to repair the canals. In 1875, El Pasoans

Joseph Magoffin and Adolph Krakhauer began the El Paso Mill and Irrigation Company and in 1882 investors in Austin, Houston, and London, England, incorporated another entity, the Rio Grande Del Norte Irrigation Company, but neither company accomplished any improvements to the existing canals or built any new ones. Serious flooding in 1884 led the citizens of the lower valley to once again petition for relief from taxes. In April 1888, a third company, the Rio Grande Valley Irrigation Company formed by men from El Paso and Ysleta, asked the El Paso City Council for a right of way to build a canal through the city to bring more water to the lower valley and then again in September asked that the city sign over a portion of the Ponce *acequia*.²⁰⁸ The City Council denied both petitions and turned to Anson Mills for advice on the issue of a reliable water supply.

After discussing his recommendations with the El Paso City Council, Anson Mills wrote to U.S. Secretary of State Thomas F. Bayard on December 10, 1888. He described the erratic behavior of the river, which usually flooded in May for about seventy-five days, but then would go completely dry and, at the time he wrote, “has no current, with not enough water in the pools to float the fish.” He expressed his opinion that it was not upstream diversions that impeded the flow because that water eventually returned to the river through evaporation, precipitation, irrigation overflows and drainage. Mills’ idea of a solution for multiple problems was to regulate the amount of water entering the El Paso/Juárez Valley. In his letter he described the frequent bed shifts caused by erosion and deposits that were usually gradual, but explained that rapid avulsive changes also took place when “hundreds of acres would be passed in a single day by a cutoff in a bend of one channel, and sometimes the bed would suddenly change from one firm bank to the other, a distance of perhaps 20 miles in length and by 6 miles in width.” During the

²⁰⁸ Minutes of the City Council, Book A, August 15, 1873; *The Lone Star* (El Paso, Texas), August 6, 1884; Minutes of the City Council, Book A, October 23, 1873; Deed Record Book F, 325, County Clerk’s Office, El Paso, Texas; *El Paso Times*, 2 December, 1884; Minutes of the City Council, Book E, Part II, 385-386.

flood of 1884, “the river swept suddenly from the Mexican side, crossed the Southern Pacific Railroad, and destroyed both track and bed for a distance of 15 miles, stopping traffic for a period of three months and causing the removal of roads to hills above the valley.” Mills had cautioned the City Council that the Rio Grande Valley Irrigation Company’s proposals would divert more water to the U.S. side of the river and antagonize Mexico. He reiterated in his letter that the Rio Grande was the “joint property of two nations,” pointing out that Mexico had a longer history of using the river than the U.S. and therefore had prior rights to the water diverted upstream in Colorado and New Mexico. Due to the arrival of the railroad in 1881, the population of El Paso had reached 11,000 by 1888 and had the potential of becoming a manufacturing center as well as a transportation hub. Mills suggested that hydro-electric power should also be considered as a legitimate use of the river. He proposed the U.S. and Mexico fund a dam at a pass three miles above the city of El Paso four to eight miles wide to create a reservoir with a four foot fall. This location already had a natural dam of rocks and boulders that the Mexicans maintained to divert water into the *Acequia Madre*, constantly replacing the rocks that high velocity flows washed away. Mills explained the reservoir would suspend silt and make keeping canals and ditches free from sedimentary deposits easier. The water held in the reservoir would have the time to warm and that would eliminate the problem of immediately applying the flood water, cold because it came from melted snow and ice, to tender new plants thereby avoiding checking their growth. He estimated the cost for both governments would be \$100,000 for the actual dam, \$100,000 to condemn the 50,000 acres that would be submerged, and \$100,000 to relocate 15 miles of the Atchison, Topeka, and Santa Fe railroad bed. By regulating flow, Mills argued, the banks of the river and location of the international boundary would be permanently established, as would “the boundaries and titles to private lands, and making it an easy matter to

collect duties and prevent smuggling, detect crimes and misdemeanors generally, arrest and punish criminals, as it is along other national boundaries.”²⁰⁹

Mills’ dam solution would take too long to build in order to satisfy the residents of Ysleta, who also rejected proposals to run a canal two hundred miles up the river to supply the Mesilla and El Paso/Juárez Valleys and another plan to dig a canal starting at Doña Ana. Another idea, the Stevenson Plan, proposed that the East El Paso Town Company offer shares of stock and dig and maintain a branch ditch from the Magoffinsville *acequia* to supply all of east El Paso. This idea also did not suit the residents of Ysleta who argued that they would still have to build their own canal to connect with this one and that they had prior use rights to the water in the river that would now be diverted before it ever reached them. The East El Paso Town Company changed its name to the El Paso Irrigation Company after incorporation and went ahead with constructing what came to be called the Franklin Canal. Lack of money and failure to receive right-of-ways in a timely fashion delayed the project, as did frequent reorganizations of the company. The canal was not completed until 1891 and the company went into receivership in 1892. After numerous changes in ownership, the company reorganized in 1898 as the Franklin Irrigation Company. The Franklin Canal did little to assuage the water problems in the Lower Valley, because it only carried water there in sufficient amounts when the flow rate over the Mexican Dam was high enough.²¹⁰ Ysleta, Socorro, San Elizario, and Clint continued to rely on their own canals.²¹¹

From the late 1800s onward, it became increasingly clear that the multiple problems related to the Rio Grande and its tendency to move, to flood, and to dry up could not be solved

²⁰⁹ Anson Mills, 259-265, 267.

²¹⁰ *El Paso Times*, November 10, 1888; *El Paso Times*, November 22, 1888.

²¹¹ The township of Clint is 3.2 miles east of San Elizario. In 1883 the San Elizario Corporation sold a plat of land in order to establish a Post Office along the railroad. By 1896 the site had a population of 150 engaged in growing fruit and alfalfa.

locally but were federal problems because, as the marker of the border between the U.S. and Mexico, they required international solutions. Cushing's opinion in 1856 had not settled questions regarding a permanent boundary location. In the 1860s, general flooding and intense flooding in 1863 and 1864 caused the Rio Grande to change its course farther south, leaving an additional one square mile of territory on the U.S. side. According to Conrey Bryson, who moved to El Paso in 1929 and wrote two histories of El Paso, this square mile of land was not worth much at the time of the new channel cutting, being a wasteland covered with a scrub plant called "chamizo." Bryson stated that neither nation was too concerned about the tract known as El Chamizal at the time.²¹² It was not until 1867 that the Mexican government questioned whether the boundary was fixed or not because the intense flooding had moved the river to the south side of El Chamizal. U.S. Secretary of State William Henry Seward reiterated U.S. Attorney General Cushing's opinion that the boundary was fixed regardless of changes in the channel location. Mexico dropped the matter until 1871 when the Mexican government protested that dikes built on the U.S. side of the river in Brownsville had caused erosion on the Mexican bank of the Rio Grande and increased accretion on the U.S. side. An investigation by the U.S. Consul at Matamoros concluded the opposite was actually taking place and Mexico did not contest the finding. In 1875, Mexico once again raised the matter of whether the boundary was permanent according to original surveys or was dependent on the current location of the river after changing course, leading to the Treaty of 1884.²¹³

In that treaty, Article I stipulates that the boundary agreed upon in the 1852-1853 surveys would be the dividing line between the two nations in perpetuity "notwithstanding any alterations in the banks or in those rivers affected by natural causes through the slow and gradual

²¹² Bryson, *The Land Where We Live*, 24

²¹³ Mueller, 39.

erosion and deposition of alluvium and not by the abandonment of an existing river bed and opening of a new one.” Article II reiterates that if the river cut a new bed due to changes in the flow rate, or developed additional channels, or should another channel become the deepest one, these events “shall produce no change in the dividing line as fixed by the surveys of the International Boundary Commissions in 1852; but the line then fixed shall continue to follow the middle of the original channel bed even though this should become wholly dry or be obstructed by deposits.” Article III states that neither nation can construct anything artificial that would impede navigability along the river but that “protection of the banks from erosion on either side by revetments of stone or other material not unduly projecting into the current of the river shall not be deemed an artificial change.”²¹⁴ The prohibitions against building anything that would impede navigability and the lack of specific provisions concerning the regulation of the river’s waters in the Treaties of 1848, 1855, and 1884 would lead to significant disputes in the future when the great dam building projects of the twentieth century began, disputes that would only be settled through international negotiations lasting until both nations signed the Treaty of 1944.²¹⁵

At the end of 1888, the El Paso City Council wrote to the U.S. State Department protesting five wing dams constructed on the Mexican side of the river that they claimed artificially altered the course of the channel and eroded the U.S. bank. This, the El Paso City Council said, was a clear violation of the 1848 and 1884 treaties. In addition, they feared Mexico

214 “Convention between the United States of America and the United States of Mexico, Touching the International Boundary Line Where It Touches the Bed of the Rio Colorado.” 24 Stat. 1011 (1884). These provisions would be extended to the Rio Grande in “Convention between the United States of America and the United States of Mexico. Extending for a Period of One Year from December 24, 1889, between the Two High Contracting Parties Concerning the Water Boundary.” 30 Stat. 1744 (1898). Ratifications Exchanged at Washington, February 2, 1899.

215 J.F. Friedken, United States Commissioner International Boundary and Water Commission, “History and Functions of Joint Mexican-American Public Bodies Regulating and Allocating Water Resources Along the Rio Grande (Bravo),” in *International Water Law Along the Mexican-American Border: A Symposium held during the forty-fourth annual meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science, April 29-30, 1968, El Paso Texas*, ed. Clark S. Knowlton for the Committee on Desert and Arid Zones Research (El Paso: The University of Texas at El Paso, 1972), 1.

was planning to construct a new dam across the entire river, although the Mexican government assured the U.S. State Department that only new wing dams were under consideration.²¹⁶ The U.S. Army Corps of Engineers investigated and found that the Mexican wing dams were indeed eroding the U.S. bank and were “an invasion of the territorial sovereignty of the United States.” This report prompted official complaints to Mexico.²¹⁷

By this time it had become clear that some sort of solution for the boundary problems in the El Paso/Juárez area where two nations shared a common river had to be addressed. In March 1889, both nations agreed to a Convention that included instituting an International Boundary Commission (IBC) to operate for the next five years to “facilitate the execution of the provisions contained in the Treaty...of 1884, and to avoid the difficulties arising from the changes in the beds of the Bravo del Norte and Colorado Rivers in those parts which serve as a boundary between the two republics.” The IBC had the discretion to “conclude the examination and decision of the cases which have been submitted to it.”²¹⁸ It took until January 8, 1889 to organize the IBC, making José M. Canalizo the first Mexican Commissioner and Anson Mills the first U.S. Commissioner. One of the immediate problems they tackled was the issue of *bancos*, a Spanish term for sandbars, formed when meander cutoffs turned back on themselves and parcels of land formed in the shape “of a pear or gourd, with the stem cut by the river’s current at the moment of separation. In many cases...[the] banco would be entirely cut off from the river and be wholly surrounded by land within the jurisdiction of the other country.” Mills observed this process was one of both gradual erosion and sudden avulsion and occurred when

²¹⁶ Mueller, 43-44.

²¹⁷ Douglas R. Littlefield, *Conflict on the Rio Grande: Water and the Law, 1879-1939* (Norman: University of Oklahoma Press, 2008), 21.

²¹⁸ “Convention between the United States of America and the United States of Mexico. Extending for a Period of One Year from December 24, 1889, between the Two High Contracting Parties Concerning the Water Boundary.” 30 Stat. 1744 (1898).

the river was running low as well as high. Mills and Canalizo informed their respective governments that they agreed the Conventions of 1884 and 1889 had not foreseen a settlement for this issue and suggested amending Articles I and II of the Treaty of 1884 so that *bancos* could be transferred to the sovereignty of the appropriate government according to their location. Private ownership would not be affected and the boundary would remain the center of the river as it ran at the time before the *banco* formed. Both governments eventually agreed to these provisions by treaty in 1905.²¹⁹

Meanwhile, Anson Mills was still pushing the idea of an International Dam at El Paso to assure the valley a reliable source of irrigation water and establish a permanent boundary line by eliminating meanders caused by flooding. Anson Mills and William W. Follett, then working with the U.S. Geological Survey, as well as Colonel E.S. Nettleton of the Powell Irrigation Survey, conducted further studies and surveys for a dam at El Paso on the site Mills had proposed. They submitted their findings to the U.S. Geological Survey on October 10, 1889. In this second attempt to sway the U.S. Congress, Mills offered greater technical details regarding the project, but unfortunately reiterated his view that Mexico had prior appropriation rights and the U.S. should either indemnify them or offer some form of reparations. This was not a popular view at that moment in the U.S. as questions regarding prior appropriation water rights were moving through multiple U.S. courts at the time, as will be discussed in Chapter Three. Mills suggested that the U.S. pay all costs of construction, except for one-half of the actual dam that Mexico would have to fund, allow Mexican workers to provide labor for the project, and have an international commission administer the dam project as well as address straightening the river

²¹⁹ Anson Mills, 278-279.

bed to settle questions regarding the location of the international boundary.²²⁰ Apportioning the water and settling water rights along a river that ran through three U.S. states before it reached the site where it belonged to two nations had by then become so complicated legally there was no action taken on this proposal for ten more years.

While the U.S. Congress debated the International Dam idea another situation the IBC faced in 1895 was the issue of El Chamizal and the location of the border. In 1894 Pedro Garcia complained to the Mexican Foreign Office that the shift in the course of the river in 1863 and 1864 had separated the tract from his holdings in Mexico. The Mexican Foreign Office referred the case to the IBC. The problem of sovereignty rested on the question: was the change gradual erosion as covered in Article I of the Treaty of 1884, or sudden avulsion that had cut a new bed or created a deeper channel other than the one in the original survey? Again the question arose, was the boundary fixed or mobile? Don F. Javier Osorno, then the Mexican Boundary Commissioner, and U.S. Commissioner Mills heard the case. Osorno decided that any slow and gradual change would not cause the river to cease to be the boundary line, but in this case the change in the river was neither slow nor gradual, therefore the original boundary line was the one surveyed in 1853. Mills disagreed and argued that if the change in course was not slow and gradual the boundary line drawn in 1853 would have no

“points in common with the present river...[and that] to restore and establish this boundary will be the incessant work of large parties for years, entailing hundreds of thousands of dollars in expense to each government and uniformly dividing the lands between the nations and individual owners, that are now, under the suppositions that for the past forty years the changes have been gradual, and the river accepted generally as the boundary, under the same authority and ownership; for it must be remembered that the river in the

²²⁰ Anson Mills and William W. Follett, “Reports on the Investigations and Survey for an International Dam and Reservoir on the Rio Grande del Norte to Preserve the Boundary between the United States and Mexico by Controlling the Flood Waters of Said River, with Appendices A, B, and C,” in *Proceedings of the International (Water) Boundary Commission, United States and Mexico, Treaties of 1884 and 1889; Equitable Distribution of the Waters of the Rio Grande, United States Section* (Washington, D.C.: 1903), 2:393-394.

alluvial lands, which constitutes 800 miles, has nowhere today the same location it had in 1853.”²²¹

The matter languished in the realm of diplomacy until 1911. In that year, the Honorable Eugene Lafleur, a Canadian jurist and respected expert on international law, came to El Paso to serve as the Presiding Commissioner of the IBC’s Tribunal of Arbitration to hear the case. This time the Mexican argument was that the boundary was fixed by treaty in 1855 as the middle of the deepest, active channel surveyed in 1852-1853 and any channel shifts either erosive or avulsive were only covered in the Treaty of 1884, which was not retroactive. Since the major change in the river’s location occurred 1863-1864 the original boundary was still valid. The Mexican government also firmly contended the Treaty of 1884 was not applicable because at the time of signing neither government had understood the behavior of the river, and that international law regarding rivers as boundaries “had no application [here] because the Rio Grande was in a technically legal sense not a river at all, but merely an intermittent torrential stream.” The U.S. argued that the Treaty of 1884 was indeed retroactive, was a declaratory statement of international law, and that the treaties of 1848 and 1855 had not set a fixed boundary line. Their argument was that when the river moved, the border went with it. The U.S. claimed El Chamizal by prescription, a type of easement that grants a party the right to use property owned by another party if the use has been open, continuous, and complies with statutory limitations.²²²

The trial lasted for over a month. Lafleur ruled against the U.S. claim of prescription and against the Mexican contention of a fixed line and non-retroactivity of the Treaty of 1884, which he found was indeed applicable. Lafleur decided the treaty allowed for a *tertium quid*, a third choice between erosion and avulsion, an option he labeled “violent” erosion causing an avulsive

²²¹ Anson Mills, 288-289.

²²² Anson Mills, 288-290.

change. He considered that witness testimony indicated that erosion along the tract had been gradual from 1852 onward and the boundary had remained the deepest river channel until the violent erosion that occurred during the flood of 1863. He ruled that the boundary line was still the middle of the river “as it existed before the flood of 1863.” He awarded the land between the 1852 survey line and the current location of the channel after the floods of 1863 and 1864 to the U.S. and the rest of the tract below that line to Mexico. Osorno dissented due to Lafluer’s findings on the fixed line theory and retroactivity of the 1884 Treaty. Mills also dissented because he did not agree the IBC had the power to divide the tract but needed to render “a clean-cut decision in favor of one or the other government.” He added that “it is [not] given to human understanding to measure for any practical use when erosion ceases to be slow and gradual and becomes sudden and violent.” Mills also pointed out that “the river from the Bosque de Cordoba [sic, Córdoba Island], which adjoins the Chamizal tract, to the Gulf of Mexico (excepting the canyon region) has been traversed by the river since 1852 in its unending lateral movement, and the mass, if not all of that land, is the product of similar erosion to that of which occurred at El Chamizal.” He argued that it would be “as impossible to locate the channel prior to 1864 as to re-locate the Garden of Eden or the lost continent of Atlantis.” Mills’ frustration became even more evident when he stated, “by the new interpretation which is now placed upon the Convention of 1884 by the majority of this Commission, not only is the entire boundary thrown into well-nigh inextricable confusion, but the very treaty itself is subjected to an interpretation that makes its application impossible in practice in all cases where an erosive movement is in question.”²²³

The inability to rely on the Rio Grande as an exact marker of the border when determining property rights and legal sovereignty continued to exacerbate smuggling and other

²²³ Anson Mills, 293-295.

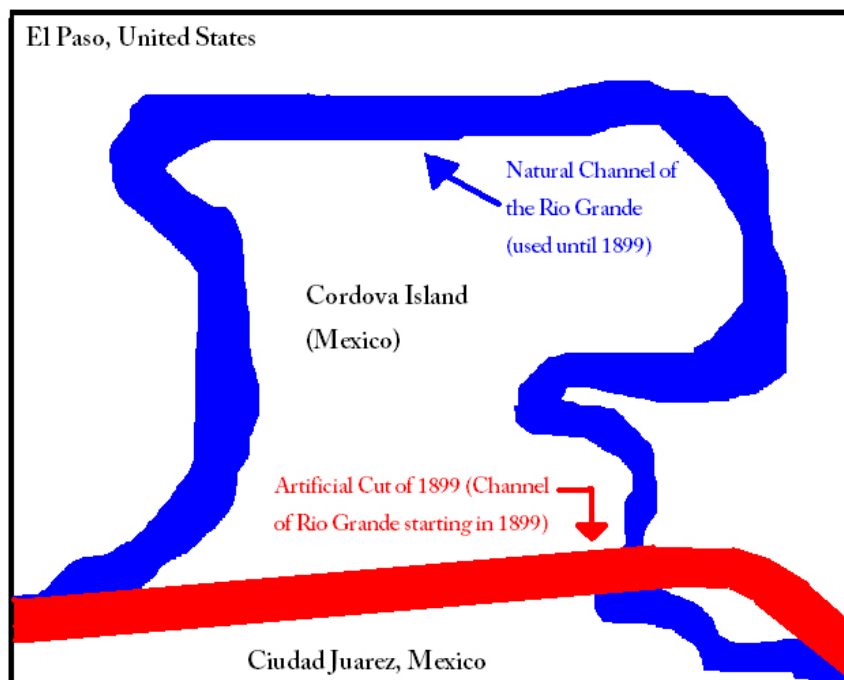
illegal activities.²²⁴ A prime example is the tract of land called Córdova Island where an oxbow had formed over time east of El Chamizal. On May 26, 1897, a major flood hit both cities with a discharge of 11,583 cfs, a flow rate that exceeded all previous records. El Paso Mayor Joseph Magoffin and the Municipal President (Mayor) of Juárez, Prieto Basave, met with the IBC on June 18, 1897, to propose moving forward with W.W. Follett and E. Corella's survey that indicated cutting a channel straight across the bottom of the oxbow would allow for unimpeded flow and lower the flooding risk. Assistant Secretary of State William R. Day notified Mills on January 10, 1898, the project had been approved, although the government of Mexico notified the U.S. State Department on January 6, 1898, that Mexico would not cede any territory. The city governments of El Paso and Juárez reached an agreement on March 13, 1898, as to how the work would proceed. El Paso Mayor Joseph Magoffin successfully negotiated with Mexican officials to allow mules, scrapers, and teamsters to cross from El Paso into Mexico to conduct their portion of the construction and promised that the city of El Paso would pay all the costs for the project. A Joint Commission of the IBC agreed on April 29, 1898, that "jurisdiction of land

²²⁴ Anson Mills included an interesting anecdote regarding assumptions regarding voting rights and citizenship along the border in his autobiography. In 1894 Commissioners Mills and Osorno took testimony from witnesses regarding the Banco de Granjeno [sic], which formed 7 miles upstream from Reynosa and Hidalgo. While traveling to the meeting, Osorno observed a large number of Mexicans carrying American flags, beating drums, and participating in an election rally in Havana, Texas. Several of these men appeared before the Commissioners the next day to testify in the banco matter. During the swearing-in, Osorno asked a Mr. Sancho Panza to state his country of origin, and Panza stated he was a Mexican citizen. According to Mills, the conversation went as follows: "Osorno looked 'astonished,' and asked Panza why he was carrying an American flag in Texas if he was a Mexican citizen. Panza replied, 'Oh, it was election time.' 'Election time,' said Mr. Osorno; 'what have you to do with elections in Texas?' 'Oh, we all go over there for elections!' Understanding the habits of frontier people better than Mr. Osorno, I suggested asking if he had voted. Rather reluctantly Mr. Osorno said: 'Did you vote in Texas?' 'Oh, yes, sir.' 'Well how can you be a Mexican citizen if you vote in Texas?' 'Oh,' said Sancho, 'if you don't believe I am a Mexican citizen I will show you a certificate of my consul!' pulling out a paper signed by the Mexican Secretary of the Boundary Commission, formerly the Mexican Consul at Brownsville, certifying he was a Mexican citizen....During the course of the examination of the other nine witnesses examined we found six claimed to be Mexican citizens though admitting they had voted in Texas the day before, which explained the fact that although the registered voters in the county numbered but 650, the Democratic majority footed up over 1,200!" Anson Mills, 280-281. Although these events took place downstream from El Paso, it is more than likely the same thing happened all along the border, illustrating that although the U.S. and Mexico claimed the international boundary was a finite, legal separation between the two nations, people living in the Borderlands had a more fluid understanding of what it meant to live in the zone divided by the border.

cut off from each nation by the river changes would not be affected.”²²⁵ Unfortunately, Mexican authorities were slow to begin the work, and on August 3, 1898, Mills wrote to Follett asking him to pressure Mayor Magoffin to persuade Mayor Basave to get the project moving forward. Mills wrote to Follett again on March 6, 1899, regarding his concerns that spring flooding might separate the neck of the tract and the cut-off would not actually work. Follett replied to Mills on April 16, 1899, that the cut-off was complete, after more than 22,000 cubic yards of earth were moved, making the new channel deeper than originally planned. By July of 1899 water was running well through the cut-off, although by December the new channel was completely dry. This prompted concerns that drifting sands might clog it, but Mills was confident the spring rise in the river would scour the bed.²²⁶

²²⁵ Conrey Bryson, *Down Went McGinty: El Paso in the Wonderful Nineties* (The University of Texas at El Paso: Texas Western Press, 1977), 119; Cleofas Calleros, “Mayor Magoffin was Prime Mover in Cordova Project,” *El Paso Times*, September 20, 1953; “In Old El Paso – Forty Years Ago,” *El Paso Herald Post*, April 14, 1939; “Memorandum from the Commissioner (IBC) March 6, 1936,” Records of the IBWC, Córdova Island, August 1897-August 1967, National Archives and Records Administration (NARA) Ft. Worth, Texas, RG 076-88-0001 3-33, Folder B.5.1.1.

²²⁶ Mills to Follett, August 3, 1898; Mills to Follett, March 6, 1899, Follett to Mills, April 16, 1899, Records of the IBWC, Córdova Island, August 1897-August 1964, NARA, Ft. Worth, Texas, RG 076-88-0001 3-33 Folder B.5.1.1.



Córdova Island Natural Channel and Artificial Cut of 1899
https://www.nps.gov/cham/learn/historyculture/images/Cordova_Island_Sketch.jpg

The cut-through channel created Córdova Island, which was not really an island because it was not surrounded by water. This attempt to address flooding did not settle questions as to the location of the boundary line. On December 4, 1901, U.S. IBC Commissioner Anson Mills wrote a letter to the IBC Joint Engineers asking them to place boundary monuments in the old channel bed to mark the boundary, and they completed the work by January 18, 1902. Mexican IBC Commissioner Fernando Beltran Puga complained in a joint IBC meeting held on June, 17, 1907, that the monuments did not adequately mark the boundary and requested that seven more be added for a total of seventeen and that a new survey take place. Additionally, in 1907 both nations had decided to build 60 ft. wide highways in their respective countries along the boundary line, but could not begin construction because the line was still not set. William W. Follett wrote to Mills on July 1, 1907, explaining that of the nineteen markers near Córdova Island Monument Number 1 could stay in place, but all the rest would need to move with the

exception of Monument Number 7, which might remain in place. By December, highway construction was still stalled as the IBC surveys continued.²²⁷

During the Mexican Revolution, which began in 1910, the fact that there was no barrier between Córdova Island and the U.S. increased fears in that nation about smuggling and loss of life. Pascual Orozco, Francisco “Pancho” Villa, and Francisco I. Madero had joined forces in 1911 to take Ciudad Juárez, using as their headquarters La Casita Gris (the little gray house), which is still standing on the Mexican side of the river.²²⁸ IBC Chief Engineer Follett sent a telegram to U.S. IBC Commissioner Mills on July 5, 1912, stating “Orosco[s] [sic] men are preparing to place a camp on Córdova tract. They would there be almost surrounded by American soil and the [Mexican] federals could not dislodge them without firing into American territory. It will be almost impossible to prevent ammunition smuggling.”²²⁹ By 1918, the IBC was still attempting to find a way to resolve the Córdova Island problem. U.S. IBC Consulting Engineer Corbin wrote to U.S. IBC Commissioner Lucius D. Hill on April 20, 1918, suggesting that the U.S. exchange some land at San Elizario Island for possession of Córdova Island, but as part of the bargain Mexico would have to waive all rights to El Chamizal. Mexico would get 15 miles of riverfront and more access to river water if all U.S. and Mexican landowners agreed to the exchange. Negotiations began, and by August of 1923 the Mexican press reported Mexico had acquired the land, but that was inaccurate as all landowners had not agreed to the idea.²³⁰

²²⁷ Mills to IBC Joint Engineers, December 4, 1901; Minutes, Meeting of Joint Commission in Juárez, June 17, 1907; Mills and Puga to IBC Joint Engineers, July 1, 1907; Follett to IBC, July 2, 1907; Records of the IBWC, Córdova Island, April 1890-Dec. 1945, NARA Ft. Worth, Texas, RG 076 076-0009, Unprocessed Box, Folder B-6.1.2.

²²⁸ The house can still be seen from the location of the American Dam, 140 ft. above the location where the Rio Grande becomes the international boundary.

²²⁹ Follett to Mills, July 5, 1912, NARA Ft. Worth, Texas, RG 076 076-0009, Unprocessed Box, Folder B-6.1.2, Records of the IBWC, Córdova Island, April 1890-Dec. 1945.

²³⁰ Corbin to Hill, “Suggestion of an Exchange of Territory Near Texas, to Render Possible a Satisfactory Permanent Boundary Line,” NARA Ft. Worth, Texas, RG 076 076-0009, Unprocessed Box, Folder B-6.1.1, Records of the IBWC, Córdova Island, April 1890-Dec. 1945.

In October of 1922, IBC meetings in Juárez illustrate several examples of the problems caused by the behavior of the river and the uncertain boundary line. The Mexican Commissioner, Felipe Ramos, brought up multiple complaints lodged with him by Mexican citizens. El Paso citizens Messers, Wells, Stillwell, and Spears had constructed a dam made of brush on the U.S. side of the river opposite the El Porvenir colonia, which had inundated the property of Mexican citizens. Ramos thought the dam should be destroyed. Ramos also reported that José Loya, Cirilo Loya, Zefernino Carbajal, and José Figueroa had told him American citizens had seized and taken possession of a tract of land they owned on the riverbank near Real de San Lorenzo. This was a banco dispute that was supposed to have been settled in 1907, but had either been overlooked or the river had moved again since that time. Another matter needing a resolution was that on May 11, 1922, the city of El Paso had erected protective works to limit flooding on the left bank near the Santa Fe Bridge, in violation of a November 28, 1917 agreement between the Boundary Commissioners. This particular construction was outside the boundary line agreed to in 1917. Additionally, the projection was causing major trash accumulation in the area. The Chief of the Comisión on Protective Works of the Río Bravo in the Juárez Valley also reported to Ramos that in the neighborhood of the Isla de Córdova there was existing and ongoing construction of protective works projecting into the riverbed and producing deviations of the current, pushing the river toward the Mexican bank. These projections damaged and threatened the stability of the protective works on the lowlands subject to inundation on the Mexican side, in violation of the provisions of Article III in the Treaty of November 12, 1884. Gabriel Saenz, president, Victoriano Carrasco and Alejandro Ramos, directors, of the Sociedad Agrícola El Mulato wanted to know if they could claim a banco that had formed on the right bank of the Río Bravo at the town of El Mulato. Ramos had told them to stake it and lay claim to it as soon as

possible. The U.S. Commissioner, Anson Mills, agreed to have his engineers investigate all of the projections constructed on the U.S. side of the river, as well as the banco situations.²³¹

While these and similar problems, as well as the land swap idea, lingered throughout 1923, the next solution the IBC proposed was building a fence at Córdova Island to establish jurisdictional control over that area. On October 13, 1923, U.S. IBC Commissioner George Curry wrote to U.S. Secretary of State Charles Evans Hughes that he had obtained an estimate of \$7,500 to build a 7 ft. high fence with 2 in. mesh along the Córdova cutoff. Curry added that he had correspondence from the U.S. Departments of the Treasury, Labor, and Justice and that they were all “very anxious to have the fence constructed.” He added that the Mexican IBC Commissioner also recommended erecting the fence and agreed that Mexico would pay half the construction costs.²³²

Meanwhile, the cut-through at Córdova Island continued to affect access to irrigation water and called into question legal jurisdiction over land titles. In April of 1927, Julio Michel, Attorney, representing the Mexican Department of Agriculture, notified the American Consulate in Juárez that several Córdova Island landowners wanted to sell their holdings because they could no longer get irrigation water from the Mexican canals. Instead, they had to pay the El Paso Irrigation Improvement District No. 1 \$7.00 per acre for water in advance, even though there was no guarantee they would get any water in drought years. In another example, The International Investment Company owned approximately 240 acres on Córdova Island, the El Tornillal Land Co. S.A. owned approximately 111 acres, and the heirs of José M. Flores held 7.4

²³¹ Records of the IBWC, Minutes 3-8 October 16, 1922, NARA Ft. Worth, RG 6 E. 076 –FOR – 01, Box 1, Folders # 1-60, October 3, 1922 – June 5, 1925.

²³² Curry to Hughes, NARA Ft. Worth, Texas, RG 076 076-0009, Unprocessed Box, Folder B-6.1.2, Records of the IBWC, Córdova Island, April 1890-Dec. 1945.é Records of the IBWC, Minutes 3-8 October 16, 1922, NARA Ft. Worth, RG 6 E. 076 –FOR – 01, Box 1, Folders # 1-60, October 3, 1922 – June 5, 1925.

acres. The value of the land held by the two companies was \$145,000. But by 1930, these owners had learned that, under Mexican law, they did not have clear title to the land. Herschel V. Johnson, Chief of the Division of Mexican Affairs, U.S. Department of State, wrote to U.S. IBC Commissioner Lawrence M. Lawson multiple times in 1930, and included a brief from Ricardo E. Mora, Attorney, El Paso, representing the El Tornillal Land Co. S.A., stating that the Mexican Secretary of State had sent Jesus E. Valenzuela to survey the land and Valenzuela claimed the owners could not present original titles. Under the Mexican Constitution, Article I - The Law of Lands July 20, 1863, the land was therefore barren and the property of the federal government of Mexico, and had been declared as such on March 26, 1894. Mora stated the owners had been given notice to vacate in thirty days, although Brewster Cameron, Juan Neftali, and Apolonio Sanchez had purchased the land on July 27, 1908 and had given Mora the incorporation documents and deed numbers, which were filed in the U.S. All parties were asking for some resolution to the question: which legal system would prevail, that of the U.S. or Mexico?²³³

Adding to the mix, was the fact that in the 1920s Prohibition was in effect in the U.S., but not in Mexico. According to Conrey Bryson,

“When I came to El Paso in 1929 it [Córdova Island] was a place of conflict and peril. From my room at the YMCA, then on Oregon and Missouri, we could hear the gun battles as smugglers tried to make their way through the dense thickets of Córdova Island. During the prohibition era, good Mexican whiskey was bringing \$30 to \$40 a quart in Chicago and running it across the border at El Paso was a thriving business. At least seven border patrolmen of the Immigration and Customs Service, and uncounted smugglers were killed on Córdova Island and in the vicinity of San Elizario, farther down the river.”²³⁴

In May 1928, Mayor R.E. Thomason, El Paso, wrote to Secretary Andrew Mellon, U.S. Treasury Department, with a litany of complaints concerning Córdova Island. Thomason reported that the

²³³ Johnson to Lawson, Correspondence, Summer 1930, NARA Ft. Worth, Texas, RG 076 076-0009, Unprocessed Box, Folder B-6.1.2, Records of the IBWC, Córdova Island, April 1890-Dec. 1945.

²³⁴ Bryson, *The Land Where We Live*, 24.

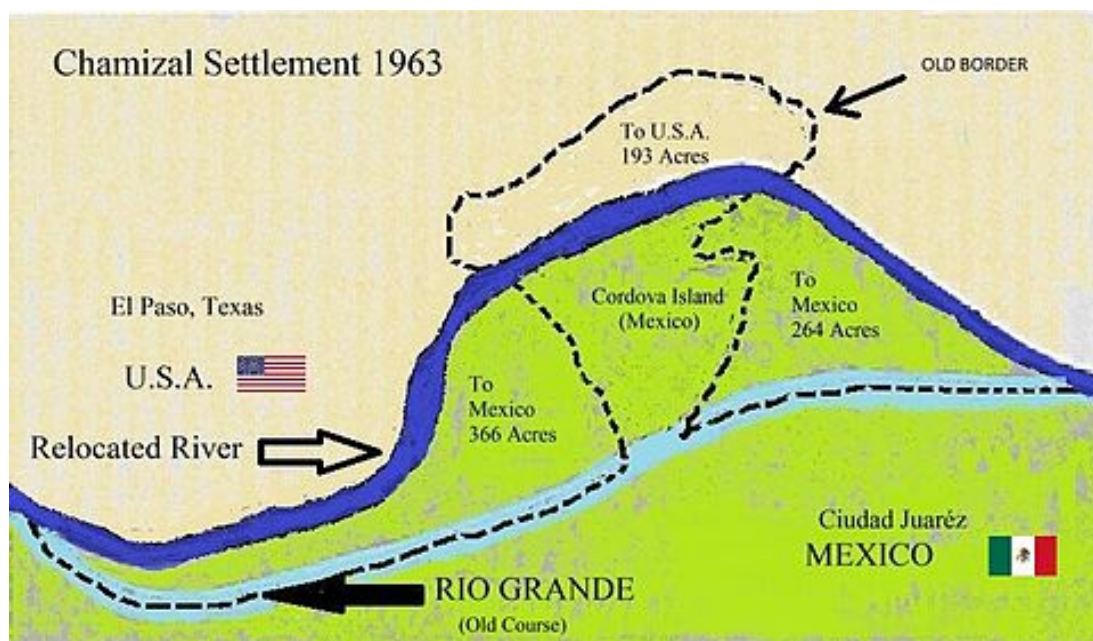
“Hole in the Wall Saloon” might be on land claimed by Mexico, but was actually in the heart of El Paso, and “for all practical purposes is on American soil and in the city limits of El Paso” near businesses and a school. The saloon was three miles from the city limits of Juárez with no direct bridge to Mexico, therefore the Mexican police did not patrol there. He went on express that the citizens of El Paso shared his outrage and informed Mellon,

“This place has been enlarged and all kinds of vice and immorality are flourishing and several hundreds of people visit the place every afternoon and night. The larger crowds are found there after the international bridge closes at 9 p.m....Fights and brawls are almost nightly affairs....There is no sewage or sanitation and the health of Americans is endangered. So many complaints have come to me from fathers and mothers of young people who visit the place, as well as good American citizens both living in the neighborhood and living throughout the city....U.S. Customs laws, immigration laws, and public health laws are daily violated. A port of entry has never been established at this point and under present conditions there is nothing to keep American citizens from walking to and fro across the boundary line. Reports are coming to me that many people remain at this resort until three and four in the morning and also that aliens are slipping into this country along with the Americans when they return home....This situation seems to me to be an outrage on decency and an insult to the American government and its laws.”²³⁵

U.S. IBC Commissioner Lawson also wrote to Secretary Mellon on June 26, 1928. He explained that by agreement the Córdova tract was Mexican territory, but that 90% of the land was owned or controlled by American citizens. He stated that he and his Mexican IBC counterpart were working on surveys to rectify the river and permanently establish the location of the border. Lawson also touted the idea of exchanging land at San Elizario for Córdova Island and that field surveys were taking place in both locations to enable this. Unfortunately, the proposed fence had not yet been built because, as Lawson surmised, Mexico did not have the funds. Lawson also notified Mellon that U.S. Customs, Immigration, and Public Health officials were concerned about the saloon situation and he suggested Mellon request all of these officials

²³⁵ Consul John W. Dye, Juárez, “Political Conditions in the Ciudad Juárez District During May 1928,” Records of the IBWC, Córdova Island, April 1890-December 1945, NARA Ft. Worth, Texas, RG 076 076-0009, Unprocessed Box, Folder B-6.1.2.

provide the Secretary of State with confidential reports.²³⁶ Rectification during the 1930s did not resolve the issue of the location of the border at Córdova Island or El Chamizal, as will be discussed in Chapter Four. The jurisdiction over Córdova Island was not settled until the matter became part of the Chamizal Settlement in 1963, when the U.S. agreed to return El Chamizal to Mexico as federal land, and cut through Córdova Island again, cementing a new channel between El Paso and Juárez. The U.S. replaced the 200 acres Mexico lost from Córdova Island with a downstream parcel. El Chamizal property owners lost their land titles and had to move.²³⁷



Chamizal Settlement 1963
https://upload.wikimedia.org/wikipedia/commons/thumb/d/de/Chazimal_dispute_map_01.jpg/480px-Chazimal_dispute_map_01.jpg

Boundaries between nations are political divisions, but the Rio Grande is a shared natural resource the U.S. and Mexico depend upon for development. When the authors of the 1848 Treaty of Guadalupe Hidalgo set the international boundary line at the Rio Grande they did not

²³⁶ Lawson to Mellon, June 26, 1928, Records of the IBWC, Córdova Island, April 1890-December 1945, NARA Ft. Worth, Texas, RG 076 076-0009, Unprocessed Box, Folder B-6.1.2,

²³⁷ Jeffrey M. Schulze, "The Chamizal Blues: El Paso, the Wayward River, and the Peoples in Between," *The Western Historical Quarterly* Vol. 43, No. 3 (Autumn 2012): 301-322.

foresee the problems this would cause for future generations. At the time it appeared to be a sensible solution; this was the border that had been claimed by Texas and the U.S. and it seemed like an easily recognized permanent separation between the U.S. and Mexico. The parties to the treaty did not consider how inaccurate maps, an unreliable survey, the underdeveloped nature of international law regarding borders and water rights, and limited understanding concerning the behavior of the river would impact the future. The international boundary was determined by conquest and then by settlement. Racial stereotypes and tropes of Anglo-Saxon superiority exacerbated a general disdain in the U.S. for Mexico and Mexicans, meaning that Anglos living along the river in the U.S. believed they had the better claim to the waters of the Rio Grande. The uncontrollable elements of drought and flood, paired with primitive engineering, had made the river an acceptable source of irrigation when the population drawing water from the Rio Grande was low, but when that changed the pressures over water allotment reached critical mass. The internal political and economic problems in Mexico forced that nation to perpetually negotiate from a position of weakness and, in retrospect, meant that negotiations over the location of the boundary and the distribution of the river's water were so unsatisfactory that the disputes dragged on far longer than they should have. The establishment of an International Boundary Commission to adjudicate these issues seemed to be a fair and equitable means for settling differences over the location of the boundary, but in reality the IBC was under the jurisdiction of two federal governments with divergent interests. The Rio Grande in the El Paso/Juárez Valley had proven to be a very problematic international border.

Chapter 3: Environmentalism, Water Law, and State Formation - Controlling the Rio Grande in the El Paso/Juárez Valley

Despite the fact that in 1848 the Rio Grande became the marker of the U.S.-Mexico border, people on both sides of the border in the El Paso/Juárez Valley continued to face common problems together. Ever since the Spanish settlements began in the early seventeenth century, humans had been trying to control the natural dictates of the desert climate and the amount of water the river provided. When the population began to substantially increase on the U.S. side of the river after 1848, sharing the available water and preventing flooding became a prime concern for both Mexican and American residents. In the nineteenth century, in both countries, public understandings of the role of nature, and the ability of humans to manage it, began to work in tandem with ideas about economic development and prosperity. As more and more people began competing for water in arid regions, the laws and court decisions regarding water rights evolved in both nations, illustrating how the state steadily became more involved in overseeing irrigation and access to water. From the late 1800s onward, residents in the valley turned to their local, state, and federal officials to address the water supply and flooding problems, but because the river is also the international boundary cooperative solutions to the shared problems of the valley seemed impossible. Both nations remained committed to protecting their own citizens rather than recognizing the valley was a shared bi-national space. It took decades of complaints to convince federal authorities to get involved, and that only happened when both federal governments became committed to conservation and reclamation for economic development. In the twentieth century, that common drive to alter and control nature led to international cooperation to address the problems of drought and flooding in the valley. Nature created the environmental conditions that convinced residents in the El

Paso/Juárez Valley that the Rio Grande needed to be managed and controlled, but it was the commitment of the state to intervene that made it possible.

Influenced by the Romantic Era in Europe, Americans had already developed a fascination with nature before the twentieth century. From the late eighteenth century to approximately the mid-nineteenth, European artists and intellectuals centered individualism and emotion in works of art, and glorified the pristine natural world as inherently good. Landscapes became a prominent form in paintings and illustrated the power and beauty of nature. Travelogues that included detailed descriptions of the natural landscape became a popular literary genre. Romanticism also influenced the development of political thought. Stressing freedom of the individual, the immediate political effect was a turn toward liberalism. Romanticism also impacted conceptions of nationalism and that, in conjunction with the growing fascination for the natural sciences, led intellectuals writing about America to pair ideas about the nation with representations of nature.

William Bartram, Thomas Jefferson, and J. Hector St. John de Crèvecoeur, all composing their works in the late eighteenth century, used their observations of nature to “delineate not wilderness but a territory, not mere land but a country.” Using the Linnaean system of describing and classifying plants, these authors all imposed a literary order on the wilderness as they watched it settled by immigrants from Europe.²³⁸ During the nineteenth century, other writers would explore how wilderness and the untamed frontier shaped both society and individuals. James Fenimore Cooper’s novel *The Last of the Mohicans*, published in 1826, explores racism and masculinity set against the backdrop of the French and Indian War. The story takes place in the wilderness, beyond the veneer of civilization, where themes of democracy and egalitarianism

²³⁸ Pamela Regis, *Describing Early America: Bartram, Jefferson, Crèvecoeur, and the Influence of Natural History* (Philadelphia: University of Pennsylvania Press, 1999), 4-5, 12.

are opposed by tropes of privilege and inevitability, a war within a war. Alexis De Tocqueville, who visited America in 1831, wrote “When the Europeans first landed on the shores of the West Indies, and afterward on the coast of South America, they thought themselves transported into those fabulous regions of which poets had sung.” An admirer of democracy in the young United States, De Tocqueville described North America as “grave, serious, and solemn: it seemed created to be the domain of intelligence, as the South [South America] was that of sensual delight.” He justified the displacement of the indigenous people of North America, stating “It is by agricultural labor that man appropriates the soil, and the early inhabitants of North America lived by the chase.”²³⁹ These authors illustrate the idea that the natural world was beautiful but untamed, a space where the individual could build character and wealth by dominating the landscape and, by doing so, build a nation.

In the mid-nineteenth century the idea of Manifest Destiny fueled the expansion of the U.S., as discussed in the previous chapter. In 1893, Frederick Jackson Turner wrote his essay “The Significance of the Frontier in American History.” Turner expressed the idea that the frontier had shaped the attributes of the U.S. because the continual push westward had continuously placed Euroamerican settlers at “the meeting point between savagery and civilization.” He went on to write that “He [the settler] must accept the conditions that it [the frontier] furnishes, or perish...Little by little he transforms the wilderness, but the outcome is not the old Europe...here is a new product that is American.” Conquering each new frontier and transforming the wilderness created “political, economic, and social results”: a nation that was a unique and exceptional space based on the values of democracy and the freedom to achieve upward mobility. The independent, motivated individual could, and should, tame the wilderness

²³⁹ Alexis de Tocqueville, *Democracy in America*, trans. Henry Reeve, ed. Henry Steele Commager (London: Oxford University Press, 1835), 22-23, 27.

and breed a strong nation. Turner's essay not only encapsulated his view of the American nation, but also his understanding of the role of the environment, a recognition that the natural world was not, in his words "*tabula rasa*." Turner recognized "the stubborn American environment is there with its imperious summons to accept its conditions," but that challenge allowed Americans to throw off old customs and ideas and "escape from the bondage of the past."²⁴⁰ Taming nature resulted in progress.

In the second half of the nineteenth century, rather different ideas about the environment and how to interact with the natural world also began to appear. In 1864, George Perkins Marsh published his comprehensive study *Man and Nature; or Physical Geography as Modified by Human Action*. Marsh stated he originally intended his work to be "a little volume showing that whereas [others] think that the earth made man, man in fact made the earth." His book persuasively illustrates that as man tampered with nature, seemingly to benefit himself, he was destroying his own future. He theorized that environmental degradation had caused the downfall of the major civilizations in the Old World and tried to caution against the same practices in the New World. Marsh discussed in detail how deforestation and overgrazing led to soil erosion and eventually to flooding. He also addressed the perils caused by increases in river sediment, concluding "all the operations of rural life, as I have abundantly shown, increase the liability of the soil to erosion by water," causing river beds to rise or channels to clog and contributing to flooding. Marsh warned that just because human interaction with the environment might not

²⁴⁰ Frederick Jackson Turner, "The Significance of the Frontier in American History" in *Does the Frontier Experience Make America Exceptional?* ed. Richard W. Etulian (Boston: Bedford/St. Martin's, 1999), 19-20, 40.

cause immediate, observable changes humans should still be cognizant that their activities did indeed alter the natural forces at work in the environment.²⁴¹

The viewpoint that nature should not be altered but instead be respected for what it provided to humans was a component of Transcendentalism, a philosophy that began in the late 1820s. Henry David Thoreau, a transcendentalist, published *Walden* in 1854, a record of his solitary life at Walden Pond from July 1845 to September 1847. His detailed descriptions of the natural world served as metaphors for his spiritual ideas, and reiterated the Romantic theme that the individual could find a purer existence in nature than in society. Preserving wilderness and leaving nature undisturbed became an increasingly popular idea in the U.S. during the 1870s. In 1872, a federal act created Yellowstone National Park, the first of its kind in the world.²⁴² John Muir was an early proponent of preservation who, borrowing from Thoreau's ideas, began in the 1870s to advocate that wilderness had intrinsic value and that when humans entered the untouched wild they connected with "life's inner harmonies, [and the] fundamental truths of existence." A growing number of like-minded people agreed with Muir's ideas, especially his proposal to set aside California's Yosemite State Park as Yosemite National Park. On September 30, 1890, the U.S. Congress passed the Yosemite Act. On March 3, 1891, Congress granted the president the authority to create National Forests through the Forestry Act and on June 4, 1892, the Sierra Club organized.²⁴³ The creation of Yosemite, and later other national parks, illustrates several important developments.²⁴⁴ First, by the late 1800s many people in the U.S. had decided

²⁴¹ George Perkins Marsh, *Man and Nature; or Physical Geography as Modified by Human Action*, ed. David Lowenthal (Cambridge, Mass.: The Belknap Press of Harvard University Press, 1st edition 1864, reprint 1967), 1, 4, 464-465.

²⁴² An Act to Set Apart a Certain Tract of Land Lying Near the Head-waters of the Yellowstone River as a Public Park, 17 Stat. 392 (1872).

²⁴³ Nash, 126, 130-134; An Act Granting to the State of California of the Yosemite Valley, and of the Land Embracing the Mariposa Big Tree Grove, 26 Stat. 650; An Act to Repeal Timber-culture Laws, and for Other Purposes, 26 Stat. 1095 (1891).

²⁴⁴ By 1915 the U.S. had a total of five national parks.

that the wonders of nature should be managed. Preservationists argued that the beauty of nature could only be maintained if it was undisturbed, and to guarantee that effort specific sites needed to be enclosed and human alterations prohibited. Conservationists believed that natural resources, such as forests, bird, fish, and game habitats, water, and the soil itself, should be protected but also managed to support sustainable development. Second, in the latter half of the nineteenth century the federal government exercised the power to preserve public lands, and would steadily extend its authority over conservation on both private and public land in the twentieth. Third, because the federal government chose locations for national parks that contained the most dramatic scenery and natural formations, these sites became landscapes that reflected the glory of the nation rather than simply being places that protected nature. And lastly, the Forestry Act did not just address the creation of national parks, it also allowed the federal government to regulate logging and other capitalist enterprises on public land. These two seemingly incompatible ideas, managed conservation of natural resources for economic activities versus enclosure and protection of specific landscapes, would shape environmental debates and government actions in the future.²⁴⁵

Conceptions of nature, and how to preserve, conserve, enshrine, or develop it are also influenced by gender constructs and gendered conceptions of nationalism. Virginia J. Scharff writes that we are so accustomed to the term “Mother Nature” that we fail to recognize how those words perpetuate the idea that “nature” is a feminized concept, something exotic, mysterious, and potentially dangerous. She states “humans have in common the curious practice

²⁴⁵ A recent article in *National Geographic* describes national parks as “common ground,” where visitors from the U.S. and around the world can gather to admire the grand works of nature. The article also notes that in 2016 the parks may be set aside by the government, but these sites are places that must protect flora and fauna and that it is up to both citizens and the government to do so. See David Quammen, “This Land is Your Land,” *National Geographic* Vol. 229, No. 1 (January, 2016): 24-47.

of knowing nature through the categories by which we know ourselves.”²⁴⁶ Societies seemingly prefer binary categories: man/woman, civilization/barbarism, order/wilderness. As Michel Foucault put it, when developing the discursive methods people use to categorize how we “know” the natural world, “communication between nature and human nature, [rests] on the basis of two opposite but complementary functions – since neither can take place without the other” not unlike the opposite but complementary gender roles prescribed for men and women.²⁴⁷ Marsh’s work discussed above is entitled *Man and Nature*, and although he probably meant humans and nature, he discusses how activities that he assumed were carried out by males altered the natural world. This ingrained perception reifies the idea that “nature” is a feminine entity that men have the right and the duty to conquer, control, shape, or enclose according to their wishes. According to George L. Mosse, “the construction of modern masculinity defined itself partly in contrast to woman, who was a subordinate yet essential partner,” and “the manly ideal corresponded to modern society’s felt need for order and progress.”²⁴⁸ Echoing tropes of paternalism and patriarchy, nationalism in the nineteenth century and beyond included the idea that men had an obligation to defend and protect the nation, especially the natural resources within the nation that would be helplessly exploited if they did not intervene. Men also needed to develop those essential resources in order to increase the nation’s power and wealth. This nationalistic outlook regarding controlling the environment became the purview of the state through the imposition of laws and the creation of bureaucracies. In his study of conservation in Mexico’s forests, Andrew S. Mathews notes “controlling nature for economic, strategic, and

²⁴⁶ Virginia J. Scharff, ed., *Seeing Nature through Gender* (Lawrence: University Press of Kansas, 2003), xiii.

²⁴⁷ Michel Foucault, *The Order of Things: An Archaeology of the Human Sciences*, translation of *Les Mots et les choses* (New York: Vintage Books Edition, 1994), 310.

²⁴⁸ George L. Mosse, *The Image of Man: The Creation of Modern Masculinity* (New York: Oxford University Press, 1996), 76-77. See also his work *Nationalism and Sexuality* (Madison: University of Wisconsin Press, 1985). See also Nancy Fraser, *Unruly Practices: Power, Discourse and Gender in Contemporary Social Theory*, (Minneapolis: University of Minnesota Press, 1989).

environmental reasons has been part of the constitution of modern states, and performing the control and legibility of nature has been one way in which rulers have tried to establish the stability and reasonableness of rule.” This tendency is not unique to the U.S. or Mexico, but is a global phenomenon that transpired over the last 200 years. In both developed and developing nations today people expect their governments to protect the environment while at the same time managing natural resources for their prosperity.²⁴⁹

In the U.S. managing water resources in the arid American West went hand-in-hand with economic development. The U.S Congress assigned the United States Geological Survey (USGS) the task of cataloguing the water resources in the American West in 1888. Frederick Haynes Newell became the Chief Hydrographer for the USGS in 1890, and under his leadership the idea developed within the agency that water was a limited resource but could be used for a variety of purposes, such as agriculture, mining, and hydroelectricity. Prior to that time the Army Corps of Engineers had focused only on keeping navigable streams open for transportation and had collected data on low water flow, but had left it to individual property owners to provide information on drainage and floods.²⁵⁰ By the 1890s it had become clear to many interested parties that agricultural development in the American West required organized efforts to systematically address irrigation. In 1891, the National Irrigation Congress formed in Salt Lake City, Utah, and began publishing pamphlets on irrigation. The National Irrigation Congress became a powerful lobbying group in the western states and by 1896 *The Irrigation Age* was a national publication. *The Irrigation Age* instructed farmers on irrigation tips and featured ads for irrigating equipment. It was the official publication of the Federation of Tree Growing Clubs of

²⁴⁹ Andrew S. Mathews, *Instituting Nature: Authority, Expertise, and Power in Mexican Forests* (Cambridge, Mass.: The Massachusetts Institute of Technology Press, 2011), 19, 31.

²⁵⁰ Samuel P. Hays, *Conservation and the Gospel of Efficiency: The Progressive Conservation Movement, 1890-1920*, First Edition 1959 (Pittsburg, Pennsylvania: University of Pittsburg Press, 1999), 6-7.

America from 1906 to 1918, as well as the American Irrigation Federation during the years 1907-1913. By the late 1890s, irrigation had graduated from simple diversion ditches into the realm of engineering science, agricultural science, and public health. Numerous articles in *The Irrigation Age* in 1896 equated irrigation with progress and prosperity in the West. Authors concluded that high temperatures and dry air contributed to a healthy, disease-free environment and explained that irrigation would not significantly raise atmospheric humidity. The monthly publication kept readers up to date on court cases involving water rights, congressional deliberations on matters related to irrigation and development, and impending or enacted legislation.

The Irrigation Age illustrates the idea that men could substitute engineering and machinery for what Mother Nature did, or at times failed to do: bring water to the land. When E. Benjamin Andrews, Chancellor of Nebraska University and National Irrigation Congress Chairman of the Section of Production by Irrigation, addressed the meeting of the Twelfth National Irrigation Congress meeting at El Paso in November, 1904, he stated that engineering had progressed sufficiently to bring water to vast areas. Irrigation, he claimed, was of “national importance...[and] of consequence to all civilized mankind.” He went on to say,

“What is the distinguishing mark that separates civilized man from savages? It is this: that, whereas the savage sits down humbly at Nature’s feet and waits to take with gratitude whatever gifts of life she deigns to bestow, civilized man, on the contrary, dominates nature. Within large limits he dominates her. If she does not obey to his liking, he takes her by the throat and forces her to do his bidding.”²⁵¹

This remark illustrates the gendered conceptions of nature and power of men to control it with their inventions that permeate the publication. The cover of *The Irrigation Age*, which kept the same design in all issues, makes that clear, as seen below.

²⁵¹ Guy Elliot Mitchell, ed., *Official Proceedings of the Twelfth National Irrigation Congress, Held at El Paso, Texas, November 15-16-17-18, 1904* (Galveston, Texas: Clarke & Courts, 1905), 65-66.



Cover, *The Irrigation Age*, Vol. XXI, No.1, Nov. 1905

Theodore Roosevelt's presidency (1901-1909) is often credited for organized federal efforts to address conservation and the trend over the twentieth century toward federal environmental management. From 1890 through the 1920s, Progressivism evolved in the U.S. from an intellectual movement concerned with addressing the social problems caused by rapid industrialization, to a political movement aimed at eliminating corruption from all levels of

government, and building a state that protected the interests of individuals rather than large corporations. Roosevelt was an avid outdoorsman as well as a Progressive. His experiences as a hunter in the American West ingrained in him the idea that failure to protect timberlands led to soil erosion, flooding, and wasting water. He and his fellow sportsmen feared that Frederick Jackson Turner was correct in his assumption that the frontier had closed. As Char Miller has argued, “with it [the disappearance of the frontier] went the masculinized landscape of exploration and survey, contest and conquest, a rugged terrain against which Roosevelt had tested himself.” Progressives feared that industrialization and urbanization had caused moral decay, social unrest, and a class-based society. The “body politic” was unhealthy. Roosevelt believed that scientific planning, efficient government, and interactions with nature could cure the troubled body and soul of the nation. As Miller puts it, “through a sustained application of this progressive balm, the nation’s forests would be reclaimed, its battered lands reinvigorated, and its prehistoric past reclaimed – heroic work for a modernist generation.”²⁵² Roosevelt’s administration exemplifies the tension inherent in opposing views within the modern environmental movement. Should nature be left undisturbed? Or should men take control of it and, as seen in Andrew’s remarks above, force her to do his bidding? Roosevelt supported both avenues. Ironically, Roosevelt’s larger-than-life face is now permanently inscribed on Mount Rushmore, a monument to the power of men to shape the nation. As Peter Boag argues, the mountain is now a cultural site celebrating not only an “idealized democracy,” but also an “idealized heterosexuality.”²⁵³ The site serves a reminder of the belief that men can, and should, shape both the natural and social landscapes.

²⁵² Char Miller, *Public Lands, Public Debates: A Century of Controversy* (Corvallis: Oregon State University Press, 2012), 70.

²⁵³ Peter Boag, “Thinking Like Mount Rushmore: Sexuality and Gender in the Republican Landscape,” in *Seeing Nature Through Gender*, op.cit., 53.

In Mexico, the history of conservation and views of the natural world developed differently than in the U.S, but with many points of commonality. Native peoples throughout the Americas are often lauded as conservationists but, as Lane Simonian has noted, although Native Americans both revered and feared nature, and different groups at times conserved or preserved natural resources, indigenous people also exploited the land and often caused environmental degradation. The Spanish Conquest introduced agriculture and pastoralism on a much larger scale in the Americas than had existed before their arrival, but by the sixteenth century Spaniards had “demystified and disempowered nature...[and] exhibited more confidence than the Indians of pre-Hispanic Mexico in their ability to alter nature without harming themselves.”²⁵⁴ During the eighteenth century the Spanish Crown actively sponsored botanical studies and exploration to locate and develop cultivable spices and foodstuffs that colonists and people in Spain could consume, rather than importing commodities from other colonial powers. From a very early period onward, Spanish officials recognized that exploiting natural resources was an important component of economic development.²⁵⁵ That is not to say that the Spanish were completely blind as to how their activities impacted the environment in the Americas; the Spanish Crown enacted numerous laws to protect forests having seen the deleterious effects of deforestation in Spain. Henrico Martínez, chief engineer for drainage projects in Mexico City, warned in 1607 that soil erosion caused by deforestation and plowing on the surrounding hillsides caused persistent flooding.²⁵⁶ In his study of Mexico City, José Esteban Castro shows how flooding continually hit the city in the early seventeenth century, causing a major exodus in 1629.

²⁵⁴ Simonian, 9-11, 28.

²⁵⁵ Daniela Bleichmar, “Atlantic Competitions: Botany in the Eighteenth-Century Spanish Empire,” in *Science and Empire in the Atlantic World*, eds. James Delbourgo and Nicholas Dew, 225-252 (New York: Routledge, 2008).

²⁵⁶ Simonian, 29. In n. 3, p. 238, Simonian explains that draining the lakes around Mexico City eventually reduced the flood threat, but led to “a desiccated landscape prone to dust storms. In addition, Mexico City lost a valuable source of water.”

Funding was a major hindrance in constructing flood control works because all taxes went back to Spain, with the exception of monies for local defense and administration. Throughout the Colonial Period, water was considered public property, as mandated by King Charles V in 1541 and reiterated in the *Leyes de Indias* in 1681. Municipalities were in charge of the water supply and flood control, as formalized in a viceregal ordinance in 1710 and again by the Spanish Cortes in 1813.²⁵⁷ After Mexico became independent in 1821, political control of the water supply and flood control in urban areas remained a municipal concern, but decisions had to be approved by each state's governor. Until 1857, the Mexican states issued *mercedes* (land grants) to citizens, allowing them to own the land but not the water on or adjacent to it. If individuals did not fulfill the conditions of the grant the land could then be conveyed to another party.²⁵⁸

President Manuel González promulgated the *Código Civil del Distrito Federal y el Territorio de la Baja California* (Civil Code of the Federal District and the Territory of Lower California) in 1883, later adopted by the state of Chihuahua in 1899. Book Two, Title II, Chapter VI, "Of the Right of Accession," Articles 796-804, differ very little from the *Siete Partidas*. Riparian property owners benefitted from any land that increased due to accumulation that had eroded from elsewhere, and could claim damages in case of substantial loss through avulsion, but had to file the claim within two years of the incident. In the case of a bed shift, the person who lost land had no claim, but an owner whose property fronted the old bed held title to the middle of the new channel. This also applied in the case of island formation in both navigable and

²⁵⁷ José Esteban Castro, *Water, Power and Citizenship: Social Struggle in the Basin of Mexico* (Oxford: Palgrave MacMillan, 2006), 77-78. Simonian also points out that part of the ordinances issued by the Cortes in 1813 decreed that forests on all but communal lands were private property and the result was that forest conservation did not re-emerge until the Mexican Revolution. *Ibid.*, 44.

²⁵⁸ Antonio Rodríguez Langone, Director, Aprovechamientos Hidráulicos, Secretaría de Recursos Hidráulicos de México, "Evolution of Mexican Water Law," in *International Water Law along the Mexican-American Border*. Symposium held during the forty-fourth annual meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science, April 29-30, 1968, El Paso Texas (The University of Texas at El Paso, 1972), 37-38.

floatable rivers. Even in navigable rivers, a branch that suddenly formed into two channels and separated a parcel did not mean the owner lost his property. In Title VI, Chapter III, “Of the Legal Easements of Water,” Articles 957-987 prohibit downstream users from injuring upstream ones and vice versa. A property owner could have a dam or other diversion disencumbered if it caused damage to other users, and no one could draw water to the point of shorting a municipality’s water supply. All rainfall, springs, and well water on a property belonged to the owner, even if usage of same damaged another party. No one could interfere with navigability. The right of the state, either at the federal or individual state levels, to control rights over water did not supersede the rights of individuals or corporations with legitimate property titles. All users of aqueducts or canals had to participate in upkeep and necessary improvements. A common theme in these laws is that the water must be put to good use and not wasted because it must be shared with others.²⁵⁹

During the latter part of the nineteenth century, Mexican intellectuals began to criticize the wasteful exploitation of natural resources, but their main focus was protecting those resources for development rather than the Romantic and Transcendentalist philosophies seen in the U.S. There were a few exceptions. Pedro Blazquez, a sportsman, thought that cities had contaminated air that caused death as well as diseases but that the countryside “was a source of health and life.” José Santos Coy described his forested land in Coahuila in lyrical terms and believed “the countryside was the only place capable of comforting the harried soul.” José M. Romero also echoed Romantic themes when describing forests in Hidalgo, where “the traveler has to stop frequently to behold the magnificent and powerful solitude.” José María Velasco, a renowned Transcendentalist, painted landscapes of the Valley of Mexico “to show his love of

²⁵⁹ J.P. Taylor, trans., and George M. Howat, *The Civil Code of the Mexican Federal District and Territories* (San Francisco, California: The American Book and Printing Co., 1904), 118-119, 137-141.

God and God's love of mankind." But, for the most part, environmental concerns in Mexico during the nineteenth century focused on the importance of conserving forests to protect timber resources as well as to prevent soil erosion. The Mexican Congress passed an act to protect forests on national land in 1861, predating the Forestry Act in the U.S. by three decades.²⁶⁰ Both nations would increasingly commit to forestry conservation in the twentieth century but, unlike the U.S., Mexico would not establish a national park until 1917, and did not make a concerted effort to create more until the 1930s.²⁶¹

A scientific approach to understanding and managing the environment became a prevalent theme in Mexico in the late nineteenth century. Manuel Orozco y Berra published his voluminous *Apuntes para la historia de la geografía en México* (*Notes for the History of Geography in Mexico*) in 1881, which traces the exploration and mapping of Mexico from the Spanish arrival to the U.S.-Mexico boundary surveys of the 1850s, reflecting the Linnaean impetus to quantify the physical world. Although the work is not an analytic history, it does illustrate Orozco's idea that Mexican geography was worthy of scientific study.²⁶² The role of the state in the scientific control of nature became an important aspect of Mexican politics at that time as well. During the Porfiriato (1876-1910) development was seen as the key to economic prosperity and putting Mexico on an equal footing with other powerful nations. A major political philosophy in Mexico beginning in 1867 was positivism guided by science, and elite *científicos* determined how the nation would exploit natural resources for development. President Porfirio Díaz appointed elites to government posts who, drawing from the ideas of Auguste Comte and Herbert Spencer, were to guide society and impose progress and order to make Mexico into a

²⁶⁰ Simonian, 47-49.

²⁶¹ The first national park in Mexico was Desierto de los Leones in the Federal District.

²⁶² Manuel Orozco y Berra, *Apuntes para la historia de la geografía en México* [*Notes for the History of Geography in Mexico*] (México: Imprenta de Francisco Díaz de Leon, 1881. Reprint, Cambridge, Mass.: Paige M. Gutenberg, Harvard Book Store, 2016).

modern nation. Positivism would “legitimate and rationalize the power of the Díaz state” and provide a social philosophy that allowed Díaz and the elites he favored to maintain political power.²⁶³ Porfirian bureaucracies consolidated water law, although ineffectively, and directed water management. However, although the Mexican state set water policy, Díaz actively sought foreign investment in Mexico and allowed private companies and individuals to monopolize land and access to water at the expense of small-scale agriculture.²⁶⁴ The centralization of power and control of water by the state was diametrically opposed to centuries of communal access to surface water.

By the early twentieth century, one line of positivist thought, expressed perhaps most clearly by Francisco Bulnes, an engineer and member of the Liberal Party, held that the Indians and other peasants could only achieve progress through state-sponsored irrigation projects that would promote landownership and productivity for smallholders, thereby preventing social rebellion. Andrés Molina Enríquez, a bureaucrat and *científico*, argued that state-directed and funded urban water supplies would improve public health, an important aspect of modernity and development.²⁶⁵ Francisco I. Madero, who would challenge Díaz for the presidency in 1910 and become president in 1911, published *Estudio sobre la conveniencia de la construcción de una presa en el cañon de Fernández para almacenar las aguas del Río Nazas* (Study on the

²⁶³ Alma Maria Garcia Marsh, “Ideology and Power: A Study of the Mexican State under Porfirio Díaz (1876-1911) and Lázaro Cárdenas (1934-1940)” (Ph.D. diss., Harvard University, 1982), 82-83, 155. Díaz also used other means to consolidate his political power, such as patronage both within the government and with private citizens. Marsh writes that this patronage system served the oligarchy, but failed to build an institutionalized political organization that could lend itself to the orderly transfer of power.

²⁶⁴ For studies of development during the Porfiriato, see John H. Coatsworth, *Growth Against Development: The Economic Impact of Railroads in Porfirian Mexico* (Northern Illinois University Press, 1981); Juan Mora-Torres, *The Making of the Mexican Border: The State, Capitalism, and Society in Nuevo León* (Austin: The University of Texas Press, 2001); Mark Wasserman, *Capitalists, Caciques, and Revolution: The Native Elite and Foreign Enterprise in Chihuahua, Mexico, 1854-1911* (Chapel Hill: University of North Carolina Press, 1984); Mark Wassermann, *Persistent Oligarchs: Elites and Politics in Chihuahua, Mexico* (Chapel Hill, N.C.: Duke University Press, 1993).

²⁶⁵ Castro, 75-87

advisability of building a dam in Fernandez Canyon to store the waters of the Rio Nazas) in 1907. The work summarizes studies that began in 1901 and outlines the morphology of the Rio Nazas, the cost of constructing a dam, how much water would be lost through seepage and evaporation, and the number of acres that could be brought into profitable cultivation, especially cotton farming, through irrigation. Madero concluded that for these reasons,

“the construction of dams that store water falling in torrents in the rainy months, to use it in irrigation in the dry season, is vital for the country and nothing presents a brighter perspective than the Fernandez Canyon, so I have no doubt that senior government officials will take the initiative, which will be warmly welcomed and supported by the people living in the riparian areas along the Río Nazas.”²⁶⁶

In the latter years of the Porfiriato numerous Liberals thought that *hacendados* (owners of large estates), private and foreign investors, agronomists, as well as government officials could work together to design and fund long-term irrigation and river-channeling projects that would add to the common social and economic development of the nation. Not everyone agreed that irrigation should be the top priority, and studies and funding plans would have to be conducted, perhaps over several years, but the general consensus was that Mexico needed to invest in major irrigation works and the federal government would have to be in charge of the projects. But this ambitious agenda did not come to fruition. A major problem was that Mexican water law was an inconsistent patchwork of local, state, and federal *reglamentos* (regulations) and ordinances, leading to litigation and confusion. The first attempt to systematize water rights, the Law of June 5, 1888, failed to clarify federal jurisdiction versus state and private rights in water. The Law of June 6, 1894, intended to create a process for water right concessions, caused even more

²⁶⁶ Francisco I. Madero, *Estudio sobre la conveniencia de la construccion de una presa en el cañon de Fernández para almacenar las aguas del Río Nazas* (San Pedro, Coahuila, 1907. Reprint, The Library of the University of California, Los Angeles, n.d.), 67. “Por ese motivo, es de vital importancia para el país la construcción de presas que almacenen el agua que cae á torrentes en los meses lluviosos, para emplearla en la irrigación en los meses de sequia, y ninguna presenta más brillante perspectiva, que la del cañon de Fernández, así es que no dudo que los altos funcionarios del gobierno tomarán la iniciativa, la cual será calurosamente acogida y secundada por los ribereños del Nazas.” Translation mine.

uncertainty when it only gave the federal government jurisdiction over streams in the Federal District and territories in opposition to the Law of 1888 that had granted a much broader federal jurisdiction. The Law of 1902 prohibited both retroactive and current claims to property rights in rivers and streams managed by the federal government, and denied claims to canals or dams built by the federal government, thereby allowing federal control over riverbanks as well as the surface water. In 1905, a law granted the president the right to condemn land in the Federal District and territories to build water supply projects, but in 1906 a law granted private parties the right to conduct feasibility studies for new sources of water. All of these laws failed to clarify the constitutional basis for the federal government superseding the authority of individual states, so in 1907 the Congress amended Article 27 of the Constitution to allow the federal government the means to determine which waters were federal and which were not. By 1909 it had become clear that granting primacy to either the federal government or private interests to fund and manage water projects had to be worked out. The compromise solution was the creation of the Caja de Préstamos para Obras de Irrigación y Fomento del la Agricultura, S.A. (Loan Fund for Irrigation Works and Development of Agriculture). The Caja de Préstamos floated bonds, obtained credit from banks, and with the backing of the government as guarantor loaned money to private interests for agricultural and other development, such as mining.²⁶⁷

Another problem Mexico faced was an unfavorable balance of trade by 1911, exporting fewer commodities and importing more foodstuffs because the agricultural sector was lagging so badly. The money was simply not available for robust federal spending, so private investment had to be supported. Although the government began in 1908 to examine the plight of small farmers, the agricultural sector was already in serious decline as early as 1890. The Ministries of Development and of Communications and Public Works had conducted studies of small

²⁶⁷ Kroeber, 56-59, 164, 166-176.

irrigation and public works projects for rural areas, but their main focus was large scale water projects for commercial agriculture, factories, and urban areas. No river basins or other sites had been prioritized for irrigation development by 1911, prompting Fernando Beltrán Puga, an engineer who was Mexico's IBC Commissioner 1906-1914 and Chief of the Irrigation Division after 1920, to lament that the plans for water resource management had not achieved any results. Clifton B. Kroeber concludes that the lack of attention to making water accessible for small-scale agriculture was perhaps "the greatest of all failures of President Díaz's agrarian policies." The Liberal ideal of creating a yeoman class of farmers that "could furnish an important part of agricultural production while forming the basis for Mexico's democratic life" had not materialized.²⁶⁸ Although many political, economic, and social justice issues led to the Mexican Revolution and the downfall of Díaz, the plight of the peasantry was an important component. The inability of the small-scale producers to feed themselves, let alone the nation, was both a rhetorical and real factor in the revolution.

As Mexico attempted to address the needs of the peasants for land and water and the pressing necessity for agricultural development, in the initial period of the Mexican Revolution it became clear that the Constitution had to be rewritten. The Constitution of 1917 included Article 27, a unanimously adopted provision written by Andrés Molina Enríquez, which federalized Mexican land and water resources and reserved to the central government in Mexico City the power to grant water rights. Since all land and water were the property of the nation, transfers of either into private hands had to consider the public interest. Venustiano Carranza had called for the Constitutional Convention that convened in November 1916, but when he became president in March of 1917 he decided that Article 27 violated the principle of private property and he only distributed 450,000 acres of public land. His successor, Alvaro Obregón, was more inclined to

²⁶⁸ Ibid., 25, 229-231.

enforce the 1917 Constitution, but he too moved cautiously regarding land redistribution, only granting three million acres by 1924.²⁶⁹ He did, however, request studies for irrigation projects during his term. By 1929, the right to approve development or use of water resources by individuals or corporations lay only with the president of Mexico. Colonial Spanish law did not recognize riparian rights, the private ownership of water from river or streams. Mexican law has retained that principle. Groundwater was, and still is, an exception, and unless specifically prohibited in a specific area individuals and corporations may drill wells.²⁷⁰

Water as a component of the public domain and the role of the state in its oversight also evolved significantly in the U.S. in the nineteenth century and into the twentieth. States and the federal government had overlapping jurisdiction over irrigation, as was the case in Mexico, and contiguous states that shared rivers and streams often had different laws regarding water rights. The first Supreme Court case that has bearing on this discussion is *Gibbons v. Ogden* (1824). Robert Fulton and Robert Livingston received the sole right to operate steamboats within the state of New York in 1808. Aaron Ogden obtained a monopoly from Fulton and Livingston to operate steamboats across the Hudson River between New York and New Jersey. Thomas Gibbons had a federal license to operate in coastal waters under the Coasting Act of 1793 and was Ogden's competitor. The court reversed Ogden's monopoly on the basis that the federal government had the final jurisdiction over interstate commerce. In the unanimous decision, written by Chief Justice John Marshall, the court claimed that commerce required navigation in order to move goods within states, to neighboring states, and across states. The federal government, in order to regulate commerce as per the Constitution of the United States, Article I, Section 8, Clause 3, therefore retained jurisdiction over navigation. Marshall did state at the end

²⁶⁹ Michael C. Meyer, William L. Sherman, and Susan M. Deeds, *The Course of Mexican History*, 6th ed. (Oxford: Oxford University Press, 1999), 523, 526, 556; Rodríguez Langone, 37-38.

²⁷⁰ Rodríguez Langone, 38.

of the decision that he had “not touched upon the right of the States to grant patents for inventions or improvements generally, because it does not necessarily arise in this cause. It is enough for all the purposes of this decision they cannot exercise it so as to restrain a free intercourse among the States.”²⁷¹ In 1824, the U.S. Congress directed the Army Corps of Engineers to improve navigable waterways and conduct surveys of major rivers. The 1824 Supreme Court ruling would affect court decisions regarding the Rio Grande after 1848 because the Treaty of Guadalupe Hidalgo had determined the river was navigable. The court also left open the question as to the rights of individual states to grant permits and right-of-ways for water projects within their boundaries if those projects might affect a river’s navigability.

Further complications arose in the U.S. due to the incompatibility of riparian and prior appropriation rights. Prior appropriation, or first usage, is central to the Spanish law that had operated for centuries in the American Southwest, while riparian rights were part of the English Common Law introduced by the British in the eastern half of the U.S.²⁷² Under English Common Law the idea of riparian rights originally meant diversions of water for household use and small agricultural enterprises, primarily gardens. Property owners had the right to draw water from any streams or rivers adjacent to or running through the land they owned. This was not a workable principle in the arid West, where water had to be moved from its source, often over great distances, for mining and agriculture. Riparian rights also prohibit inter-basin transfers, which would have severely limited development. Placer mining, the mining of alluvial sediments along active and dry rivers, involves water. In an active river the normal flow has to

²⁷¹ *Gibbons v. Ogden*, 22 U.S. 1 (1824).

²⁷² For further discussions of how Roman, Spanish, and Mexican water laws still operate in the American Southwest, see Hans W. Baade, “Roman Law in the Water, Mineral and Public Land Law of the Southwestern United States,” *The American Journal of Comparative Law*, Vol. 40, No. 4 (Autumn, 1992): 865-877; Charlotte Benson Crossland, “Acequia Rights in Law and Tradition,” *Journal of the Southwest*, Vol. 32, No. 3 (Autumn, 1990): 278-287; Michael C. Meyer, “The Living Legacy of Hispanic Groundwater Law in the Contemporary Southwest,” *Journal of the Southwest*, Vol. 31, No. 3 (Autumn, 1989): 287-299.

be diverted to mine alluvial deposits; only panning is possible in an active river. For hydraulic mining of alluvial deposits in dry riverbeds water pressure is necessary. Westward expansion had resulted in the acquisition of federal lands and federally governed territories, as well as new states, and by 1862, when the U.S. Congress passed the Homestead Act, the federal government owned 97% of the land in the American West, except in Texas.²⁷³ After the Civil War, the federal government became involved in several aspects of development in the American West, including transportation, mining, and agriculture. The Mining Act of July 26, 1866, “declared that mineral lands of the United States were free and open to exploration and occupation, subject to such regulations as might be prescribed by law and the local customs or rules of the inhabitants of the several districts, as far as the same were not in conflict with the laws of the United States,” thereby acknowledging the Spanish doctrine of prior appropriation could continue wherever it was already in effect. The act also included the proviso “that water rights established by priority of possession should be maintained and protected, and the right of way for canals and ditches for the purpose of diverting water for mining, agricultural, or mechanical use was acknowledged and confirmed.”²⁷⁴ In 1870, Congress amended this act to require that public land titles had to comply with water rights as defined in the 1866 act; later in 1877 the Desert Land Act decreed that all surplus, non-navigable water could be used for irrigation, mining, or manufacturing. Water rights could be based on claims of prior appropriation but did not in any

²⁷³ Nicholas Targ, “Water Law on the Public Lands: Facing a Fork in the River,” *Natural Resources & Environment*, published by the American Bar Association, Vol. 12, No. 1 (Summer 1997): 14-15.

²⁷⁴ An Act Granting the Right of Way to Ditch and Canal Owners over the Public Lands, and for other Purposes, 14 Stat. 251 (July 26, 1866).

way limit federal authority over water on public lands.²⁷⁵ This seemed to settle the order of water rights on federal public lands, but not necessarily for privately owned land.

That question was the crux of *Lux v. Haggin* (1886), heard by the Supreme Court of California.²⁷⁶ Donald J. Pisani argues that this California case had profound implications for the development of water law in the arid American West and presaged the decline of private water companies.²⁷⁷ The mining company owned by Charles Lux and Henry Miller had been using water drawn from the Kern River on their land since 1868. By 1877, James Ben-Ali Haggin's Kern County Land and Water Company was draining off so much water from the Kern River that Lux and Miller received none. Both parties had taken advantage of the Desert Land Act to file claims on far more than the 640 acres permitted to a single owner by filing through surrogates who received from \$1 to \$5 for their signatures. In *Basey v. Gallagher* (1874) the U.S. Supreme Court had intimated, although not ruled directly, that states and territories could determine water rights based on local customs, laws, and decisions.²⁷⁸ The legal question in the California case was which held primacy: the prior appropriation rights Lux and Miller claimed or the riparian water rights asserted by Haggin?

California adopted English Common Law in 1850 when it became a U.S. state. The California legislature also adopted the principle of prior appropriation in 1855 to allow persons who did not own riparian land access to water. The California Supreme Court decided that both principles would prevail in *Lux v. Haggin*, establishing the legality of a "dual water system." Riparian rights would be protected on the basis of constitutional principles concerning the rights

²⁷⁵ An Act to Amend "An Act Granting the Right of Way to Ditch and Canal Owners over the Public Lands, and for other Purposes," 16 Stat. 217 (July 9, 1870); An Act to Provide for the Sale of Desert Lands in Certain States and Territories, 19 Stat. 377 (March 3, 1877).

²⁷⁶ *Lux v. Haggin*, 69 Cal. 255; 10 P. 674 (1886).

²⁷⁷ Donald J. Pisani, *From the Family Farm to Agribusiness: The Irrigation Crusade in California and the West, 1850-1931* (Berkeley: University of California Press, 1984), 249.

²⁷⁸ *Ibid.*, 194-200; *Basey v. Gallagher*, 87 U.S. 670 (1874).

attached to individuals and private property ownership, but prior appropriation would hold equal weight under the law. Prior appropriation would be the basis of water rights on public lands, but riparian rights would attach when the land became privately owned or developed for a useful purpose. Privately owned lands only had rights to water under the principle of usufruct; the landowner could use the water but did not own it. Furthermore, any prior users had to recognize that others were entitled to the water they were not appropriating and that, as stated in the California Constitution, “the use of all water now appropriated, or that which may hereafter be appropriated, for sale, rental or distribution, is hereby declared to be a public use, and subject to the regulation and control of the state.” The court found that Lux’s appropriation rights preceded Haggin’s riparian rights, but that both parties were entitled to the water and they eventually reached an out-of-court settlement.²⁷⁹

The principle iterated in this case holds that Mexico, a sovereign nation, had established that water was communal property. When lands passed from Mexico into the control of the U.S., the U.S. became the owner of all public lands. The U.S. could grant its citizens rights under English Common Law conceptions of property but, not having been the original owner of the property, could not confer title to water. Government entities could, however, separate the water from the land and grant prescriptive rights to water for industrial or agricultural purposes and, having done so, remove any future claims to riparian rights to that water. Each state or territory could determine the order of water rights for themselves, as affirmed by the U.S. Supreme Court in *Sturr v. Beck* (1890) and then definitively stated in *Kansas v. Colorado* (1906), when the court

²⁷⁹ R.H. Hess, “California Irrigation Right,” *California Law Review* Vol. 5, Issue 2 (January, 1917), 147-152, 157; L.H. Taylor, “Irrigation Legislation: Right of way for Canals and Reservoirs over Government Lands,” *The Irrigation Age* Vol. IX, No. 3 (Chicago: March, 1896), 128.

ruled each state had jurisdiction over its waters and could choose between riparian or prior appropriation rights, or a combination of both.²⁸⁰

States that had both humid and arid lands, such as Texas, Kansas, Nebraska, North and South Dakota, Oregon, and Washington, adopted the California system, or dual water system. The rejection of riparian rights by Colorado in *Kansas v. Colorado* established the Colorado system, or prior appropriation rights only, adopted by New Mexico, Nevada, Arizona, Idaho, Utah, Montana, and Wyoming. Three court cases in Texas illustrate the types of decisions that arose from the dual system. In *Mud Creek, etc., Co. v. Vivian* (1889), the court ruled that an incorporated irrigation company had a prescriptive privilege to divert water for irrigation granted by the state of Texas, but not the right to the entire amount of water in a stream. However, if the company had used the water for ten continuous years and during that time others with riparian rights downstream had not objected, the downstream users could not claim damages. In this case the Mud Creek Irrigation Company could not stop upstream diversions that, they claimed, reduced the amount of water they received. Later cases cited this 1889 decision as a precedent for taking all the water in a stream under specific situations. In *McGhee, etc., Co. v. Hudson* (1893), the court ruled water that was not already appropriated was public and could be diverted to arid lands for irrigation. *Watkins Land Co. v. Clements* (1905), determined that irrigation was an artificial use of water because it was for large-scale purposes such as agriculture or stock-raising, and could not preclude the riparian rights of others. This seemingly maintained the assumption that riparian usage was for domestic purposes such as drinking water and gardens when, in fact, large-scale water users were actually claiming riparian rights.²⁸¹

²⁸⁰ *Sturr v. Beck* (1890), 133 U.S. 541; *Kansas v. Colorado* (1906), 206 U.S. 46. See also Donald J. Pisani, “*Lux v. Haggin*: The Battle of the Water Lords,” in *From the Family Farm to Agribusiness*, 191-249.

²⁸¹ Edward Hamming, “Water Legislation,” *Economic Geography*, Vol. 34, No. 1 (Jan., 1958): 42-46; *Mud Creek, etc., Co. v. Vivian*, 74 Tex. 170, 11 S.W. 1078 (1889); *McGhee, etc., Co. v. Hudson*, 85 Tex. 587, 22 S.W. 398

The fact that Western states sharing rivers and streams have different legal tenets plus local customs of Spanish communal rights to water, and the competing interests of upstream and downstream water users meant that a coherent, comprehensive system for adjudicating water rights was nearly impossible. What did consistently emerge from the huge number of legal disputes over water in the American West was that either an individual state or the federal government had the mandate to confer or allow water rights for “beneficial use,” meaning for development. The consequences for the El Paso/Juárez Valley were a complex tangle of legal rights, where prior appropriation was the custom before and after 1848, then the dual system on the Texas side also became legal in the late nineteenth century. The competition for water in the valley on opposite sides of the border, as well as with upstream users in New Mexico and Colorado, could not be definitively solved legally without federal interstate intervention and international negotiations because there was no commonly accepted set of rules applicable to the various interested parties. This was a particular problem when it came to sharing the water in the Rio Grande between the U.S. and Mexico because prior appropriation was not equally applicable in both nations.

While the residents of the El Paso/Juárez Valley argued over dams and canals in the late nineteenth century, and Mexico and the U.S. disputed the location of the boundary, the squabbles over water in the Rio Grande became an interstate issue in the U.S. and an international dispute between the U.S. and Mexico in the 1890s. Anson Mills’ International Dam proposal had been favorably received in Washington D.C. and appropriations bills for the project had been introduced in both houses of the U.S. Congress, with the proviso that Mexico would get half the

(1893); *Watkins Land Co. v. Clements*, 98 Tex. 578, 86 S.W. 733 (1905); Gregory J. Hobbs, Jr., “Federal Environmental Law and State water Law: Accommodation or Preemption,” *Natural Resources & Environment*, Published by the American Bar Association, Vol. 1, No. 4 (Winter 1986): 23-26, 57-59; Roderick E. Walston, “Western Water Law,” *Natural Resources & Environment*, Published by the American Bar Association, Vol. 1, No. 4 (Winter 1986): 6, 8, 48-52.

water stored in the reservoir in return for giving up any indemnity claims. In April of 1890, Mills was confident the bills would pass and the project would go forward.²⁸² Although both houses of Congress agreed that Mills' idea had merit, the fact that this was an international dam and not a domestic one limited support for approval, as did objections from representatives in eastern states that opposed having the federal government fund western water projects. However, on April 29, 1890, the U.S. Congress passed a concurrent resolution that stated upstream diversions were, in fact, limiting the amount of water reaching the El Paso/Juárez Valley. The resolution noted that upstream appropriations of water had created a "standing menace to the harmony and prosperity of said countries [the U.S. and Mexico], and the amicable and orderly administration of their respective Governments." Congress requested that the president of the U.S., Grover Cleveland, begin negotiations with Mexico to resolve water problems along the Rio Grande. The April 1890 resolution authorized building the dam, but did not appropriate any funding for the project.²⁸³

With the International Dam proposal at a complete standstill, entrepreneurs became interested in an alternative option. On January 12, 1893, three El Paso merchants incorporated the Rio Grande Dam and Irrigation Company in New Mexico, and began seeking investors in order to build a dam and reservoir at Elephant Butte in New Mexico 125 miles upriver from El Paso to sell water. Irrigators would have to give up existing water rights in return for an annual fee based on acreage. John L. Campbell, El Paso's city engineer, drew upon Anson Mills' specifications for the International Dam for the design. The dam would regulate the river's flow and store water to release in drought years, and supply water for new irrigation canals throughout

²⁸² Mills, *op.cit.*, 272.

²⁸³ Concurrent Resolution of 29 April, 1890, "Concerning the Irrigation of Arid Lands in the Valley of the Rio Grande River, the Construction of a Dam Across Said River at or near El Paso, Tex., for the Storage of its Waste Waters, and for Other Purposes," 51st Cong., 1st Sess., 21 Congressional Record 3963, 3977 (1890).

the Mesilla Valley in New Mexico.²⁸⁴ This proposal further alarmed residents in the El Paso/Juárez Valley about the amount of water they would be likely to receive downstream if irrigation continued to increase in the Mesilla Valley; Mexicans were particularly concerned because the dam, reservoir, and control of downstream releases would be entirely under the jurisdiction of the U.S.

A severe water shortage in 1894 prompted Mexican farmers around Juárez to contact their consul, José Zayas Guarneros, who wrote to Foreign Minister Matías Romero, describing conditions in the El Paso/Juárez valley. Romero complained to the U.S. Secretary of State that because Americans were withholding water from Mexico by building dams and irrigation systems upstream along the Rio Grande he predicted a “mass exodus” from the Mexican side of the river. U.S. Secretary of State Walter Q. Gresham replied that the problem was drought, not upstream diversions. Romero wrote again in 1894 to U.S. Secretary of State Richard Olney claiming that the U.S. was violating all previous treaties regarding the river. He reported that the population in and around Juárez had declined by half, and reiterated Mexico’s prior usage rights to those of irrigators upstream in the U.S. Romero stated that El Paso Del Norte had used the water of the Rio Grande to irrigate crops for more than 200 years and that the city and districts within its jurisdiction managed to survive with 20 cubic meters of water even during droughts. Romero asserted that the current water shortage began about ten years prior to his filing a complaint, when irrigation expanded in Colorado.

“[This situation] so greatly diminish[ed] the water in the river at El Paso that except when rains happen to be abundant, there is scarcity of water from the middle of June until March. In 1894 the river was entirely dry by June 15, so that no crops could be raised and even fruit trees began to wither. The result has been to reduce the price of land and cause great hardship to the people, whose numbers in Paso del Norte, Zaragoza, Tres Jacales, Guadalupe, and San Ignacio diminished from 20,000 in 1875

²⁸⁴ Littlefield, 39-43.

to one-half that number in 1894.”²⁸⁵

Minister Romero argued that prior treaties prohibited “impeding or interrupting navigation,” and that “nothing could impede it more absolutely than works which wholly turn aside the water of these rivers.”²⁸⁶

Secretary Olney asked U.S. Attorney General Judson Harmon to settle the issue of what existing treaties actually meant regarding any changes to the Rio Grande inside the territorial U.S. that might affect navigability, and to settle the question as to whether or not the navigability clause in the prior treaties with Mexico prohibited diversions. In what became known as the Harmon Doctrine, Harmon responded that settlements had long existed “in the region of Santa Fe,” and that although future settlement along the entirety of the upper Rio Grande must have “been apparent,” both parties to the Treaty of Guadalupe Hidalgo had neglected to make any provisions to reserve any water rights for Mexico that could be imposed on the U.S. or U.S. citizens. Article VIII of the Treaty of Guadalupe only preserved property rights for Mexicans living in U.S. territory after 1848, not for people living on the other side of the border. Harmon stated that the issue at hand was not dams or diversions affecting navigation, but the impact of upstream irrigation. He argued that the legal issue was “there not being enough water for irrigation in both countries, the question is, which shall yield to the other?” Harmon noted that international law had contradictory opinions on this question but, he decided,

“The injury now complained of is a remote and indirect consequence of acts which operate as a deprivation of prior enjoyment. So it is evident that what is really contended for is a servitude which makes the lower country dominant and subjects the upper country to the burden of arresting its development and denying to its inhabitants the use of a provision which nature has supplied entirely within its own territory.”²⁸⁷

²⁸⁵ “Correspondence and Documents Relating to the Rio Grande Irrigation Project, Dec. 1, 1895,” Max Weber papers, C. L. Sonnichsen Special Collections Dept., The University of Texas at El Paso Library, Folder 1, MS 012.

²⁸⁶ Max Weber Papers, Folder 1.

Harmon added that nations are sovereign within their own territory and “self preservation is one of the first laws of nations.” He went on to agree that upstream events can have downstream consequences, such as clearing wooded land, but the issue at hand here was “novel” because although this was a local complaint it had international consequences. In his opinion, his department could only set policy, not take action, but “the rules, principles, and precedents of international law impose no liability on the United States.”²⁸⁸ Harmon’s ruling meant that water users upstream now saw a clear path to build dams and diversions at the expense of the El Paso/Juárez Valley, even though their actions would impact residents on both sides of the border. In 1895, the U.S. General Land Office granted the Rio Grande Dam and Irrigation Company a right of way to build a dam at Elephant Butte, in spite of Texan and Mexican objections. Although Harmon’s decision only addressed sovereignty it did allow, as had the cases in Texas discussed above, upstream users rights to water even if their actions adversely impacted downstream users.

Rather than settling the matter, Harmon’s ruling only inflamed the situation. Secretary Olney, concerned about the escalating problems downriver in the El Paso/Juárez Valley and the international implications of Harmon’s ruling, in 1896 arranged for IBC Commissioners Anson Mills and Don F. Javier Osorno to settle on a permanent location for the border and to look into the matter of an equitable distribution of the Rio Grande’s waters, although water distribution internal to the U.S. was beyond the scope of the IBC.²⁸⁹ Mills and Osorno continued to promote the original International Dam proposed by Mills as the best solution, especially after it was

²⁸⁷ Ibid.

²⁸⁸ Ibid.

²⁸⁹ Marvin E. Whittington, Counsel, International Boundary and Water Commission United States Section, “Evolution of American Law as to Surface Waters in the Southwest, with Special Reference to the Rio Grande (Bravo),” *International Water Law Along the Mexican-American Border: A Symposium held during the forty-fourth annual meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science, April 29-30, 1968, El Paso Texas*, ed. Clark S. Knowlton for the Committee on Desert and Arid Zones Research (El Paso: The University of Texas at El Paso, 1972), 43.

endorsed by the president of Mexico, Porfirio Díaz. The IBC study affirmed that part of the water shortage problems in the El Paso/Juárez Valley was the result of increased upstream irrigation, and in 1896 U.S. Secretary of the Interior David R. Francis, at Secretary Olney's request due to the continued complaints by Mexico, imposed an embargo on new irrigation projects along the Rio Grande in New Mexico and Colorado. Francis suspended all applications for rights-of-way on public lands that were part of proposed irrigation or dam projects.²⁹⁰ The Rio Grande Dam and Irrigation Company's right-of-way could not be revoked as it had been granted prior to 1896, but by May 1897, U.S. Attorney General William B. Childers, at the request of Secretary of War Russell A. Alger, blocked the project temporarily by filing an action in New Mexico against the Rio Grande Dam and Irrigation Company that asserted a dam at Elephant Butte would impede navigation along the Lower Rio Grande beyond the El Paso/Juárez Valley. The New Mexican court granted an immediate injunction, halting all work on the project.²⁹¹ Ironically, the action relied on the issue of navigability in Article VII of the Treaty of Guadalupe Hidalgo, the very argument Harmon decided was inapplicable. It also invoked the principles in the River and Harbor Act (1890), Sec. 10, which had prohibited "the creation of any obstruction, not affirmatively authorized by law, to the navigable capacity of any waters, in respect to which the United States has jurisdiction." The Secretary of War had standing in the case because the River and Harbor Appropriation Act of July 13, 1892, Sec. 3, declared that it shall not be lawful "to build any dam, weir, or structure of any kind in any navigable waters of the United States without the permission of the Secretary of War, in any port, roadstead, haven, harbor, navigable river, or other waters of the United States, in such manner as shall obstruct or

²⁹⁰ Raymond A. Hill, "Development of the Rio Grande Compact of 1938," *Natural Resources Journal*, Vol. 14, No. 2 (1974): 165-166. Some modifications to the embargo took place in 1907, but it was not lifted until 1925.

²⁹¹ Littlefield, 58.

impair navigation, commerce or anchorage of said water."²⁹² The injunction launched twelve years of litigation.

Articles published in *The Irrigation Age* during 1896 reflect the growing frustration with the patchwork of state water laws in the western U.S. and the challenge of sharing water in interstate rivers and streams. One article provided detailed information on the proposed International Dam at El Paso and suggested that as Congress deliberated the project they would have to consider not only federal control of irrigation along international streams, but also oversight of interstate irrigation systems.²⁹³ The dual water system created constant conflicts between prior appropriators and later settlers who claimed riparian rights on their land. Cleson S. Kinney, attorney and author of a comprehensive study of water law, bemoaned the fact that state laws were often challenged and held to be unconstitutional. California's Wright Act of 1887, which allowed farmers to organize and establish irrigation districts, had been consistently challenged in court.²⁹⁴ Kinney noted that other states with laws permitting irrigation districts would probably have their laws challenged as well. He also complained that the federal government had sent John Wesley Powell to survey locations in the West for reservoirs during 1888, the government had withdrawn these sites so they could not be settled or privately purchased, but then proceeded to do nothing about any construction. He demanded that the government either build the reservoirs or release the sites so private companies could do so.²⁹⁵ At

²⁹² An Act Making Appropriations for the Construction, Repair, and Preservation of Certain Public Works on Rivers and Harbors and for Other Purposes, 26 Stat. 426 (1890); An Act to Amend the Act Making Appropriations for the Construction, Repair, and Preservation of Certain Public Works on Rivers and Harbors and for Other Purposes, 27 Stat. 88 (1892).

²⁹³ *The Irrigation Age*, Vol. X, No. 1 (Chicago: July 1896), 5-6; Vol. X, No. 2 (Chicago: August, 1896), 55-70.

²⁹⁴ The U.S. Supreme Court upheld the legality of irrigation districts later that year in *Fallbrook Irrigation Company v. Bradley*, 164 U.S. 112 (1896).

²⁹⁵ Cleson S. Kinney, "Irrigation Legislation, Reservoir Sites Withdrawn by the Government," *The Irrigation Age* Vol. IX, No. 1 (Chicago: January, 1896), 80. See also his *A treatise on the law of irrigation including the law of water-rights and the doctrine of appropriation of waters, as the same are construed and applied in the states and territories of the arid and semi-humid regions of the United States; and also including the statutes of the respective*

the International Irrigation Congress held in Phoenix, Arizona, December 15-17, 1896, the delegates adopted the resolution that the federal government should finance irrigation projects, an idea F.H. Newell had been proposing since his early days with the USGS.²⁹⁶

In the case of El Paso and Juárez, local people were seeking more federal intervention to solve water supply and flooding problems because the Rio Grande was an interstate river as well as the international boundary. This coincided with the shift toward U.S. federal interest in irrigation as a component of development in the late nineteenth century similar to what was happening in Mexico. On March 3, 1877, the U.S. Congress passed the Desert Land Act, which allowed for the purchase of 640 acres of arid land at \$1.25 per acre if the purchaser delivered water to the land and “reclaimed” it within 3 years. The acreage had to be free of timber stands and unable to produce agriculture without irrigation. The original act applied only to California, Oregon, Washington, Idaho, Nevada, Montana, Utah, Wyoming, and the Dakota Territory, but later legislation included Colorado in 1892.²⁹⁷ The August 18, 1894 Carey Act granted states with desert lands up to 1 million acres of federally owned land if the state would ensure the acreage was irrigated, reclaimed, occupied before 1904, and that at least 20 acres out of each 160 acre allotment were under cultivation. All provisions of the Carey Act fell under the purview of the states.²⁹⁸ However, it quickly became clear that speculators and cattlemen were taking advantage of the Desert Land Act and the Carey Act to obtain acreage with no intention of irrigating. Legitimate irrigators increasingly expressed the opinion that the federal government should become directly involved in water delivery systems.

states and territories, and decisions of the courts relating to those subjects (Washington D.C.: W.H. Lowdermilk, 1894).

²⁹⁶ Hays, 10.

²⁹⁷ An Act to Provide for the Sale of Desert Lands in Certain States and Territories, 19 Stat. 377 (March 3, 1877).

²⁹⁸ Alfred R. Golzé, M.ASCE, Director of Programs and Finance, Bureau of Reclamation, *Reclamation in the United States* (New York: McGraw Hill, 1952), 15-19.

Meanwhile, the battle between The Rio Grande Dam and Irrigation Company and the federal government continued. The trial court in New Mexico found the Rio Grande was not navigable in New Mexico, which nullified federal standing, and dismissed the case. An appeal went forward to the Supreme Court in *United States v. Rio Grande Dam and Irrigation Co.* (1899).²⁹⁹ The Supreme Court found that the federal government did indeed have jurisdiction over navigable watercourses, but the matter of navigability remained a question of fact since there had been no trial, and remanded the matter back to New Mexico. It became clear early in this legal dispute that the federal government was wary about offending Mexico and abrogating an international treaty. In support of El Paso's requests, in 1900 U.S. Senator from Texas Charles A. Culberson and U.S. Congressman from Texas John H. Stephens introduced resolutions in their respective houses calling for a dam at El Paso and a treaty with Mexico regarding water apportionment, which were later combined as the Culberson-Stephens Bill. The bill never became law, even after being re-introduced in 1901 and 1902.³⁰⁰ It was also fairly obvious as this case dragged on that the federal government could not prove the Rio Grande was navigable either just above or just below El Paso, as they continued to request delays to conduct more and more fact-finding studies. Yet the Attorneys General involved in the matter clung to the idea in international law that if any part of river was navigable that designation applied to the entire river and the federal government had jurisdiction over navigation within the territorial U.S., as well as an obligation to keep the Rio Grande navigable due to the Treaty of Guadalupe Hidalgo. In 1901, Special Assistant Attorney General Marsden C. Burch offered to drop the government's

²⁹⁹ *United States v. Rio Grande Dam and Irrigation Co.*, 174 U.S. 690 (1899). See also *United States v. Rio Grande Dam and Irrigation Co.* 184 U.S. 416 (1902) and *Rio Grande Dam and Irrigation Co. v. United States*, 215 U.S. 266 (1909).

³⁰⁰ "A Bill to Provide for the Equitable Distribution of the Waters of the Rio Grande between the United States and Mexico, and for the Purpose of Building an International Dam and Reservoir on Said River at El Paso, Texas," H.R. 9710 (March 19, 1900) and S. 3794 (March 26, 1900).

litigation if the Rio Grande Dam and Irrigation Company would recognize the prior appropriation water rights of the El Paso/Juárez Valley. The federal government then offered to build the dam in 1902 for far less money and pass on the savings as a reimbursement to the Rio Grande Dam and Irrigation Company. The federal arrangement would also guarantee a set amount of water for Juárez. The company's head, Nathan E. Boyd, rejected these offers. In 1903, the courts in New Mexico ruled The Rio Grande Dam and Irrigation Company had forfeited the right to build the Elephant Butte Dam because the project had not been completed, or even begun, within the five-year limit set by law. Boyd continued to press his case in the courts, but the protracted litigation that lasted until 1909 ruined the company.³⁰¹

At the turn of the century, devastating drought conditions in the El Paso/Juárez Valley forced residents to once again turn to the federal government for relief. On February 5, 1901, the German Consul in Ciudad Juárez, Max Weber, offered a memorandum to the U.S. Congressional Subcommittee on Foreign Affairs on conditions in El Paso and Juárez. He reported that the population in Juárez had now fallen to 5,000 and that "farms on both the Mexican and Texas sides of the Rio Grande Valley have been abandoned and become worthless, and while the country was famous for centuries for producing the finest grapes in the southern part of this country, the vineyards are now totally destroyed and they produce hardly enough for local consumption." He provided some numbers on property values, claiming the land in and around Ciudad Juárez "has depreciated in value, without exception, from 50 to 80 percent." He cited two specific examples from the Mexican side of the border as well. A Mr. Angerstein's property value had fallen from \$400,000 to \$50,000 and former Army Surgeon Dr. Alexander's property "which had on it about 40,000 grape vines and was estimated at from \$20,000 to \$25,000, cannot

³⁰¹ Stephen C. McCaffrey, "The Harmon Doctrine One Hundred Years Later: Buried, Not Praised," *Natural Resources Journal* Vol. 36, No. 2 (Summer 1996), 553-563; Littlefield, op. cit., 56-78.

be sold today for \$6,000 Mexican money.” Weber claimed that the annual loss to Mexico due to the lack of water was \$2,000,000, and because this had been ongoing since 1880, Mexico had lost \$40,000,000. He also explained this was the situation on the Texas side of the river as well, where “the rural population is completely ruined and people who were well-to-do formerly are now forced to make a living by working on the railroad for \$1 and \$1.50 per day.” Weber urged adoption of the Culberson-Stephens Bill because he believed it would “liquidate in a friendly way the damages amounting to many millions of dollars...the citizens of Paso Del Norte and El Paso have sustained,” and would also “give Colorado and New Mexico good title to the water for irrigation which they have been illegally using for the last twenty-five years.”³⁰²

Anson Mills also wrote on behalf of Mexico to the U.S. Congressional Subcommittee on Foreign Affairs on February 18, 1901, arguing against the dam at Elephant Butte because the International Dam at El Paso would better serve the people in El Paso and Juárez.³⁰³ The Rio Grande continued its feast or famine behavior, as reported by Monsignor Henry Granjon, Bishop of Tucson, in 1902. During his visit to the El Paso del Norte area he noted “most of the time the river bed is dry and serves as a road for vehicles.” He then went on to write, “What is no less regrettable than the chronic drought of the river is the bad habit that it has, during great overflows, of suddenly transporting its bed elsewhere. You camp, for example, one evening on the banks of the river, and the next morning you see it flowing by several hundred meters from your campsite.”³⁰⁴ Due to the alternating problems of flooding and drought the exact placement

³⁰² Max Weber, “Memorandum Presented to the Congressional Subcommittee on Foreign Affairs, in re. H.R. 9710, by Max Weber, of Ciudad Juárez, Mexico, Feb. 5, 1901,” C. L. Sonnichsen Special Collections Dept., The University of Texas at El Paso Library, Max Weber papers, Folder 2, MS 012.

³⁰³ Anson Mills, “Letter Presented to the Congressional Subcommittee on Foreign Affairs, in re. H.R. 9710, by Anson Mills, February 18, 1901,” Max Weber papers, Folder 2, MS 012, C. L. Sonnichsen Special Collections Dept., The University of Texas at El Paso Library.

³⁰⁴ Monsignor Henry Granjon, Bishop of Tucson, *Along the Rio Grande: A Pastoral Visit to Southwest New Mexico in 1902*, ed. Michael Romero Taylor, trans. Mary W. de López (Albuquerque: University of New Mexico Press, 1986), 44.

of the border was still in limbo, El Paso's promising agricultural future was fading away, Juárez was losing population and real estate value, and water apportionment between Mexico and the U.S. was still not settled.

The failure of the International Dam to materialize, and the dispute between the Rio Grande Dam and Irrigation Company and the U.S. government illustrate two important developments. First, by 1902 the federal government envisioned itself as the best entity to construct dams for irrigation, and used the courts to stop a private company from doing so, on rather flimsy legal footing. Second, the episode also indicates a growing willingness to at least attempt to treat Mexico fairly in matters of water apportionment rather than asserting sovereignty as per the Harmon Doctrine. As Gabriel Eckstein has pointed out, international water laws "may be viewed more properly as tools of politics and international relations rather than those of a legal regime...and [may be] designed to further relations between states."³⁰⁵ In his study of the negotiations between the U.S. and Mexico to share the waters of the Colorado and Rio Grande Rivers, Norris Hundley also noted that in treaty settlements "abstract rules have often given way to practical considerations in which politics, geography, and economics have been the basis of the agreement." Settling water apportionment between the two nations on a strictly legal basis was impossible because both countries had "developed contradictory theories about the use of their common rivers, and both labeled their theories international law." Instead, diplomacy would have to suffice. Finding a solution for the problems in the El Paso/Juárez Valley became more urgent by 1902, but not necessarily because of local conditions and complaints. At that time the U.S. State Department and the Mexican Foreign Ministry became interested in conservation efforts and agricultural development in the rich alluvial Lower Valley between

³⁰⁵ Gabriel Eckstein, "Examples of the Political Character of International Water Law," *Proceedings of the Annual Meeting (American Society of International Law)* Vol. 102 (April 9-12, 2008), 364.

Texas and Mexico, the portion of the Rio Grande that is fed primarily by rivers originating in Mexico.³⁰⁶ If dams, irrigation, and agricultural development in the U.S. deprived Mexico of water, then Mexico might do the same in turn to the U.S.

The problems facing the El Paso/Juárez Valley regarding water and development in the early twentieth century coincided with a commitment from the U.S. federal government to fund dam projects in the west for irrigation and hydroelectric power in the Reclamation Act of 1902.³⁰⁷ The very name of the act is indicative of the idea that in the West arid lands could be altered and made productive through water delivery systems; humans could change the environment to suit their own ends. Privately funded irrigation companies and cooperative irrigation districts had proven to be inefficient, rarely profitable, and liable to legal challenges. As Donald J. Pisani has noted, drought and an economic depression in the 1890s caused proponents of irrigation to increasingly turn to their state legislators and to Washington D.C. “as a cure for the agricultural stagnation of the ‘terrible nineties.’”³⁰⁸ The complaints emanating from El Paso and Juárez regarding water shortages had managed to get the federal governments in both nations involved, and in the U.S. the result was the 1896 embargo on new irrigation projects in New Mexico and Colorado discussed earlier in this chapter. In 1901, the U.S. Congress held hearings on a bill to determine how the federal government should bring water to the desert. Reclamation projects would be funded by public land sales. Western representatives supported the bill, but eastern representatives objected claiming it was unfair to take public monies to fund western farmers who would be in direct competition with eastern ones. The dissenters said reclamation should be left to the states, despite the fact the Desert Land and Carey

³⁰⁶ Hundley, 18, 31.

³⁰⁷ An Act Appropriating the Receipts from the Sale and Disposal of Public Lands in Certain States and Territories to the Construction of Irrigation Works for the Reclamation of Arid Lands, (1902) 32 Stat. 388.

³⁰⁸ Pisani, *From the Family Farm to Agribusiness*, 282.

Acts had thus far been a failure. However, when Theodore Roosevelt became president after the assassination of William McKinley, he gave his full support to the Newlands Bill, which became the Reclamation Act of 1902. The Reclamation Act applied to 16 of the 17 western states and territories, but omitted Texas because that state had no public lands to contribute to funding reclamation projects. Congress had modified the bill proposed in 1901 to overcome earlier objections by using only the monies raised by sale of public lands in a state to fund projects within that state. Section 8 provided that no provisions in the act could supersede the laws of a state or territory.³⁰⁹

The Reclamation Act created the U.S. Reclamation Service, renamed the U.S. Bureau of Reclamation (USBR) in 1923. Similar to the *científicos* in Mexico, the Bureau's leaders thought that technology could direct social change.³¹⁰ As many historians have argued, the power, scope, and implementation of conservation associated with the USBR, as well as other agencies such as the Forestry Service, is often overstated or misunderstood. Samuel P. Hays writes that in the U.S. the "progressive revolt of the early twentieth century...[is often viewed as] an attempt to control private, corporate wealth for public ends." However, as Hays has argued, the fact that corporations obtained large tracts of land under the Carey and Desert Land Acts did not necessarily mean that they were destroying natural resources because, he concluded, they were more likely to address conservation than individuals. Corporations had both the funds and profit motive to maintain sustainable development while anti-monopolists as well as individuals frequently opposed conservation efforts. Karl Jacoby explored the negative response by individuals to conservation laws and regulations in his study of the Adirondack Mountains and Yellowstone Park. Rural people did not necessarily view conservation as progress and continued

³⁰⁹ Golzé, op. cit., 23-26.

³¹⁰ Littlefield, op.cit., 95.

to cut timber, hunt and fish, as well as live in parks and forests after they were set aside and managed by the government. Their customary activities suddenly became illegal. According to Jacoby, the history of American conservation is often “neatly compartmentalized into crusading heroes (conservationists) and small-minded, selfish villains (conservation’s opponents).” Emily Wakild also examines this phenomenon during the years 1910-1940, when the Mexican government established parks to conserve natural resources. People who had made their living in the forests were not always pleased when the government curtailed their traditional activities.³¹¹

According to Hays, Theodore Roosevelt believed that “social and economic problems...should be solved, not through power politics, but by experts who would undertake scientific investigations and devise workable solutions.” Roosevelt sought rational, planned management of natural resources to stem social unrest looking both to a scientifically directed future and, somewhat contradictorily, backward to an agrarian utopia. This scientific bent was similar to the resource management policies developing in Mexico in the late nineteenth and early twentieth centuries, but unlike in Mexico the U.S. movement toward conservation was not interrupted by an armed revolution. However, conservation still had to be “sold” to the American public and was not the top-down approach attempted in Mexico. As Donald J. Pisani has argued, conservation was not achieved by the “emergence of bureaucracy or a professional civil service.” Instead, “men like Frederick H. Newell and Gifford Pinchot [enlisted] ‘the public,’ or at least middle-class professionals, in their causes. Each agency [the Reclamation Service and the Forest Service] staked its future on developing elaborate ties to constituencies outside government.

³¹¹ Hays, op. cit., 262-263; Karl Jacoby, *Crimes Against nature: Squatters, Poachers, Thieves, and the Hidden History of American Conservation* (Berkeley: University of California Press, 2001), 3; Emily Wakild, *Revolutionary Parks: Conservation, Social Justice, and Mexico’s National Parks, 1910-1940* (Tucson: The University Of Arizona Press, 2011).

Science was employed as a political weapon – to win the largest constituency.”³¹² Newell and Pinchot promoted the Reclamation Service and the Forestry Service through publications, mailings, and participating themselves in organizations such as the National Irrigation Congress. Irrigators, in particular, joined forces with federal conservation efforts to achieve their own ends. Pisani concludes that these persuasive efforts illustrate “the weakness, not the strength, of bureaucracy.”³¹³

Alfred R. Golzé, Director of Programs and Finance, USBR, defined reclamation as “the process of reclaiming the desert lands of the western United States through irrigated agriculture, supported by coordinated development of hydroelectric power.” Champions of reclamation envisioned that the work of the Reclamation Service would make the West self-sustaining, because the growing population would not have to import foodstuffs. Hydroelectric power would contribute to economic growth, simultaneously funding water projects and adding to tax revenues.³¹⁴ Marc Reisner’s *Cadillac Desert* and Donald Worster’s *Rivers of Empire* both explore the idea that the Reclamation Act was a pivotal point in the environmental history of the American West, and that reclamation led to extensive environmental damage, wasted millions of dollars, and favored large-scale agriculture. According to Reisner, in spite of all the dams and canals the government financed, the American West is still underdeveloped and only a tiny percentage of the land is irrigated.³¹⁵ Worster argues that the American West is “first and most basically, a culture and society built on, and absolutely dependent on, a sharply alienating, intensely managerial relationship with nature,” and was “built by state power, state expertise,

³¹² Pisani, *Water, Land, and Law in the American West*, 195.

³¹³ Hays, 267; Pisani, *Ibid.*, 195.

³¹⁴ Golzé, vii, 37.

³¹⁵ Marc Reisner, *Cadillac Desert: The American West and Its Disappearing Water* (New York: Viking Press, 1986), 3.

state technology, and state bureaucracy.”³¹⁶ Donald J. Pisani reaches somewhat different conclusions in *Water and American Government: The Reclamation Bureau, National Water Policy, and the West, 1902-1935*. Pisani concludes that the Bureau had a mixed record of successes and failures, but “shattered the idea of the ‘great American desert’...[and] destroyed the notion that the West would forever remain one large pasture punctuated by scattered mines, or simply a storehouse of raw materials, or a refuge or dumping ground for native Americans, criminals, scoundrels, and the victims of respiratory diseases.” Private efforts at conservation worked in tandem with federal projects and the state never achieved “a monopoly of ‘economic sovereignty.’”³¹⁷

The Reclamation Service did offer a solution to the ongoing problems of apportionment of the waters of the Rio Grande and to the complaints from Texans and Juarenses concerning dwindling river water and agricultural losses. That solution, however, had both positive and negative consequences. In early 1902, Arthur Powell Davis, John Wesley Powell’s nephew, of the U.S. Geological Survey conducted a study of the Rio Grande in New Mexico. Davis concluded that a dam and reservoir built by the government at Elephant Butte could store 2,000,000 acre-feet of water and would assure Mexico delivery of 60,000 acre-feet of water per year. This was the basis of the offer made to the Rio Grande Dam and Irrigation Company that Boyd had rejected. Water shortages and drought conditions had become so acute by then that Mexican Ambassador to the U.S. Manuel de Aspiroz wrote to U.S. Secretary of State John Hay in 1904 demanding that the U.S. either build a dam or compensate Juárez farmers for damages. He claimed that these conditions became alarming in 1896 and that population loss and

³¹⁶ Donald Worster, *Rivers of Empire: Water, Aridity, and the Growth of the American West* (New York: Oxford University Press, 1985), 5, 131.

³¹⁷ Donald J. Pisani, *Water and American Government: The Reclamation Bureau, National Water Policy, and the West, 1902-1935* (Berkeley: University of California Press, 2002), 294-295.

agricultural decline had continued at an accelerated rate ever since. Hay then wrote to Secretary of the Interior Ethan A. Hitchcock asking if the Reclamation Service could get involved.³¹⁸ The drought had also convinced irrigators in New Mexico that some solution had to be found to share Rio Grande river water with Texas, due to their concerns about the ongoing legal cases between Kansas and Colorado over Arkansas River water. New Mexico was still a territory in 1904 and it was possible that in a suit with Texas, a state, they would not have equal standing before the courts.

Anson Mills had not given up on the International Dam at El Paso, but the Reclamation Service continued to promote their dam at Elephant Butte as a better solution. A letter dated October 22, 1904, from A.P. Davis, W.H. Sanders, and B.M. Hall, Reclamation Service Board of Engineers, to F.H. Newell, Chief Engineer, Reclamation Service, listed the main points of their studies and surveys:

1. Elephant Butte (EB) reservoir has a 2 million acre ft. capacity; International Dam (ID) only 500,000 acre ft.
2. EB can furnish 600,000 acre ft. per annum, ID only 180,000 acre ft.
3. EB will lose no water through overflow, ID will waste a large amount of the inflow.
4. With any given amount of water EB will only have half the surface for evaporation of the ID.
5. EB will take 82 years to fill to 60% with mud, ID will take 46 to fill to 60% with mud.
6. EB reservoir is deep and narrow, ID is wide and shallow, consequently sluicing out mud will be 9 times more efficient at EB.
7. EB will store entire flow of Rio Grande, and prevent floods impacting Santa Fe Railroad, and several important towns. ID will waste water by overflow, have maximum evaporation, regulate no floods above El Paso, cover 25,000 acres of good land near El Paso and make marshland of 15,000 more above it that will produce unsanitary conditions at El Paso.
8. ID will destroy 40,000 acres immediately north of El Paso to irrigate 55,000 acres below El Paso, EB will irrigate the 40,000 acres the ID would destroy and irrigate 50,000 acres below El Paso, as well as 90,000 acres above El Paso in New Mexico, a total of 180,000 all of which is tributary (upstream) to El Paso.

³¹⁸ Manuel de Aspiroz to John Hay, June 3, 1904; John Hay to Ethan A. Hitchcock, June 27, 1904, As found in Littlefield, op.cit., n. 14, n. 15, 240.

9. EB would furnish water to 110,000 acres in NM and 20,000 in TX (130,000 total) and still release water downstream to 50,000 acres below El Paso.³¹⁹

The National Irrigation Congress met in El Paso in November of 1904, a year of severe drought in the region, and Davis' reports and studies were part of the agenda. The Congress illustrates the degree to which Texans, Mexicans, and their respective governments had become not only involved in irrigation, but also in finding some solution to sharing the waters of the Rio Grande. Many illustrious invitees who could not attend sent letters of regret and statements read into the proceedings, including U.S. President Theodore Roosevelt, Secretary of State John Hay, Secretary of War Ethan A. Hitchcock, Mexican President Porfirio Díaz, and his Vice President, Ramon Corral. El Paso and Juárez were well represented at the meeting. Out of the 79 delegates from Texas, 36 were from El Paso, one from Ysleta, and one from Clint. Mexico had 46 delegates, 14 from Ciudad Juárez and its outlying colonias. Egypt sent a delegate as well. Captain T.J. Beall of El Paso welcomed the delegates to the city, and in his speech about the importance of irrigation said, "It is in those countries where human toil and skill must be exerted to make a living out of the ground that thorough manhood is developed, and it is here you will find the highest types of mankind, standing upon the highest plane of enlightenment and civilization." National Irrigation Congress Chairman of the Forestry Section Gifford Pinchot, representing the Forestry Service, and National Irrigation Congress Chairman of Engineering and Mechanics Section Senator Frederick H. Newell, representing the Reclamation Service, both addressed the delegates. Pinchot praised the Reclamation Act and Newell spoke about the potential for reclamation, adding that he thought Texas would soon be covered by the act, which

³¹⁹ Bureau of Reclamation Records, Project Histories, Feature Histories, and Reports, 1902-1932 Rio Grande (NM-TX), NARA, Denver, RG 115 FY 10, Entry 10, Bureau of Reclamation Transfer from Washington D.C., Box 475, Folder Rio Grande, 1904+.

did happen in 1906.³²⁰ Third Vice President of the National Irrigation Congress, John Hall from Lampasas Springs, Texas, presented Davis' report on the Elephant Butte Dam and explained its ramifications. After a motion from the floor, Texas and New Mexico delegates agreed to adopt the Elephant Butte Dam proposal. Representatives from Mexico stated they had not had the opportunity to compare the Elephant Butte Dam and International Dam specifications, but for the moment agreed to accept the Elephant Butte proposal and forward the information to their respective government officials for final consideration.³²¹

Not everyone had acquiesced to the idea of the federal government taking control of building a dam that would impact New Mexico, Texas, and Mexico. Farmington, New Mexico's *The Herald* printed two letters to the editor under the headline "As to the Site of the Proposed Dam" on December 4, 1904. J.L. Campbell, Chief Engineer, Rio Grande Dam and Irrigation Company, expressed his anger at B.M. Hall, Engineer, Reclamation Service, for criticizing his original plans and discrediting Anson Mills' design (that Campbell had borrowed from directly). He then went on to applaud the fact that New Mexico and Texas residents of the valley had finally come together over building a dam, but he still supported private investment over publicly funded efforts. The paper also printed Hall's response. He stated that he respected Mr. Campbell but a low dam owned by a private company would have been "an insurmountable obstacle in the way of any comprehensive plan by the Reclamation Service for irrigating the Rio

³²⁰ In spite of the rhetorical linkage of "manhood" with irrigation, eleven of the delegates were women, listed as either Mrs. or Miss. A Pearl Baily of New Mexico is most likely a woman, and Guadalupe Ascarate, also of New Mexico, could be a woman as that is a common first name for both men and women in Hispanic culture. Mitchell, Guy Elliot, ed., *Official Proceedings of the Twelfth National Irrigation Congress, Held at El Paso, Texas, November 15-16-17-18, 1904* (Galveston, Texas: Clarke & Courts, 1905), 27, 30, 84-85; An Act to Extend the Irrigation Act to the State of Texas, 34 Stat., L 259, February 25, 1905, Approved June 12, 1906.

³²¹ Ibid., 107-108. Delegates accepting on behalf of the American side of the Rio Grande valley: Felix Martinez, El Paso; A.P. Coles, El Paso; Z.T White, unknown; A. Courchesne, El Paso; J.A. Smith, Ysleta; Oscar C. Snow, Mesilla, New Mexico; H.B. Holt, Las Cruces, New Mexico; Wm. Palmer, Jr., unknown; R.E. Twitchell, Las Vegas, New Mexico; Martin Lohman, unknown. Delegates accepting on behalf of Mexico: Jacobo Blanco, San Luis Potosí; Roberto Gayol, Mexico City; Jose Duvallon, Victoria, Tamaulipas; Ygnacio Carranza, Mexico City; Rafael De La Mora, Guadalajara, Jalisco.

Grande Valley.” He also wrote that it was not Campbell’s fault the Rio Grande Dam and Irrigation Company could not raise enough money to build a larger dam because the smaller dam the company proposed would be filled with silt every 15 years.³²²

With irrigators in New Mexico, Texas, and Mexico seemingly amenable to an immediate, comprehensive solution, the U.S. Congress offered Mexico a treaty in 1905 to build a dam at Elephant Butte and guarantee a set allotment of water to Mexico, if Mexico would not press for damages or make claims to any additional water down to Fort Quitman. Mexico had previously questioned the Harmon Doctrine in order to make a case for damages, but U.S. Secretary of State Elihu Root had already decided Harmon’s ruling was not in violation of international law and Mexico had no case. Mexico contested several elements of the treaty on other grounds. The amount of the allocation was too small and should be increased to at least 75,000 acre-feet of water per year, the water should be delivered to the diversion canals rather than into the bed of the river, and Mexico had a right to half of any surplus or recharge water flowing from El Paso to Fort Quitman. The U.S. would not agree to these demands. Mexico conceded in 1906 and both nations signed the “Convention between the United States and Mexico for the Equitable Distribution of Waters.” Also in 1906, the U.S. Supreme Court ruled in *Kansas v. Colorado* that “each state has jurisdiction over the lands within its borders, including the beds of streams and other waters. It may determine for itself whether the common-law rule in respect to riparian rights or that doctrine which obtains in the arid regions of the West of the appropriation of waters for the purposes of irrigation shall control. Congress cannot enforce either rule upon any state.”³²³ But the ruling also stated that “equitable apportionment” should prevail in interstate

³²² Records of the Bureau of Reclamation, General Administrative and Project Records, 1902-1919, Rio Grande Project, NARA, Denver, RG 115 FY 13, Entry 3, Box 438, Folder 46, Penasco Rock Reservoir Site – Elephant Butte National Archives, Tray 456.

³²³ *Kansas v. Colorado*, 206 U.S. 46 (1906).

conflicts over a shared source of water. Unfortunately, the term “equitable” was not specifically clarified. Equitable, as a legal term means “fair, just, based on principles of equity.” Equity means “fairness, justice according to principles of fairness and not strictly according to formulated law.” But it also means “the value of property minus all encumbrances on it.” International law and U.S. law were extremely vague about equitable apportionment, and Mexican law rested squarely on the rights of prior appropriation tempered by the idea that water was public property. Was Mexico entitled to half of the water? Or an amount based on property values in Juárez? The 1906 Convention chose the latter interpretation, and did not create an equal division of the Rio Grande’s waters, because the population in Juárez occupying developed land, a total diminished due to the drought and shortages of the 1890s, was the formula for allotment.³²⁴ The Convention shows that by 1906 the federal governments in both nations had taken unto themselves the right to determine just how much water people could access.

In the 1906 Convention, the U.S. promised to deliver 60,000 acre-feet of water annually to the head works of the *Acequia Madre*, and the rest would flow into the El Paso/Juárez Valley. The water would be delivered, “as nearly as may be possible” as follows:

³²⁴ Hess, op. cit., 147; Littlefield, op.cit., 125, 175; *Gilbert Law Summaries* (Orlando, Florida: Harcourt and Company, 1997), 102. 103.

	Acre feet per month	Corresponding cubic feet of water
January	0	0
February	1,090	47,480,400
March	5,460	237,837,000
April	12,000	522,720,000
May	12,000	522,720,000
June	12,000	522,720,000
July	8,180	356,320,800
August	4,370	190,357,200
September	3,270	142,441,200
October	1,090	47,480,400
November	540	23,522,400
December	0	0
	60,000 Acre Feet	

In case of “extraordinary drought or serious accident to the irrigation system in the United States, the amount delivered to the Mexican Canal shall be diminished in the same proportion as the water delivered to lands under said irrigation system in the United States.”³²⁵

Article I of the 1906 Convention provided for a dam and reservoir near Engle, New Mexico, in the location called Elephant Butte. The U.S. Reclamation Service was in charge of the construction, called the Rio Grande Reclamation Project at that time, but the work did not proceed quickly.³²⁶ A diversion dam had to be built upstream at Leasburg first. In October, 1906, J.P. Nelson of San Antonio won the bid for the Leasburg Diversion Dam and Canal and Change of River Channel for \$145,431.50, depositing a certified check for \$6,500.00 after beating out the second place bid offered by Albert Wallis of El Paso. Extreme flooding in 1907 meant Nelson had to request a contract extension on July 13, 1907, and in August the Secretary

³²⁵ “Convention between the United States and Mexico Providing for the Equitable Distribution of Waters for Irrigation Purposes,” 34 Stat. 2953 (1906).

³²⁶ Often simply called the Rio Grande Project, which can also refer to the Rectification Project of the 1930s. To avoid confusion this study uses Rio Grande Reclamation Project when referring to Elephant Butte Dam and attached projects in this chapter, but after completion the name changed to the Rio Grande Federal Irrigation Project.

of the Interior extended the contract to November 5, 1907.³²⁷ The Leasburg Diversion Dam was not completed until 1908. Construction at Elephant Butte was further delayed in 1909 when the Victorio Land Company demanded \$600,000 for 33,640 acres that would be covered by the reservoir. The U.S. Reclamation Service offered only \$65,000 and it took years of hearings in New Mexico courts to settle on an amount of \$200,000. During the delay, in 1912 a flood hit the El Paso/Juárez Valley and damaged 16,000 acres. Actual work on Elephant Butte did not commence until June 3, 1913. The cost for the project totaled \$5.2 million and the final dam structure is 301 ft. high, 1,674 ft. long, and contains 618,785 cubic yards of concrete. The reservoir can hold up to 2,065,010 acre-feet of water.³²⁸

Throughout the early twentieth century, conservation efforts continued to develop in the U.S. and Mexico, as well as in other nations. Miguel Angel de Quevedo, Mexico's "apostle of the tree," was an advocate of forestry conservation during the Porfiriato and advised President Lázaro Cárdenas, who became president in 1934. Quevedo received a degree in science from the University of Bordeaux in 1883, and went on to study forest conservation in Paris. He received his degree in civil engineering from the Ecole Polytechnique in 1887, specializing in hydraulic engineering. Returning to Mexico City, his first assignment was to lower the lakes around Mexico City to prevent flooding, a huge undertaking completed in 1900. In 1901, he talked about the relationship between forests and water before Mexico's Second National Congress on Climate and Meteorology, and urged the passage of tough forest conservation laws. As Lane Simonian has noted, by this time the president of the U.S. had committed to conservation efforts, but Porfirio Díaz had not. That changed in 1907, and by 1908 Quevedo was applying European

³²⁷ Bureau of Reclamation Records, General Administrative and Project Records Rio Grande, 1902-1919, NARA, Denver, RG 115 FY 13, Entry 3, Box 792, Folders 17 B.1, 17 B.2.

³²⁸ Report on Rio Grande Rectification by Special Committee of Engineers, El Paso Chapter, American Association of Engineers, June 5, 1922, Records of the IBWC, U.S. Sector, El Paso Texas; Reports on Rio Grande Rectification, May 1930, Records of the IBWC, U.S. Sector, El Paso Texas, Folder 2.22.2/2.

forestry conservation techniques in Mexico. In 1909, President Theodore Roosevelt organized the North American Conference on the Conservation of Natural Resources in Washington D.C., inviting Lord Grey of Canada and President Porfirio Díaz of Mexico, both of whom attended. Roosevelt asked Gifford Pinchot, U.S. Forester and Chairman of the National Conservation Commission, to find a Mexican delegate, and Pinchot invited Quevedo to address the gathering.³²⁹ Pinchot had also studied conservation in France, and believed that international cooperation on conservation efforts could lead to world peace. Roosevelt opened the conference by saying, “In international relations, the great feature of the growth of the last century has been the gradual recognition of the fact that instead of its being normally to the interest of each nation to see another depressed, it is normally to the interest of each nation to see the others elevated.” He then went on to add “I believe that the movement that you this day initiate is one of the utmost importance to this hemisphere and may become of the utmost importance to the world at large.”³³⁰ Reaching out to experts in other nations to address conservation and seeking international solutions to shared environmental issues is also reflected in the evolution of the National Irrigation Congress, which changed its name to the International Irrigation Congress in 1912. At the last congress in 1916, the delegates commemorated the international negotiations and agreements that had made Elephant Butte Dam and Reservoir a possibility. Clearly, by this time advocates of conservation were sharing ideas across borders.

The Reclamation Service’s oversight of the Rio Grande Reclamation Project was also a step on the path to the shift from statutory and customary legal water rights to the obligation to purchase water rights. The government, local, state or federal, did not abandon prior

³²⁹ Simonian, 67-76.

³³⁰ Jamie Lewis and Char Miller, “Gifford Pinchot and the Quest for World Peace,” *Raleigh News and Observer*, January 3, 2010; Jamie Lewis, “February 18, 1909: National Conference on Conservation is Held,” February 18, 2010, Accessed July 10, 2016, <https://fhsarchives.wordpress.com/2014/02/>

appropriation or riparian rights, but superimposed an authority to build dams and canals and then sell access to water. This shift began in the El Paso area in the mid-nineteenth century. In 1852, the Texas Legislature passed the Irrigation Act, a community irrigation law and the first irrigation law in Texas, introduced by legislators from El Paso and San Antonio whose jurisdictions relied heavily on irrigation for agriculture. The act allowed a county to regulate dams and distribute shares of water. As seen above in Chapter Two, in the late nineteenth century the city of El Paso passed ordinances similar to those of Mexico and Spain regarding irrigation rights and the responsibility of irrigators to maintain canals and diversion ditches. In 1878, John Wesley Powell had recommended that neither riparian nor prior appropriation rights should be recognized in arid lands, but instead water users associations should form within natural drainage basins. These autonomous organizations could grant access to water and oversee maintenance of water works, create rules that suited their particular needs and climate, and doing so would prevent large corporations or other interests from monopolizing water.³³¹

When it became clear that the Reclamation Service would control the water flowing down the river from Elephant Butte, Felix Martinez, A. Courchesne, and J.A. Smith organized the El Paso Valley Water Users Association on December 27, 1904. The association would sell rights to use the water released from the reservoir in order to repay the government over time for building Elephant Butte Dam. The individual property owner could only secure rights for up to 160 acres, as per the 1902 Reclamation Act, by buying stock in the association based on the number of acres to be irrigated, constituting a lien on the property. The Elephant Butte Water Users Association organized in the Mesilla Valley in 1904 as well.³³² These water users associations led to the establishment of water improvement districts, and illustrate an acceptance

³³¹ Pisani, *Water, Land, and Law in the West*, op.cit., 12-13, 20.

³³² White, op.cit., 107-109.

of increasing government involvement in irrigation. With the permission of the Attorney General of Texas, El Paso County Commissioners Court established the El Paso County Drainage District on September 11, 1912. The county floated \$68,000 in bonds to build a main canal, six laterals, and levees at the request of irrigators at Ysleta, Socorro, San Elizario, and Fabens. J.M. Escajeda, Tereso Juárez, Braulio Chavez, Eleno Sierra, Anastasio Olguin, Severo Cordero, Juan Cordero, Aurelio Medina, Jr., Sabino Siessa, Gabriel Holguin, Sr., Juan Salcido, Tomas Valenzuela, Domingo Valenzuela, and Andres Telles petitioned the court to establish the drainage district. The boundary of the district was: “Beginning at Monument No. 1 of that part of International Boundary Line between the United States and Mexico that forms the south boundary of what is known as “The Island” which lies south of the town of Fabens, in El Paso County, Texas; thence north 70 degrees 30 minutes east 275 varas to a point on the south bank of the present Rio Grande River; thence down the south bank of said river, following the meanders thereof, to a point where the channel of the present river intersects the old bed of river near Monument 20 of said International Boundary Line to the place of beginning, said tract of land being known as “The Island” and containing 15,000 acres of land.”³³³

³³³ Transcript of Record Authorizing Issuance of El Paso County Drainage District Bonds in the Amount of \$68,000, and El Paso County Drainage District No. 1, The State of Texas Reclamation Department Comptroller’s Records, Texas State Archives, Austin, Call No. 1982/6-25.

On September 13, 1915, The Office of Public Roads and Rural Engineering of the U.S. Department of Agriculture and the Board of Water Engineers of the State of Texas created a Memorandum of Agreement to investigate seepage losses in canals, decide how much water an irrigator needed, and determine if the water was being applied at the proper rate. Irrigators in El Paso and Hudspeth Counties had to petition the Texas Board of Water Engineers for a set amount of water, and if the water was the result of the Rio Grande Reclamation Project, L.M. Lawson, Project Manager, also had to submit a recommendation either for or against.³³⁴ Responding to a petition from C.N. Bassett and J.J. Schairer, on April 24, 1917, the El Paso Commissioners Court issued a Public Notice, calling for the election of five directors to oversee a water improvement district that would be a public utility. The district would use Reclamation Service money to build water projects, and pay the government back with user fees. Secretary of the Interior Franklin K. Lane would not agree without Congressional approval, but later approved a contract after Reclamation Service District Counsel F.W. Dent assured the Department of the Interior in a letter dated October, 4, 1917, that the Texas 35th Legislature had authorized water districts on August 21, 1917. L.M. Lawson met on September 29, 1917, with the Elephant Butte Water District Users Association and the El Paso Water District Users Association to hear their concerns and suggestions. Lawson wrote to the Chief of Construction, Rio Grande Reclamation Project, in Denver on October, 25, 1917 informing him that after several meetings both districts agreed to certain dates when water would be available for irrigation. Lawson stated that although it is “desirable to keep water out of the river in the winter to prevent seepage, winter crops still require some water. The associations agree to close the

³³⁴ “In Re. Memorandum of Agreement between the Office of Public Roads and Rural Engineering of the U.S. Department of Agriculture, and the Board of Water Engineers of the State of Texas, Regarding Cooperative Investigation of Irrigation in the State of Texas, Not Dated, But Accompanying a Letter Written By L.W. Page, of date Sept. 13, 1915,” Texas Water Commission, State Board of Water Engineers, Minute Book #1, Texas State Archives, Austin, Call Number 1991/041-1174 A.

gates at Elephant Butte for two weeks in November, and again from December 7 to February 1.” He notes that “while our project operations, especially those of maintenance work, would have been carried on better with no irrigation for a longer period, we realize that there must be cooperation with the farmers in producing winter crops, and have compromised with the first demands of both associations, which differed considerably.”³³⁵

Lawson sent Secretary Lane correspondence on December 29, 1917, regarding a contract for \$1,000,000 he thought would be needed for drainage and improvements in the El Paso Water Users District. The federal government agreed to provide \$500,000 for drainage works, to include the Mesa Drain (23 mi.), the Middle Drain (20.5 mi.), the River Drain (21 mi.), the Island Drain (9 mi.), and the West Side Mesilla Drain (11 mi.), plus necessary bridges, canals, drainage inlets, “and other requisite appurtenant works.” An additional \$500,000 would be spent as necessary to improve irrigation and the Reclamation Service would oversee maintenance as mandated in the Reclamation Act, Article 9. “The Secretary [of the Interior], in his discretion, if he deems lands within the District temporarily incapable of successful cultivation on account of/seepage, alkali, or other conditions, may notify the District that it will be relieved from payment of the amounts payable or a part thereof” at a time to be determined by the Secretary.³³⁶ Irrigators in Juarez also formed a water users association, the Unidades de Riego (now Juarez Irrigation District 009), but not until 1939. In 1980 the El Paso County Water Improvement District No. 1 took over maintenance and operation of canals, laterals, and drainage systems from the Bureau of Reclamation, and then ownership of same in 1996.

³³⁵ Records of the Bureau of Reclamation, Washington, D.C., General Administrative and Project Records 1902-1919, Rio Grande 330-330 B, NARA, Denver, RG 115, Box 816, Entry 3, Folders 330 A.1, A.2.

³³⁶ Records of the Bureau of Reclamation, Washington, D.C., General Administrative and Project Records 1902-1919 Rio Grande 1132B—1259, NARA, Denver, RG 115 FY 13, Box 826, Entry 3, Folder 1259, Rio Grande Operations and Maintenance.

By 1916 Elephant Butte Dam was complete and agriculture in the El Paso/Juárez Valley became less of a gamble as the water supply became somewhat more reliable. As a result, Louis J. Ivey introduced large-scale cotton production to the El Paso/Juárez Valley and changed the agricultural landscape. Ivey passed through El Paso in 1905 on his way to California. He was the first farmer to plant cotton at Callexico in the Imperial Valley, and he and his family went on to develop better strains of the crop as well as cotton gins and cotton seed oil mills. In 1912, he came back to El Paso and planted three acres in long-staple cotton at Ysleta and eight at Tornillo. In 1916, he planted long-staple cotton on 1,856 acres at the Ivey-Dale Farm at Tornillo, building 30 miles of canals and the first cotton gin in the area. In 1920, he also developed the 1,800 acre Ivey-Dale-Owen Farm. Ivey and Associates built cotton gins at Fabens, Texas, and Las Cruces, New Mexico. As the first merchant in the El Paso/Juárez Valley involved in the cotton export, import, and domestic mill businesses, he also taught cotton classification and marketing to students and farmers. Ivey contended that the El Paso region could become a major producer of quality cotton, and he was correct.³³⁷ The more reliable river water supply changed agriculture on the Mexican side of the border as well, where long-staple cotton quickly became the leading crop.

However, arguments between the U.S. and Mexico over water allotments continued. The water flowing downstream from Elephant Butte Dam reached the *Acequia Madre* first, so Mexican farmers took their water and then released the remainder into the Franklin Canal for the farms on the Texas side. Compounding this situation was that fact that in 1918 reclamation became a priority in the Middle Valley of the Rio Grande, the basin in New Mexico above San Marcial. Depletions above the Middle Valley in the San Luis Valley of Colorado had caused

³³⁷ Louis Ivey, Jr., "Louis Joseph Ivey: Biographical Sketch and Research" (Legislative Reference Library, Committee Details, July 19, 2010); Trish Long, "Louis J. Ivey was father of area's cotton industry," *El Paso Times*, June 26, 2010.

seepage and silt accumulation, decreasing flow and causing water shortages downstream. In 1923 the governors of New Mexico, Colorado, and Texas each appointed a commissioner, and along with a fourth member appointed by the President, these commissioners began negotiations for an interstate compact regarding the equitable distribution of the Rio Grande's water. The goal was to ensure that the water allotments agreed to in the Convention of 1906 would be delivered as promised as far as Fort Quitman. The resulting Rio Grande Compact of 1929 essentially maintained the status quo, meaning that neither New Mexico nor Colorado could increase the amount of water they were taking from the river. In 1935 Texas brought a suit before the U.S. Supreme Court against New Mexico, claiming that excessive diversions in New Mexico had increased water salinity in the Rio Grande causing damages to Texas.³³⁸ This suit and its ramifications will be discussed in Chapter Five.

During the 1920s, the Mexican federal government began to accelerate investment in irrigation for development. President Alvaro Obregón (1920-1924) requested studies addressing how to increase the amount of irrigated lands. Daniel Cosío Villegas, one of Mexico's leading twentieth century intellectuals, wrote in 1924 that Mexican agriculture lacked advanced methods of cultivation, suffered from poor soil conditions, and that "engineering works, especially of irrigation, will be necessary throughout the nation. We cannot expect anything as a gift of Nature; everything in Mexico depends upon the activity and ingenuity of man."³³⁹ Due to a lack of funding Obregón's plans for irrigation did not go forward, but his successor Plutarco Elías Calles (1924-1928) committed to what Luis Aboites Aguilar has termed "revolutionary irrigation." Calles championed the idea that small farmers, *campesinos*, should be supported

³³⁸ Hill, op. cit., 166-167.

³³⁹ Daniel Cosío Villegas, as found in Angus Wright, "Downslope and North: How Soil Degradation and Synthetic Pesticides Drove the Trajectory of Mexican Agriculture through the Twentieth Century," in *A Land between Waters: Environmental Histories of Modern Mexico*, Christopher R. Boyer, ed., 22-49 (Tucson: The University of Arizona Press, 2012), 31-32.

through *bancos agrícolas* (agricultural banks) to provide capital to help them participate in the development of the nation. Future social revolutions and unrest could be prevented by raising the poorest *campesinos* up into what Mexico sorely needed, a middle class of agricultural producers. Farmers could obtain credit to buy equipment, machinery, seeds, fertilizer, and the materials to build dams and irrigation ditches. In January of 1926 the Mexican Congress passed *la Ley sobre Irrigación con Aguas Federales* (the Federal Law of Irrigation), creating the Comisión Nacional de Irrigación (National Irrigation Commission or CNI). The CNI would oversee irrigation projects and the government established *colonos* (colonists), chosen because they were considered hard-working and had shown individual progress by accumulating some economic resources, within federal irrigation districts and *unidades de riego* (units of irrigation). Between 1926 and 1928 Mexico spent 40 million pesos on irrigation works. In 1927 alone, Mexico built seven dams to irrigate 494,000 acres as well as provide hydroelectric power. Not all projects were entirely successful, due to engineering errors, but Mexico was obviously committed to federally planned water projects. Calles recognized that people in rural areas did not always have access to running water or interior plumbing and also created the Departamento de Salud Pública (Public Health Department) to oversee many aspects of hygiene, including clean water.³⁴⁰

By the 1920s El Paso and Juárez seemingly had an adequate supply of drinking water without having to draw from the river. In 1904 the International Water Company had opened

³⁴⁰ Héctor Aguilar Camín, and Lorenzo Meyer, *In the Shadow of the Mexican Revolution: Contemporary Mexican History, 1910-1989*, trans. Luis Alberto Fierro (Austin: University of Texas Press, 1993), 102; Luis Aboites Aguilar, *La Irrigación Revolucionaria: Historia del Sistema Nacional de Riego del Río Conchos, Chihuahua, 1927-1938* (México, D.F.: Secretaria de Educación Pública, 1987), 24-26; Casey Walsh, *Building the Borderlands: A Transnational History of Irrigated Cotton along the Mexico-Texas Border* (College Station: Texas A&M University, 2008), 53-55; Steven E. Sanderson, *The Transformation of Mexican Agriculture: International Structure and the Politics of Rural Change* (Princeton, New Jersey: Princeton University Press, 1986), 43; Jürgen Buchenau, *Plutarco Elías Calles and the Mexican Revolution* (Lanham, Maryland: Rowman & Littlefield Publishers, Inc., 2007), 123-124.

wells on the mesa. The company went bankrupt and the city took over its rights in 1910. By 1918 the city no longer relied on the river to supplement drinking water drawn from wells, and by 1927 went from using wells on the mesa to wells in the City Artesian Area and the Montana Field. The Lippincott Report of 1927 noted that the groundwater was sufficient to meet El Paso's needs for the next thirty years, but also warned that the population could grow at a fourfold rate over that period. Although engineer J.B. Lippincott had recommended using the water supplied by Elephant Butte Reservoir when it reached El Paso to supplement the drinking water supply, his advice went unheeded. The water in the Hueco Bolson is partially recharged by water from the Rio Grande and is brackish at the upper levels, but becomes increasingly saline as the water is drawn down. By 1935 the wells in the Montana field had become highly saline and the water level had dropped alarmingly. The city went back to using wells on the mesa, but by then the population of both El Paso and Juárez had grown substantially; in El Paso it had increased from 39,279 in 1910 to 102,421 in 1930, in Juárez from 8,218 in 1900 to 39,669 in 1930. The estimated amount of water pumped from the Hueco Bolson in El Paso rose from 1.5 million gallons per day in 1906 to 15 million gallons per day in 1934, reaching 16 million gallons per day in 1938. Juárez extracted 2.8 million cubic meters from the bolson in 1930 and 4.1 million cubic meters in 1940. Individuals and businesses continued to operate their own wells, further drawing down water levels. The USGS investigated the situation in 1935, releasing the results to the city of El Paso in 1937. However, addressing water conservation for the bolson did not occur until 1943 and it was not until 1945 that the study appeared as *Groundwater Resources of the El Paso Area, Texas*.³⁴¹

³⁴¹ Christopher Wallace, *Water Out of the Desert* (N.P.: Southwestern Studies, 1996), 21-23, 48; Tanski, 7; Sandra Bustillos Durán, *Juárez: La ciudad y el reto del agua* (Ciudad Juárez: Universidad Autónoma, 2009), 56.

Elephant Butte Dam proved to be both a blessing and a curse for the El Paso/Juárez Valley. The dam may have increased agricultural productivity, but it did not solve flooding problems and, in fact, made them worse. Prior to construction of the dam, the river filled in May and June from the upstream snowmelt. Seasonal flooding scoured the main channels and prevented silting. Arthur Powell Davis, Director and Chief Engineer, U.S. Reclamation Service, in 1919 reiterated William W. Follett's warning prior to constructing Elephant Butte Dam that it would cause downstream silting, but sediment release could be regulated. Follett had recommended in 1913 that a dam 40-50 ft. high be built at a gorge halfway between the dam and the head of the reservoir, creating a reservoir within the larger one. He proposed running a tube 8 ft. in diameter along the grade that runs from the upper end of the dam into the smaller reservoir. The tube would flush out most of the silt. When the water level in the main reservoir became low the smaller one in the gorge would receive the river water and most of the sediment would remain there before water passed over the spillway into the main reservoir. If the water level dropped in the smaller reservoir, the natural river flow would cut away at the silt and muddy water would flow downstream, which would be a good source of fertilizer. Silt would still accumulate in the larger reservoir, but at a slower pace. This plan would cost an additional \$4,000,000. The U.S. Reclamation Service Board of Engineers, W.L Marshall, D.C. Henny, and Louis C. Hill studied Follett's plan and wrote to Frederick H. Newell, Director of the U.S. Reclamation Service, on December 5, 1913. The engineers said they did not think the extra money was available, that the amount of silt accumulation Follett was trying to prevent would not justify the cost, that in the future better engineering techniques would afford a more economical solution, and although they agreed that silt in the released water would be a beneficial fertilizer, they believed the richest material would remain near the surface and not

settle in the reservoir. They concluded the whole idea was too experimental and did not endorse it. Consequently, Newell denied Follett's recommendation.³⁴²

When Elephant Butte Dam and Reservoir were completed, the gates opened on March 17, augmenting the river flow, and river water ran through the valley until September 17. The sharp gradient below Elephant Butte Dam accelerated flow velocity and carried silt from the reservoir to El Paso and Juárez, where the gradient decreases. Increased irrigation in El Paso and Juárez diverted a higher volume of water from the river, leaving the silt to build up in the river bed. By 1917 the river bed was 6 feet higher than it had been in 1907; by 1933 it had risen another 6 feet, an elevation higher than some areas in the towns of El Paso and Juárez.³⁴³ Due to the lack of scouring, and because the amount of silt released from Elephant Butte could not be regulated, the dam exacerbated flooding problems.

In 1921, the El Paso Chapter of the American Association of Engineers created a drainage committee and several subcommittees to conduct a survey and report on the relationship between Elephant Butte Dam and flooding in the El Paso/Juárez valley. On the U.S. side 50,000 acres and on the Mexican side 30,000 acres were occupied or under cultivation. The assessed value of irrigation and drainage works was approximately \$20,000,000. In August of 1921 discharge after rains had caused the river to flow at 4,000 cfs and flooded 4,200 acres. The engineering report concluded that Elephant Butte had altered the river's natural slope because the

“1) amount of flow is changed by diversion for irrigation; 2) distribution is changed by holding back the extreme floods which formerly came down periodically; 3) amount and character of sediment is changed; 4) only the character of the soil in the channel and banks is approximately unchanged [but is loose and liable to

³⁴² Bureau of Reclamation Project Histories, Feature Histories, and Reports 1902-1932, Rio Grande (NM-TX), NARA, Denver, RG 115 FY 10, Box 475, Folder Rio Grande, 1904+; Arthur Powell Davis, D.Sc., and Herbert M. Wilson C.E., *Irrigation Engineering*, First Edition 1896, Seventh Edition (Brooklyn, N.Y.: Braunworth & Co., Book Manufacturers, 1919), 379-380.

³⁴³ G. Frederick Reinhardt, “Rectification of the Rio Grande in the El Paso-Juárez Valley,” *The American Journal of International Law*, Vol. 31, No., 1 (Jan., 1937), 48.

add to silting].”

Possible remedies included dredging, allowing cut-offs to form on their own, building drains, and using levees to restrict the channel. The report did not consider the cost of these remedies, but concluded that failure to act would adversely affect the economy of both cities. The engineers recommended that to stop silting the velocity had to be increased or constant dredging would be required, but the most practical solution would be to straighten the channel, raise the banks, and increase the grade to protect the cities from flooding.³⁴⁴ El Paso city and county officials contacted the U.S. Army of Engineers in 1922 for assistance with flood control, but that department concluded that the river in the El Paso area was not navigable and therefore outside their jurisdiction. But Secretary of the Interior Albert Bacon Fall, a former U.S. Senator from New Mexico, did get involved due to an engineering report the Reclamation Service produced to explore the suggestion of a controlled waste-way and channel entirely on the U.S. side for 75 miles between El Paso and Fort Quitman. The Reclamation Service engineers unanimously recommended straightening the river and building levees as the better solution. Fall wrote to Secretary of State Charles Evans Hughes in May of 1922, requesting that his department become involved because the river was part of the international boundary.³⁴⁵

While these ideas were under consideration, El Paso and Juárez endured an historic flood in 1925, causing \$1,000,000 in damages. Heavy rains in New Mexico and the El Paso/Juárez region caused the river to swell and on August 3 the river breached the levees and flooded Fabens, inundating nine homes and causing \$30,000 in damages. U.S. Congressman Claude B.

³⁴⁴ Report on Rio Grande Rectification by Special Committee of Engineers, Records of the IBWC, U.S. Sector, Folder 2.22.2/2. President of the El Paso Chapter J.L. Campbell formed the drainage committee as follows: W.E. Robertson, Chair, L.M. Lawson, W.E. Stockwell, W.C. Stewart, T.H. Claussen, H.P. Corbin, W.H. Lark, L.A. White, and Vernon Sullivan. Added later and formed into sub-committees: C.R. Folk, F.H. Knapp, Forrest E. Baker, R.F. Burges, and Salvador Arroyo.

³⁴⁵ L. M. Lawson, Engineer, Department of the Interior, “Report on Condition of the Rio Grande on the Rio Grande Project, March 10, 1925.” Reports on Rio Grande Rectification, May 1930, Records of the IBWC, U.S. Section, El Paso, Texas. Folder 2.22.2/2.

Hudspeth demanded that the river be straightened, deepened, and that the levees be improved. He had previously met with the heads of the War Department, the Appropriations Committee, and the Rivers and Harbors Committee to urge that they take action, but they had not done so by August. Hudspeth was hopeful that because Frank W. Mondell, from Wyoming and known to be “friendly to Western states,” was about to become Secretary of the Interior, the Bureau of Reclamation could take on the role of addressing the “flood menace.”³⁴⁶ By September 3, the river was still running too high and flooding; the Upper Valley Road and all low areas in Smeltertown were under six inches of water, which had undermined the foundations of all structures built of adobe, causing them to fall down. Approximately 250 Mexican families had to camp on the high ground east of the county highway that the rising water had reached. According to the *El Paso Times*, “The Courchesne Bridge was impassable and the area represent[ed] a vast lake, the Santa Fe railroad track a pier running north into the water area.” Juárez Mayor Pedro M. Fierro and Chief of Police Augustin Gallo reported their dikes were still holding and they expected that to continue, but they had “400 men patrolling the levees – police, soldiers and civilians. Our people in El Paso’s lower south side are suffering more than over here.” Three thousand men worked feverishly in the Fabens area to shore up the levees at San Elizario Island, especially near Tornillo, which had been hit the hardest in August. Officials thought the township of Fabens would not be threatened, but they expected the flood crest to reach Fabens at midnight September 3, and at Tornillo 12 hours after that.³⁴⁷ Relief workers were out in force on September 4, and although the dikes were holding, more than 1,000 acres of valuable cotton land within a five-mile radius near San Elizario were flooded, and another 500 acres below the island bridge. The river highway from Ysleta to Fabens was underwater.

³⁴⁶ *El Paso Times*, 3 August, 1925.

³⁴⁷ *El Paso Times*, 3 September, 1925.

Hundreds of men continued to build temporary dikes to prevent further flooding.³⁴⁸ Rain continued to fall and the *El Paso Times* reported on September 4 that streets in South El Paso were running streams, overtopping the curbing on Texas Street. The intersection of Piedras and Alameda was a small lake, and Washington Park was partly underwater.³⁴⁹ The El Paso County Commissioners Court met on September 4 and discussed either floating \$10,000 in bonds for a new road-levee system or building an All-American Canal north of the river to divert water from the headgates. The latter proposal would have to be undertaken by the federal government.³⁵⁰ On September 9, the County Commissioners Court voted that the County Engineer work out a plan with the Bureau of Reclamation to build a high embankment topped by an unpaved road along the entire length of the river as it ran through the county. El Paso's Mayor and City Council met with members of the Commissioners Court the next day to make plans to rectify the river.³⁵¹

The IBC, U.S. Section, investigated what had caused the extensive flooding and concluded the problem was both silting and inadequate levees. The IBC found that

“as irrigation development proceeded in the valley attempts were made to confine the channel – the middle of which was the international boundary line between the U.S. and Mexico – by levees. This accentuated the problem as the low water channel continually became more restricted, the levees were generally of inadequate size and the flood channel between levees became heavily grown up with brush and was inadequate to pass river floods.”³⁵²

Even minor flooding during periods of heavy rain caused meanders that destroyed cultivated fields, headgates and wingdams, and changed the location of the international border.³⁵³ In 1927 the U.S. and Mexican IBC Commissioners began investigating how to rectify and stabilize the

³⁴⁸ *El Paso Herald*, 4 September, 1925.

³⁴⁹ *El Paso Times*, 4 September, 1925.

³⁵⁰ *El Paso Herald*, 5 September, 1925.

³⁵¹ *El Paso Herald*, 10 September, 1925.

³⁵² *History of the IBWC, Section 18, El Paso Projects, Rio Grande Rectification Project*. Folder 2.1/3. International Boundary and Water Commission, El Paso, Texas.

³⁵³ Mueller, 78-82; Bryson, 23.

boundary. They concluded that “the problem was unique in that any engineeringly [sic] feasible project would require cuts across river loops in both nations and when accomplished, result in a new artificial channel whose center line would become the international boundary line.”³⁵⁴ Rectification, although a huge engineering undertaking, seemed to be a solution for multiple problems.

By 1928, not only were the Mexican and U.S. sections of the IBC studying the flooding and other water problems in El Paso/Juárez valley, the Department of Communications and Public Works in Mexico had also become involved in fieldwork to determine the best route for a rectified channel. Salvador Arroyo, Civil Engineer and Delegate of the Department of Communications and Public Works at the VI National Convention of Engineers meeting in Juárez in May 1928, also recommended rectification, as well as other necessary improvements. He reported that 14,900 hectares on the Mexican side were under cultivation by 1928, primarily in highly profitable cotton. The rising riverbed was causing seepage into fields and limiting drainage after irrigating. He noted that levees would help with flooding, but reiterated Mexican concerns about irrigation recharge water and river water apportionment, adding,

“Moreover, the deficient drainage of the higher portions of the valley actually impede the beneficial utilization of a large quantity of water which is at the present prejudicial, because by storing itself in the subsoil, it causes the level of the subterranean stratum to rise; water which if returned to the river, by normalizing the drainage conditions, could be made useful for the expansion of areas located lower down in the course of the valley, which are threatened with a shortage of the necessary allowance of water for irrigation in case it should be decided on the American side to reduce to the minimum the allowance which at present leaves the dam, whether with the object of satisfying the demands of some state, which like Colorado, believes it has the right of preference over those waters, or because in periods of maximum drought an unforeseen necessity might arise to hoard to the maximum the quantity of water stored in Elephant Butte, and save in that manner from a serious disaster

³⁵⁴ *History of the IBWC*, Folder 2.1/3.

the greater part of that region which is irrigated from that reservoir.”³⁵⁵

Arroyo went on to voice the opinion that this would have to be an international project requiring great cooperation and would be a great feat that would impress the world, becoming

“an inestimable precedent which would contribute in great measure to smooth away the difficulties in resolving questions of much greater importance for our nation and for the United States, such as the equitable distribution of the international waters, which has begun to occupy the attention of the governments of both nations and upon the definite solution of same depends the progress and future development of the greater portion of the frontier zone of both countries.”³⁵⁶

Arroyo was correct that the proposed Rectification Project had become a subject of interest in the field of international law and would be an example of effective diplomacy. In 1929, The World Affairs Institute reported that rectification could address the fact that the prior treaties between the U.S. and Mexico had not made any “provisions for artificial changes now so strongly urged because of the intensive cultivation and improvements that have been made on areas adjoining the river.” Channeling the “fickle meanderings” of the Rio Grande would finally solve the problems of sovereignty, land titles, and establish a permanent border while eliminating the “flood menace.”³⁵⁷

Legal stances and opinions had not been able to settle the question of water rights in the arid Southwest, nor had they been able to settle where the international boundary would be due to the fact that the Rio Grande in the El Paso/Juárez Valley so often changed its course. By the 1920s, in both the U.S. and Mexico, irrigation projects had become a key factor in development and an important political issue. During the latter half of the nineteenth and into the early

³⁵⁵ Salvador Arroyo, “The Present Regimen of the Upper Rio Grande Valley and the Problem Which the Said River has Created for the Valley of Juárez and El Paso,” IBWC, U.S. Section, El Paso, Texas, Reports on the Rio Grande Rectification, May 1930, Folder 2.22.2/2.

³⁵⁶ Ibid.

³⁵⁷ World Affairs Institute, “The Meandering Rio Grande,” *Advocate of Peace Through Justice* Vol. 19, No. 3 (March 1929): 140-141. Established in 1924, the Institute of World Affairs has worked to bring individuals, communities, business leaders, and government representatives together to develop strategies for resolutions to international challenges.

twentieth century ideas about the environment and how it should be either preserved or tamed had shaped the path toward federal management of natural resources in both the U.S. and Mexico. Conservation, reclamation, and irrigation were components of social, as well as environmental, engineering by the end of the 1920s. Men could shape the environment and, as a result, shape the development of their nations. Advocates of world peace believed that international solutions to shared environmental concerns were preferable to contentious claims of sovereignty over water sources. However, scholars such as Alfred Crosby and Elinor G.K. Melville have pointed out that economic and political concerns have imposed agricultural practices upon environments not ideally suited for certain types of cultivation or pastoralism.³⁵⁸ In the case of the Rio Grande, Elephant Butte Dam was an attempt to control the amount of water reaching the El Paso/Juárez Valley and did lead to more cultivation, but exacerbated flooding. The proposed solution was to turn to even more engineering and construction to further alter the natural environment. In 1933 the U.S. and Mexico would commit to undertaking the largest, most expensive international construction project up until that time: The Rio Grande Rectification Project.

³⁵⁸ See Alfred Crosby, *Ecological Imperialism: The Biological Expansion of Europe, 900-1900* (Cambridge University Press, 1986); Elinor G.K. Melville, *A Plague of Sheep: Environmental Consequences of the Conquest of Mexico* (Cambridge University Press, 1994).

Chapter 4: Constructing the Rio Grande - The International Boundary Commission, Labor, Relief, and the Rio Grande Rectification Project

Mexico and the U.S. both saw the Rio Grande Rectification Project as a solution to flooding and as a method to ensure the efficient use of water for development, both economic and social. Due to the world-wide Great Depression, both federal governments became keenly interested in water projects that could provide jobs as well as support agriculture in the 1930s. The emergence of new government programs, and the expansion of existing ones, made it possible to do both. Although both governments faced shrinking revenues, they turned to deficit spending to stimulate their economies. Bi-national cooperation to solve flooding problems and water apportionment in the El Paso/Juárez Valley became an example for settling other longstanding disputes between the two nations over shared rivers in the coming decade of the 1940s. However, the Rectification Project was not a perfect model. It did not employ as many local people as it could have. In 1933, the U.S. created the Civilian Conservation Corps (CCC) as a national effort to employ young men, who would conduct important work to save natural resources. CCC units took on some work along the river in the U.S. associated with the Rectification Project that could have gone to locals. U.S. International Boundary Commission hiring rules and deportations of Mexicans from the U.S. illustrate some of the longstanding issues of racism as it impacted labor in the U.S. Although the engineering work did result in flood control, more efficient irrigation, and finally made the location of the border permanent in most of the valley, ongoing expenditures were necessary to maintain those results. Both governments have had to spend money to maintain the rectified Rio Grande after its completion and are still doing so today. While the project was underway, the U.S. also built the American Dam and Canal to ensure that Mexico could never get more water than agreed upon in 1906.

Despite these shortcomings, the Rectification Project was still a remarkable example of two nations coming together to settle longstanding issues along their common border.

The Rio Grande Rectification Project required cooperation between multiple local, state, and federal agencies on both sides of the border. As early as 1925, the El Paso City Council had recommended that El Paso work with their counterparts in Ciudad Juárez on a regional development plan, recognizing that El Paso and Juárez form an international metropolitan area.³⁵⁹ Although comprehensive regional planning did not begin at that time, residents in the area understood that the political border complicated efforts to work on water apportionment and flood control, elements central to the economic development of the valley. Development took on a new meaning when the global economy collapsed at the end of 1929. The U.S. struggled with rising unemployment and a serious drought lasting from 1930 to 1936 that affected every state except Maine and Vermont. Record high temperatures and drought continued in the Plains states until 1941, and when windstorms hit the dry, bare ground they created the Dust Bowl.³⁶⁰ Not only were there not enough jobs in the U.S., it appeared in the early 1930s that soon there would not be enough food. Conservation was no longer an environmental philosophy. It had become, for the moment, an urgent necessity.

Mexico did not suffer extreme drought conditions during the 1930s, but the economic situation was just as dire and the agricultural sector was lagging well before 1929. In 1930 Mexico had 30 million pesos (\$15 million) in cash reserves but by 1931 government revenue in Mexico had fallen by 80% and federal spending had to be seriously curtailed. The surplus was

³⁵⁹ John Hernandez, *Rio Grande Regional Environmental Project: A Preliminary Proposal for the Preparation of a Research Design that Will Lead to the Development and Implementation of a Model Environmental Management Plan for an Interstate-International Region*. Grant Proposal Reviewed by the Pan American Health Organization. Prepared by the New Mexico Water Resources Research Institute and the New Mexico Environmental Institute, 1972.

³⁶⁰ Donald Worster, *Dust Bowl: The Southern Plains in the 1930s* (New York: Oxford University Press, 2004), 10-12.

gone and Mexico had to begin deficit spending. The peso fell from 2 pesos to the dollar to 3.5 pesos to the dollar. Wages declined by 10%. Investors were no longer interested in putting their money to work in Mexico, and credit became extremely tight in the deflated economy. Departmental cut-backs and firings of government workers slowed federal irrigation and water project spending.

In addition, the political situation in Mexico in the early 1930s hampered efforts to create comprehensive economic recovery strategies because Mexico had three presidents over six years. President Calles served a four-year term, and could not run again in 1928, but changes to the constitution meant his successors would now serve for six years. Jürgen Buchenau's study of Calles shows that during his presidency Calles deftly combined populism with authoritarianism, and managed to achieve agricultural and industrial productivity while promoting a civilian bureaucracy over local rule by the *caudillos* and generals that had fought in the revolution. This led to what Buchenau has termed the "institutionalization of the revolution." Calles supported Alvaro Obregón, who had been a powerful general in northern Mexico during the fighting period of the Mexican Revolution and served as president 1920-1924. Obregón won the election, but was assassinated before he could take office. This left Calles as the most powerful surviving leader of the revolution, who continued to wield his influence behind the scenes. In the interim before new elections, the Mexican Congress chose to appoint the man Calles put forward, Emilio Portes Gil (1928-1930), the first of three *peleles* (puppets) Calles supported. Calles' candidate Pascual Ortiz Rubio (1930-1932) won the election. However, Ortiz Rubio would not obediently follow all of Calles' policy decisions and Calles forced him to resign after two years. Calles picked Abelardo L. Rodríguez (1932-1934) as his replacement. During this period, the collapsing economy, rebellions, and the arrival of thousands of deportees from the U.S. complicated efforts

to stabilize the economy. Buchenau also demonstrates that Calles did not have as firm a grip on his surrogates as other historians have posited and was simply “a king-maker who enjoyed veto power.” His surrogates all but abandoned the social reforms the Mexican revolution had sought to achieve, such as land redistribution, rural education, and strong labor unions. Calles supported Lázaro Cárdenas in the 1933 election, but Cárdenas turned out to be no puppet and moved the revolution back to the left.³⁶¹ Cárdenas, like FDR, was also a proponent of conservation and reclamation, supporting efforts to improve irrigation and prevent flooding in Mexico, carrying forward those plans that had begun during Calles’ presidency. Although FDR and Cárdenas entered office after their predecessors had approved the Rectification Project, Cárdenas ramped up additional efforts to develop irrigation in northern Mexico. By doing so, Mexico put more pressure on the U.S. to fairly share the water in the Rio Grande, which focused even more attention on altering the river within the U.S., as will be discussed later in Chapter Six.

The Rio Grande Rectification Project would link reclamation and conservation to the goals of economic development and increased employment in both nations. Detailed planning for rectification began in 1930. The studies made it clear that this would be a huge engineering project that would be quite expensive and both governments would have to commit to spending large amounts of money in an era of limited revenues. Another problem that had to be addressed was jurisdiction over construction. During the 1910s the U.S. Reclamation Service built Elephant Butte Dam and Reservoir, and in the 1920s, when the agency became the U.S. Bureau of Reclamation (USBR), additional canals and drainage works within the U.S. to guarantee delivery of the reservoir water downstream as per the 1906 treaty. The USBR was already working on canals and drainage systems on the El Paso side of the river in the early 1930s. But the joint International Boundary Commission (IBC) was the only agency that could make any changes to

³⁶¹ Buchenau, 142, 144; Meyer, et.al., *The Course of Mexican History*, op. cit. 569-573, 575-577, 583, 614.

the river's channel in the valley because it was the international boundary. The USIBC (IBC, U.S. sector) and the MXIBC (IBC, Mexican sector) would have to get their respective governments to agree by treaty to any alterations that changed the course of the river.³⁶² Rectification would require that the USBR and the USIBC work together, as well as with the MXIBC, the Mexican Departamento de Comunicaciones y Obras Públicas (Department of Communications and Public Works, DCOP), the Comisión Nacional de Irrigación (National Irrigation Commission, CNI), and local authorities on both sides of the border. Channeling the river would require international cooperation and sizeable budgets, but proponents believed the effort would also provide jobs during the duration of the work, promote agricultural development, and prevent destructive flooding.

Negotiating Rectification of the Rio Grande

On January 11, 1930, USIBC Commissioner L.M. Lawson wrote to USBR Commissioner Dr. Elwood Mead, informing him that El Paso city and county officials were very interested in flood prevention and had formed a committee comprised of W.E. Robertson, prominent citizen and engineer representing the city; R.E. McKee, contractor and engineer representing the El Paso Chamber of Commerce; E.B. McClintock, County Judge representing El Paso County; Roland Harwell, Manager, El Paso County Water Improvement District No. 1; and Burton Fleming, Manager, Elephant Butte Irrigation District at Las Cruces. The committee proposed a resolution authorizing expenditures for protection of land in the El Paso Valley as

³⁶² Letter Lawson to IBC, "Construction of Tornillo Heading by Bureau of Reclamation – Rio Grande Project," July 16, 1925, Records of the International Boundary and Water Commission, NARA, Ft. Worth, RG 076-FOR-01, Boundary and Claims Commission and Arbitrations, Foreign Affairs Office, Minutes of the Joint Commission, 1922-1980, Box 1, Folders 61-82.

well as a portion within the limits of Mexico, as might be deemed proper and in accordance with previous international agreements. Lawson believed the plan was identical to one passed in 1910 to protect developed land in the Imperial Valley, California. The committee also wrote to Acting Secretary of State Joseph T. Cotton, informing him that property values in the El Paso/Juárez Valley on both sides of the river now totaled \$175,000,000, and damages in the millions could occur if there was heavy rainfall below Elephant Butte Dam. Their letter mentioned that Mexico appeared to be unwilling to sign any new treaties at that moment and some sort of international negotiations would have to take place because rectification would change the location of the border. Noting that the USBR supported the plan, as did senators and representatives from New Mexico and Texas, the committee respectfully asked for Cotton's support. Commissioner Mead wrote to Ray Lyman Wilbur, Secretary of the Interior, on January 23, 1930, reiterating USBR support for rectification, and reminded the secretary that the Bureau had already spent more than \$6,000,000 in New Mexico and Texas on reclamation projects. Rectification would protect that investment. Wilbur agreed to USBR involvement in the project in early February. L.R. Fiock, Project Supervisor of the Rio Grande Federal Irrigation Project, wrote to Lawson on May 2, 1930, requesting he proceed with IBC projects along the river in the El Paso/Juárez Valley. He urged Lawson to work with the MXIBC on a rectification agreement. Fiock noted that IBC work, as well as construction by the cities of El Paso and Juárez ahead of and in tandem with the work by the USBR, would help speed up the process of getting the agencies' roles defined and bringing Mexico to the table.³⁶³

³⁶³ Lawson to Mead, January 11, 1930; Committee to Acting Secretary of State Joseph T. Cotton, January 21, 1930; Mead to Wilbur January 23, 1930; Wilbur to Sheppard February 3, 1930; Fiock to Lawson May 2, 1930; Bureau of Reclamation Records, NARA, Denver, RG 115 FY 13 Project Correspondence, File 1930-1945, Rio Grande Basin – Rio Grande Rectification 201.-500.1, Box 946, Entry 7, Folder 301 Engineering and Board Reports.

Rectification could not proceed without a formal agreement between the two nations and the joint International Boundary Commission (IBC), as the agency representing both parties, led the way in creating one. The U.S. and Mexico had appointed IBC engineers in 1924 to prepare rectification plans, and the IBC submitted these plans in Minute No. 61, June 23, 1925. Both governments approved the proposed plans, but requested additional studies and provided the funding to conduct them in the spring of 1928. The IBC submitted a revised plan in Minute No. 111, December 21, 1928, estimating it would take \$3,390,100 to purchase right-of-ways, clear land, build levees, construct a rectified channel through the El Paso/Juárez Valley, and handle the associated miscellaneous work of building or improving canals and drains. IBC engineers offered plans for rectified channels that could handle either 18,000 or 8,000 cfs (cubic feet per second) flows. The IBC report stated that the El Paso City Council and El Paso County Commissioners Court had already spent \$500,000 on flood control and Juárez had also made “large expenditures” to do the same, but because these protective works had to follow the river’s meanders in “unsuitable” locations they were ineffective. The IBC estimated that the cities of El Paso and Juárez, as well as their residents, had spent over \$7,000,000 on irrigation and drainage works by 1928, but there was no guarantee that these improvements could survive a flood like the one that occurred during the month of September in 1925.³⁶⁴ The engineers reported that bypassing meanders and reducing the length of the river from 155 miles to 88 miles from the lower limit of Córdova Island downstream to Box Canyon at Fort Quitman as well as dredging the channel would change the gradient from 1.82 ft. per mile to 3.20 ft. per mile, thereby

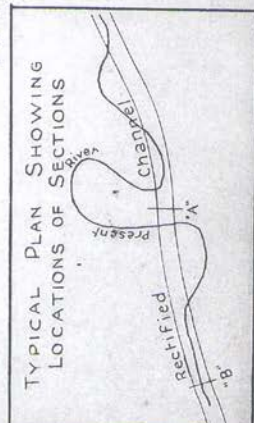
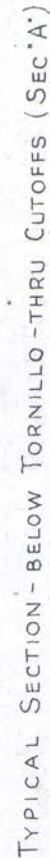
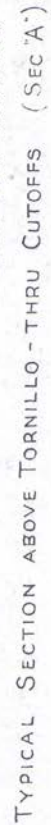
³⁶⁴ Minute No. 111, December 21, 1928, Records of the International Boundary and Water Commission, NARA, Ft. Worth, RG 076-FOR-01, Boundary and Claims Commission and Arbitrations, Foreign Affairs Office, Minutes of the Joint Commission, 1922-1980, Box 1, Folders 1-60.

increasing the river's silt carrying capacity. The IBC also committed to keeping the new channel clear of brush and other obstructions in perpetuity.³⁶⁵

IBC Commissioners L.M. Lawson and Gustavo P. Serrano, with their Acting Secretaries Mervin B. Moore and Jose Hernández Ojedo, met in Mexico City on July 28, 1930, to finalize agreements on the Rio Grande Rectification Project, and outlined how to divide the rectification work. They met again on July 31 and agreed in Minute No. 129 that the IBC would oversee the trenching of the river downstream to Fort Quitman, straightening the river and eliminating bancos, building levees on both sides of the river to control flooding, and that the rectified channel would become the international boundary. New IBC studies indicated that if the flood of 1925 had reached 6,000 cfs below Elephant Butte Dam a flow of 18,000 cfs would have occurred at El Paso. In the revised plan, IBC engineers recommended building Caballo Dam in New Mexico, 25 miles downstream from Elephant Butte. The dam would create a 100,000 sq. ft. capacity reservoir, which would limit epic flooding to 11,000 cfs. Building the dam rather than a flood channel that could accommodate 18,000 cfs would save \$500,000. The IBC estimated it would cost \$4,856,500 for rectification and miscellaneous work plus \$1,250,000 to build Caballo Dam, which could also provide hydro-electric power. Secretary of the Interior Wilbur approved the new plan that included Caballo Dam in August of 1930.³⁶⁶

³⁶⁵ Boundary and Claims Commission and Arbitrations, #1-135, Box 1, Records of the IBWC, NARA, Ft. Worth, RG 76 E.076-FOR-1, Folder # 83-115, 1926-1929.

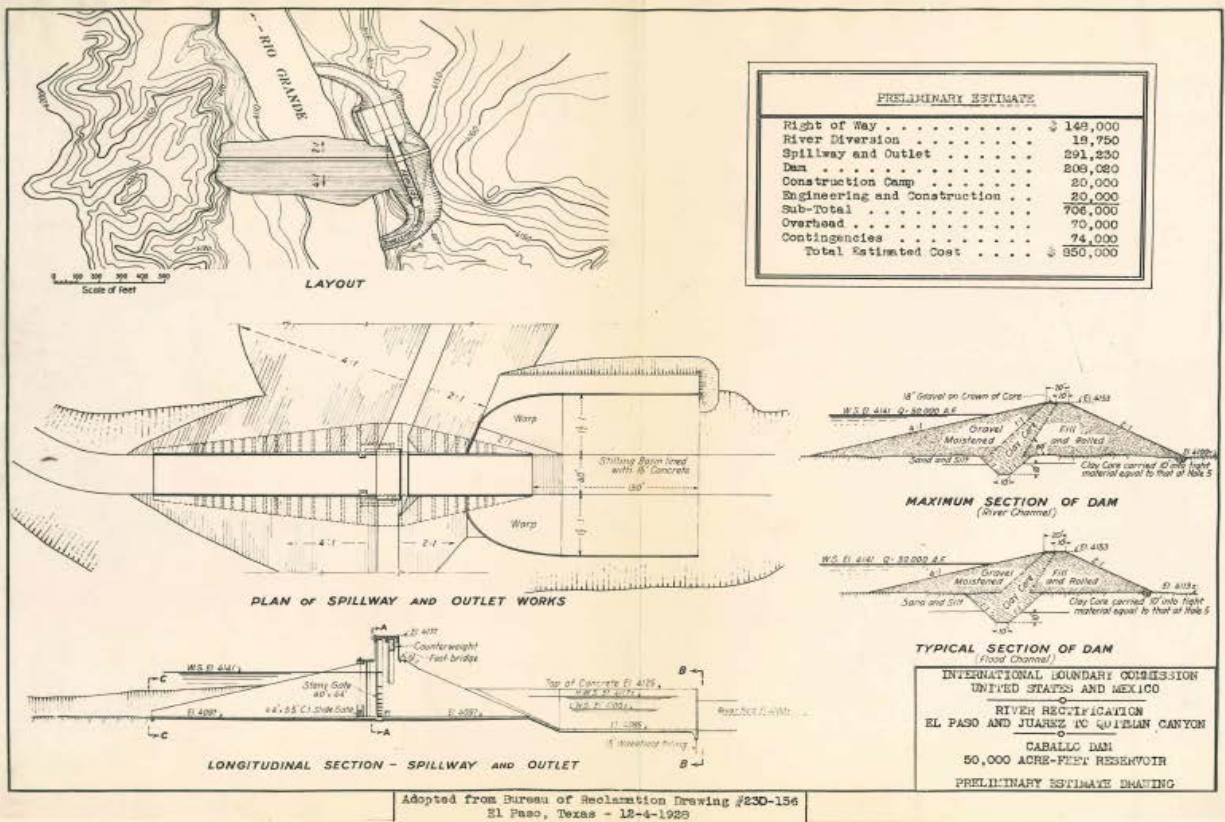
³⁶⁶ Dixon to Cotton, August 18, 1930, Bureau of Reclamation Records, NARA, Denver, RG 115 FY 13 Project Correspondence, File 1930-1945, Rio Grande Basin – Rio Grande Rectification 201.-500.1, Box 946, Entry 7, Folder 301 - Engineering and Board Reports.



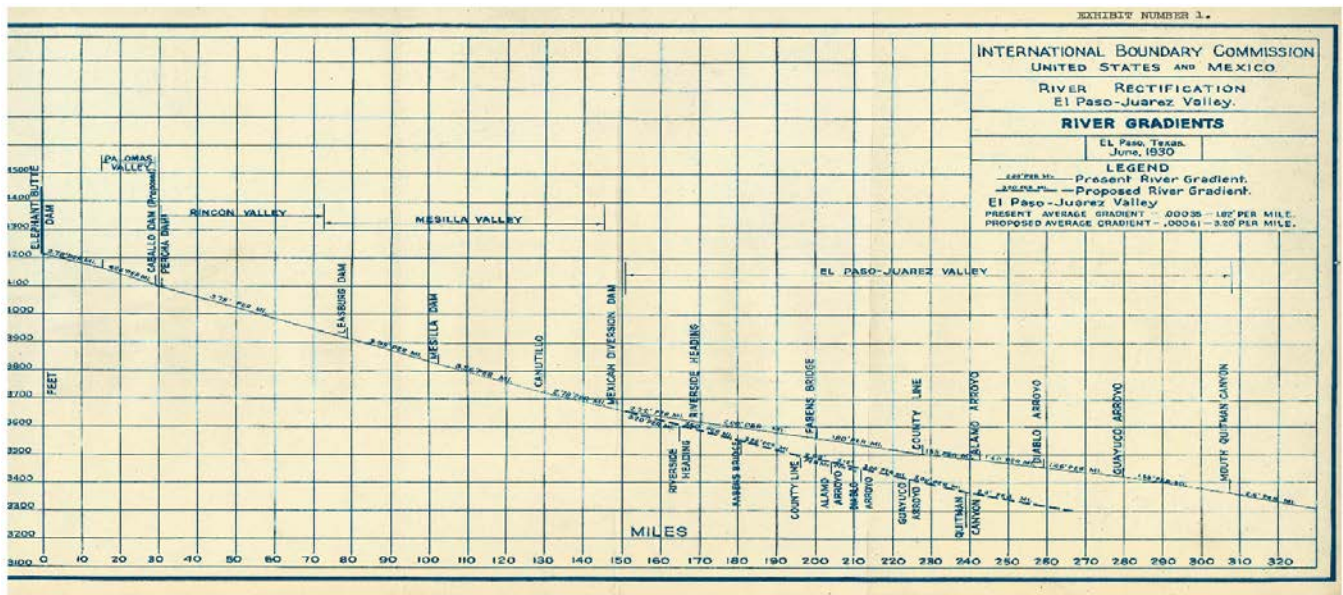
HYDRAULIC FUNCTIONS

$n = .025$ - - - NORMAL CHANNEL
 $n = .030$ - - - SIDE OR FLOOD CHANNELS
 A. 254 TO 287 W/P 158 TO 174 r 4.7 TO 7.5 V 32%
 S=00045 TO .0008 Q=10.700 TO 11.600 SF. - .303 TO 32%

NOTE ALL DIMENSIONS IN METERS



Plans for Caballo Dam
Project, Feature, and History Reports, Records of the Bureau of Reclamation, NARA, Denver.



River Gradients Elephant Butte Dam to Fort Quitman Canyon, with Arroyos
Project, Feature, and History Reports, Records of the Bureau of Reclamation, NARA, Denver.

It would take three more years to conclude the international negotiations and move forward. During that time, the IBC continued to address the issue of bancos formed during avulsive changes to the Rio Grande. During 1930 alone, the IBC settled 19 banco disputes in the El Paso/Juárez Valley, further illustrating the necessity of rectification. Lawson wrote repeatedly to the State Department between 1930 and 1933 requesting additional funds for resolving banco disputes because the process was very time consuming and required so many surveys.³⁶⁷ Settling the matter of the international boundary at El Chamizal and Córdova Island was also part of the delay. As early as 1912, Mexican President Francisco Leon De la Barra had intimated he might cede El Chamizal for an exchange of land at San Elizario Island and a cash payment, but only after the Mexican people had been prepared for such a proposal. Due to the Mexican Revolution, negotiations over El Chamizal did not resume until the U.S. recognized the presidency of Álvaro Obregón in 1923. The disastrous flood of 1925 encouraged both nations to embrace rectifying the river and, in principle, the necessary exchange of land resulting from eliminating meanders. When the U.S. government dropped its arms and ammunition embargo to Mexico in July of 1929, and further announced “that all domestic strife had terminated within the Mexican republic,” the two governments moved forward with plans for rectification. By 1931, the two governments had agreed to rectification as far downstream as Fort Quitman.³⁶⁸

The U.S. State Department assumed that rectification negotiations would also settle the disputes over the location of the border at El Chamizal and Córdova Island. U.S. Ambassador Reuben J. Clark and Mexican Minister Manuel C. Tellez agreed to the proposed Rectification Project in 1932, and included in the agreement transferring El Chamizal to the U.S. In

³⁶⁷ IBWC Subject Files, 1917-1932, Records of the IBWC, NARA, Ft. Worth, RG 76 HM 2007 E.1B, Box 3, Folder B 13.2.

³⁶⁸ Donald W. Peters, “The Rio Grande Boundary Dispute in American Diplomacy,” *The Southwestern Historical Quarterly*, Vol. 54, No. 4 (April 1951), 417-418, 424, 426-427.

compensation, Mexico would receive an equal amount of land from the U.S., and a cessation of payments to the U.S. under the terms of the Pious Fund settlement. The Catholic Church started the Pious Fund in 1697 to maintain and develop Jesuit missions in California. After the recall of all of the Jesuits in 1768, the Spanish government took over its administration, and then later the Mexican government in 1821. When the Treaty of Guadalupe Hidalgo divided Alta and Baja California in 1848, Mexico stopped using the fund to support missions in the U.S. In 1868, an American and Mexican Mixed Claims Commission agreed to evenly split the accrued interest generated by the fund. But Mexico refused to make any more payments after the 1868 settlement, and the case went forward to The Hague in 1902, the first international dispute to be heard by The Hague's Permanent Court of Arbitration. The tribunal found in favor of the U.S., and Mexico had to remit the missed payments and continue sending money for the California missions. The payments ceased after 1912, due to the Mexican Revolution.³⁶⁹ The inclusion of this bargaining chip is significant because it illustrates that both nations wanted the Rectification Project to proceed and negotiators thought they could use that desire to settle other disputes. Although the Pious Fund was a tempting enticement, it was not enough to overcome the problem of settling the El Chamizal issue. First, to determine the amount of land to award Mexico in exchange for El Chamizal surveyors would have to establish the location of the boundary in the channel of the Rio Grande in 1864. This was an impossible task as neither nation could agree on that exact location.³⁷⁰ Second, popular opinion in Mexico was firmly against ceding or selling any land at either El Chamizal or Córdova Island. In October of 1932, Mexican President Abelardo L. Rodríguez stated, "My government will never close any treaty implying loss or

³⁶⁹ William E. McDonald, "The Pious Fund of the Californias," *The Catholic Historical Review*, Vol. 19, No. 4 (Jan., 1934), 427-428, 430, 435.

³⁷⁰ Mueller, 75.

modification of the national territory.”³⁷¹ Cutting off the meanders was acceptable because all involved parties agreed these were essentially bancos, which could be exchanged under the terms of the Banco Treaty of 1905 that allowed for transfers of land that did not exceed 617 acres (205 hectares) or affect more than 200 inhabitants. To expedite rectification, in 1933 both nations temporarily dropped the matter of the Pious Fund as well as any boundary settlement at El Chamizal and Córdova Island, allowing the Rectification Project to proceed. Rectification could have set the international boundary line in the entire valley, but exchanging any territory at El Chamizal and Córdova Island was simply too sensitive an issue and the opportunity was lost.

The projected total for the Rectification Project was \$6,106,500. Some of the estimated expense was to be charged separately to each government as necessary: \$412,500 for purchasing right-of-ways along the river in each nation, \$75,000 for doing the same at Córdova Island, \$266,000 for purchasing segregated tracts, \$225,000 for changes to irrigation systems, and an additional \$195,700 for contingencies and overhead. The IBC decided to divide the cost for the remainder of the project by using property values, which was the same manner they had used to apportion Rio Grande water between the U.S. and Mexico in the 1906 treaty. The USBR’s Federal Rio Grande Irrigation Project, originally named the Rio Grande Reclamation Project that resulted in the construction of Elephant Butte Dam, guaranteed water for 53,000 acres in the El Paso area and 17,000 acres below the limits of the project. The Mexican side of the valley had 35,000 acres under cultivation but only 20,000 acres had water rights under the 1906 treaty. Consequently, the Mexican side of the river was far less developed and had fewer irrigation systems. The USBR estimated the U.S. side of the valley was worth \$17 million (34 million pesos). MXIBC Engineer Salvador Arroyo estimated the land on the Mexican side was worth 5,400,000 pesos. By prorating land values to pay for straightening the river and building the

³⁷¹ *New York Times*, 22 October, 1932.

levees, the IBC determined a fair division would be for the U.S. to pay for 88% of the project, or \$4,340,424, and Mexico the remaining \$591,876. The U.S. and Mexico agreed by treaty to the “Rectification of the Rio Grande Convention” on February 1, 1933.³⁷²

Cotton Production and the Rio Grande Rectification Project

Conservation and improved resource management, especially of soil and water, was a primary concern in the El Paso/Juárez Valley due to the value of cotton production, the leading crop on both sides of the border. Attention to pairing conservation and agricultural activities was not just a national federal effort in the U.S.; the state of Texas also became more involved. The U.S. Extension Service had been established in 1914, as had the Texas Extension Service. During the Depression, the Texas Extension Service established multiple Experimental Stations to determine practices in specific areas that would conserve soil and water, eliminate pests, and promote more efficient agricultural production. County Extension Agents organized regular gatherings for women to teach them modern methods of kitchen planning, gardening, fruit growing, raising poultry, wardrobe production, home and yard improvement, and preserving food, especially canning. The agents also enforced the Agricultural Adjustment Act (AAA) rules regarding quotas for agricultural production. Starting in 1933, Extension Agents provided contracts to farmers who promised to cut production in return for a subsidy, which the Commodity Credit Corporation issued as a loan using the commodity as collateral. The subsidized crops included cotton, corn, wheat, rice, peanuts, tobacco, and, later, dairy products. At that time cotton was the main crop produced in the El Paso area. The price of cotton had been

³⁷² “Rectification of the Rio Grande, Convention between the United States and Mexico,” 48 Stat. 1621, Treaty Series, No. 864, Feb. 1, 1933.

decreasing since the end of World War I due to an almost 50% increase in worldwide production. In 1932 and 1933, the price of cotton produced in the U.S. had fallen to 4.6 cents per pound. The cost to farmers for purchasing seed, machinery and other necessities was by then 14% higher than before World War I, yet they received 54% less for cotton than in the pre-war years. The gross income for cotton farms in the U.S. fell from \$1,470,000,000 during 1928-1929 to \$464,000,000 in 1932 and 1933, due to increasing production and falling demand. The gross family income from cotton and cottonseed dropped from \$735 to \$232. The subsidies did raise the price of cotton, and in 1934 the value of cotton and cottonseed had risen to \$862,000,000 in the U.S.³⁷³

This increase in value, however, did not necessarily improve the income of the average cotton-producer, and neither providing subsidies nor reducing the amount of acreage in production had a widespread beneficial impact on the agricultural sector. The AAA rules were not popular with all farmers because they had no input on the legislation, and the regulations were problematic in Texas because of the diversity of agricultural production. For example, limiting the supply of corn raised the cost of feed for raising hogs, poultry, and cattle. Additionally, the subsidies benefitted farmers owning the most land. Economist Donald Paarlberg explains that “the top one percent of the farmers [nationwide] got 21 percent of the benefits.” Taking land out of production negatively impacted tenant farmers, who lost their leases. The number of African American tenant farmers in Texas dropped from 65,000 to 32,000 between

³⁷³ Address of Secretary of Agriculture Henry A. Wallace, Atlanta, Georgia, April 13, 1935; Dr. W.N. Williamson, “Agricultural Planning Movements in Texas,” Agricultural Adjustment 1933-1941, Agricultural Extension Service Historical Files, Boxes G-10, G-18 and G-26, Cushing Memorial Library, Special Collections, Texas A&M University, College Station, Texas.

1930 and 1940 and the number of African Americans without land who worked as agricultural laborers increased by 25,000.³⁷⁴

In January of 1936, the U.S. Supreme Court ruled the AAA was unconstitutional. The act taxed food processors and the revenue funded the subsidies to farmers. The court ruled that the tax was coercive because farmers had to sign a contract to get the payments and a “true” tax could not be earmarked for a specific group.³⁷⁵ However, the federal government and a sufficient number of farmers supported the AAA and worked to have it replaced. The *El Paso Times* reported on February 1, 1936, that 2,000 farmers from 150 Texas counties had gathered in Waco and voted unanimously for a constitutional amendment that would allow the reinstatement of the AAA, arguing that it was no more unconstitutional than the protective tariff. They protested the “unwarranted and un-American attacks” on the AAA and “the fact that its conservative leadership has given agriculture for the first and only time in the history of the country the recognition it deserves, that of equal opportunity with other basic industries.” Congress began to work on new legislation in February, and on February 26 passed the Soil Conservation and Preservation Act, which provided subsidies for planting grasses and legumes. It took until 1938 to create the second AAA, which allowed growers to vote on crop quotas and eliminated the tax on food processors. However, in the long run the cotton subsidies did not substantially assist the small-scale growers because the subsidy was only \$7.50 per bale, advantaging large-scale producers. By 1939, even after the government held cotton off the market and paid to reduce planted acreage, cotton production was three million bales greater than it had been in 1932.³⁷⁶

³⁷⁴ Tindall, 1262, 1275; Donald Paarlberg, “Tarnished Gold: Fifty Years of New Deal Farm Programs, in *The New Deal and Its Legacy: Critique and Reappraisal*, ed. Robert Eden, n.p. (Westport, Conn.: Greenwood Press, 1989), as found in Powell, 137.

³⁷⁵ *United States v. Butler, et. al.*, 297 U.S. 1 (1936).

³⁷⁶ “Texas Farmers Demand Change in Constitution; Stand Behind Roosevelt,” *El Paso Times*, 1 February, 1936, Powell, 138.

Cotton production was also vital to the economy in the Juárez area. Cotton production throughout Mexico had sharply declined by 1932, from 203,000 cultivated hectares producing 60,000 bales in 1928 to 78,000 hectares producing 22,000 bales in 1932, mainly because of the decline in financing capital after the stock market crash in 1929. While the U.S. was cutting production starting in 1933 to prop up prices, the Mexican policy after 1934 was to increase production, especially along the rivers in northern Mexico and along the Rio Grande. Casey Walsh has shown that cutbacks in U.S. production did artificially raise the price of cotton worldwide, which in turn stimulated more production of cotton outside the U.S. As foreign governments began supporting more development in their cotton sectors, U.S. investors and cotton businessmen started putting their capital to work in those countries.³⁷⁷

Due to the different goals of U.S. and Mexican cotton producers, the agricultural development rationale for the Rio Grande Rectification Project was not exactly the same in Mexico as it was in the U.S. in early 1933. Farmers in Mexico wanted improved irrigation and water delivery to develop cotton farming for exports and for the textile industry in Mexico. Texas producers wanted higher yields on reduced acreage to take advantage of inflated prices. Farmers on both sides of the river, as well as other residents, wanted to stop the silt accumulation that led to the flooding that destroyed crops, ruined irrigation systems, and damaged property at great expense. Although the project had been agreed upon by treaty in early 1933, the work would not begin on the Mexican side until late 1933, and not until January of 1934 on the U.S. side. Levees would provide protection from flooding caused by heavy rainfall, and roadways atop the levees would make cultivated rural areas more accessible. Eliminating bancos would reduce property disputes and permanently establishing the location of the international boundary

³⁷⁷ Walsh, 93-98.

would settle questions of sovereignty over land along the river. In spite of the projected expense, the assumed benefits justified the Rectification Project.

Relief, Race, Citizenship, and Labor

FDR's First New Deal addressed the failing bank system, attempted to stabilize agricultural commodity prices, and by May had created the Federal Emergency Relief Administration (FERA) to provide funds to state agencies to develop work programs. In June of 1933, Congress passed the National Industrial Recovery Act (NIRA) to create public works projects to employ people. The act also created the Public Works Administration (PWA), headed by Harold L. Ickes, Secretary of the Interior, and Congress awarded the PWA \$3.3 billion for constructing roads, public buildings and flood control projects. PWA funds did not directly employ people. Instead, federal agencies hired contractors to complete specific public works projects approved by Ickes or the directors of the agencies, such as the USBR, within the Department of the Interior. The Second New Deal created the Works Progress Administration (WPA) in 1935, replacing the FERA, and gave the states money to directly employ people to build infrastructure. States and localities had to supplement WPA money with their own funds.

The IBC had to hire contractors and laborers to work on rectification, and these workers were initially funded by a PWA grant for the Rectification Project. Not many Mexican Americans got the available jobs and no Mexican citizens could be hired at all by the USIBC. A 1934 memorandum from the Office of the USIBC Commissioner Lawrence M. Lawson noted that the Rectification Project had to follow the hiring rules mandated by the NIRA. This meant that only approved contractors and individuals registered with the appropriate National

Reemployment Service agencies could be employed by the USIBC. Lawson explained the Rectification Project would need “much labor of many classes, including those pertaining to the skilled trades, common labor, and classes in between the named groups.” He went on to say that a great deal of hand labor would be required. The memorandum explained that Mexican workers would conduct that type of work for very low wages, even as little as 10 cents per hour. Landowners using Mexican labor to clear and grub (remove brush, trees, roots, and other impediments with tools or machinery) on their land concurrent to the building of the Rectification Project levees were paying \$10.00 per acre to “alien” workers, who netted 4.5 to 5 cents per hour. Lawson argued the low pay would not keep the Mexicans from “destitution” anyway, would drive down wages, and would preclude the hiring of Americans. NIRA rules required that the USIBC ensure their contractors hired only American citizens, and promised a net pay of 40 cents per hour for clearing and grubbing land.³⁷⁸

Lawson expressed a definite preference for hiring Anglo Americans over Mexican Americans, explaining the federal labor rules meant that “gainful employment is actually made available and is being taken advantage of by a far greater number than ever before of high-type Americans of other than Mexican extraction, the former comprising about eighty-five percent of the present payroll for those employed on the project as Government forces, and the latter also, of course, American citizens, comprising only fifteen percent.” The memorandum makes it quite clear that Lawson believed that the Rectification Project, at first funded by the PWA, would accomplish the relief envisioned by the federal government: replacing Mexican and Mexican American workers with needy Anglos. He stated on the last page of the memorandum,

³⁷⁸ “New Conditions Benefitting Labor in Connection with the Construction by American Section, International Boundary Commission, United States and Mexico of Federal Projects Under Public Works Administration Allotments to the Department of State,” July 15, 1934, Records of the IBWC, Section 18, El Paso Projects, Rio Grande Rectification Project, Folder EP G-2.2, International Boundary and Water Commission, El Paso, Texas, 1-5.

“It is not difficult to visualize the far-reaching effect upon the class of labor which is benefited in the prosecution of the project as a project of the Public Works Administration Project. And it is manifest both that the American citizen not of Mexican extraction, under the old labor conditions, could doubtless not have even secured any employment at all, but if he did, he could not have eked out the meanest kind of existence with the pittance which would have constituted the fruits of his labor.”³⁷⁹

The Rectification Project did provide some employment, but the majority of men hired to work for the USIBC were Anglos.

Evidently the Mexican Sector of the IBC (MXIBC) did not have the same restrictive hiring policies as the USIBC. Gaspar Cordero, born in El Paso in 1908 to parents from Mexico, graduated from the School of Mines and Metallurgy (now The University of Texas at El Paso) in 1932 with a Bachelor of Science degree. His first job was with the WPA building roads in El Paso, and he worked on construction at Scenic Drive. Cordero described the unemployment situation as so acute he wielded his pick and shovel alongside “doctors, lawyers, and engineers with years of experience.” The pay was \$30 per month, a sum he found “adequate.” After six months doing road construction, a friend of his whose aunt was married to MXIBC Commissioner Armando Santa Cruz used his influence to get Cordero an introduction and a job. Cordero made \$185 per month as a MXIBC engineer, a sum he thought was extraordinary because it was higher than that of the president of the El Paso National Bank. Cordero, a U.S. citizen, remained in that job for the next three years.³⁸⁰

Lower Valley resident Tom Rogers, born in 1906, also reported on how bad the Depression was in El Paso. His first job was working in his father’s furniture business, at first in

³⁷⁹ “New Conditions Benefitting Labor in Connection with the Construction by American Section, International Boundary Commission, United States and Mexico of Federal Projects Under Public Works Administration Allotments to the Department of State,” July 15, 1934, Records of the IBWC, Section 18, El Paso Projects, Rio Grande Rectification Project, Folder EP G-2.2, International Boundary and Water Commission, El Paso, Texas, 1-5.

³⁸⁰ Interview with Gaspar Cordero by Richard Estrada, July 3, 1975, “Interview no. 195,” Institute of Oral History, The University of Texas at El Paso.

the warehouse and then as a salesman, until his father went out of business due to poor sales. Rogers said only eight new homes were built in El Paso during 1933, and the trend of wealthier people from Mexico moving into El Paso during the 1920s had ceased. He worked several temporary jobs for his father's ex-competitors and as a clerk at a hotel. Rogers also got a job working for the WPA on Scenic Drive. When asked if there was discrimination in hiring he said yes. The project supervisor spotted Rogers at work one day and, because he knew him personally, promoted him to a supervisory position where he made \$2.40 a day.³⁸¹ Cordero, a Mexican American, was a trained engineer and a college graduate, but the Anglo Rogers, who only had a high school diploma and no experience with or training in construction, got a better job and more pay under the U.S. relief program.

Race, citizenship, and employment opportunities reflect the realities of the Great Depression, a time of surplus labor and job shortages. When employment became scarce, deportations and repatriation of Mexicans became popular in the U.S. After 1929, Mexicans were increasingly labeled as criminals, health threats, and subversives. Some feared they threatened the racial purity of the U.S. Sociologist Max Handman noted in 1930 the primary problem was that Mexicans, and by extension Mexican Americans, held an uncertain place in the racial hierarchy. As he put it, "We have a place for the Negro and a place for the white man: the Mexican is not a Negro, and the white man refuses him an equal status." The 1930 census indicates that in El Paso ethnic Mexican men worked in the lowest paid jobs, primarily in agriculture, construction, smelting, transportation, and retail, while ethnic Mexican women also worked in retail and as domestics. Cleofas Calleros reported that a Mexican [ethnic Mexican] girl with a high school diploma could get a job at the Kress store for \$15 a week, and could wait

³⁸¹ Interview with Tom Rogers by Clyde McCarthy, March 28, 1978, "Interview no. 703," Institute of Oral History, The University of Texas at El Paso.

on customers who spoke English or Spanish. But a mono-lingual Anglo girl with the same degree would get a supervisory position for \$20-25 per week. Mexicans, either Mexican citizens or Mexican Americans, only earned, at most, 75 cents a day picking cotton and, as seen above, substantially less money for other agricultural work. El Paso had been a major entry point for Mexicans during the 1920s when U.S. employers and farmers needed cheap labor, and then became a prime location for funneling them back into Mexico during the 1930s. Deportations peaked in 1931, dropping off in 1935.³⁸² But the numbers remained high. Mexico took in 18,000 deportees in 1935, 14,000 in 1936, 11,000 in 1937, 12,000 in 1938, and 16,000 in 1939. Repatriation was one of the reasons President Cárdenas supported irrigation for agriculture along the border, envisioning that this might involve the deportees in the agricultural sector and expand production.³⁸³ As Casey Walsh's study of the Lower Rio Grande Valley and Manuel Bernardo Ramirez's work on El Paso and Juárez indicate, deportees were essentially dumped on the other side of the border. In Juárez, some of these deportees would provide a labor pool for the Rectification Project. The newspaper *La Prensa* ran a story originally printed in Juárez on September 18, 1935, explaining that the city would be getting more improved flood protection works by order of President Cárdenas. He provided 300,000 pesos to the Department of Communications and Public Works to hire more local labor, and also promised the Banco de Crédito would be furnishing more loans to expand cotton production because the Rectification Project would alleviate the flood threat that destroyed crops and land.³⁸⁴

³⁸² Interview with Cleofas Calleros by Oscar J. Martinez, September 14, 1972, "Interview no. 157," Institute of Oral History, The University of Texas at El Paso; Manuel Bernardo Ramirez, "When the Mexicans Go Home: El Paso and the Mexican Exodus, 1929-1934" (M.A. thesis, The University of Texas at El Paso, 1994), 22, 27-28, 56, 62, 71, 108.

³⁸³ González y González, 240-241.

³⁸⁴ *La Prensa*, 23 September, 1935.

The Rectification Project was originally a PWA project in the U.S., but only until early in 1936. After that, the U.S. State Department was in charge of the project, which was no longer considered to be any sort of relief work. The USBR used CCC labor on projects associated with rectification, but until 1937 in order to enroll in the CCC a young man already had to have an unemployed family on the relief rolls. El Paso officials certainly tried to obtain as many public works and relief projects as possible during the Depression. But recovery plans were not helping everyone, and in February of 1936, Texas Congressman Martin Dies complained that in Europe eight million more people were working than had been in 1935, while in the U.S. unemployment levels were still 59% higher than in all of Europe. During February of 1936 the El Paso County Commissioners Court repeatedly asked for changes in WPA hiring rules so that more people could get relief. They submitted a resolution to Harry L. Hopkins, National WPA Administrator, informing him that at least 100 persons in El Paso who had been promised WPA jobs still were not working and were “approaching starvation.” They asked Hopkins to change the rules and allow distribution of surplus food to these people while they waited to see if they could get work on PWA projects.³⁸⁵ While the Commissioners were trying to get some federal help regarding jobs and food, one unfortunate man, 75 years of age and on relief, was murdered during a robbery that netted the thieves a grand total of \$5.00. In a separate incident, a 69 year old ex-convict broke into a home because he was “hungry and cold” and stole some jewelry and a coat. He pawned the jewelry for \$1.50 and got \$2.00 for the coat.³⁸⁶

Julian Montgomery, Texas PWA Director, informed the El Paso County Commissioners Court in July of 1936 that there would be no more allotments made in Texas for that year.

³⁸⁵ “Today,” “3,170 Register for WPA Jobs,” “Court Asks WPA Change,” “WPA Ruling Change Asked,” *El Paso Times*, 10, 11, 14, February, 1936.

³⁸⁶ “El Pasoan, 75, On Relief, Believed Slain for \$5; Police Arrest Two Men,” “Hungry, Cold; Ex-Convict Robs El Paso Minister’s Home,” *El Paso Times*, 7 February, 1936.

According to Montgomery, the ruling to deny additional funds came directly from FDR, who had mandated that no PWA projects could get funding unless there were a sufficient number of skilled and unskilled laborers available and on the WPA relief rolls. PWA projects, which were permanent, had priority over WPA projects that were temporary relief work. The problem for Texas was that W.P. Drought, Texas WPA Director, had determined there were not enough skilled laborers on the relief rolls to justify any new projects.³⁸⁷ PWA projects already underway would continue to get funding, but no new WPA projects would be authorized. In August, WPA rules changed again and mandated that skilled workers would be sent to projects already underway rather than be put to work locally.³⁸⁸ This seemed to make the situation worse, as the El Paso County Commissioners received multiple complaints during August that “aliens” were getting public works jobs.³⁸⁹ Although non-citizens were not eligible for government relief in the U.S., the competition for relief was so intense it acerbated racial prejudice. As Manuel Ramirez asserts, in 1936, after the peak of deportations, Anglos continued to believe that ethnic Mexicans, citizens or not, already had better jobs and housing, and had no need for relief work. He adds that due to deportation, the remaining ethnic Mexicans in El Paso were reluctant to apply for relief for fear of being deported, and the number of ethnic Mexicans on relief had dropped significantly by 1936.³⁹⁰

When there was no increase in PWA or WPA projects, El Paso officials continued to lobby for as many CCC camps as possible to get needed conservation and other projects accomplished because that organization never lacked funding during the Depression, as will be

³⁸⁷ Julian Montgomery to All Applicants, Memorandum, July 29, 1936, C.L. Sonnichson Special Collections, The University of Texas at El Paso Library, MS 132, Commissioners Court Papers, Box 5, Folder 8/10/1936.

³⁸⁸ WPA Memorandum, August 15, 1936, Records of the Texas Planning Board, Texas State Archives, Austin, RG 017-23, Folder 5.

³⁸⁹ Letter to Ivey, August 25, 1936, C.L. Sonnichson Special Collections, The University of Texas at El Paso Library, MS 132, Commissioners Court Papers, Box 5, Folder 8/25/36.

³⁹⁰ Ramirez, 22.

discussed in Chapter 5. El Pasoans supported the involvement of the USIBC, USBR, and the CCC in conducting needed work. Juárez also benefitted from the MXIBC and Department of Communications and Public Works efforts. Federal funding made the Rio Grande Rectification Project possible, but although rectification employed many people, it was not an effective jobs program.

The Rectification Project and the American Dam and Canal

The Public Works Administration (PWA) allocated \$2,800,000 for the Rectification Project on January 3, 1934. On February 3, 1934, U.S. Secretary of State Cordell Hull allowed rectification work to begin on the U.S. side of the Rio Grande; acquiring right-of-ways had already begun on the Mexican side under the Department of Communications and Public Works, and some land clearing along the river supervised by the MXIBC.³⁹¹ FDR also issued Executive Order No. 6575-A on February 3, 1934, stating that under Title II, Section 203 (a) of the National Industrial Recovery Act, the Secretary of State had “the authority to purchase by the right of eminent domain lands as needed for the Rio Grande Rectification Project, to sell or lease any property so acquired, and to execute on behalf of the United States any necessary conveyances or other instruments incident to disposition of such property.”³⁹² On April 24, 1934, the State Department extended this authority to the USIBC.³⁹³ Under Article 27 of the Mexican Constitution, meanwhile, all property, water, and minerals belonged to the nation, and

³⁹¹ G. Frederick Reinhardt, “Rectification of the Rio Grande in the El Paso-Juarez Valley,” reprinted from *The American Journal of International Law* Vol. 31, No. 1 (Jan., 1937): 44-54, as found in Records of the IBWC, U.S. Section, El Paso, Texas, 2.22.2/2.

³⁹² Bureau of Reclamation Project Correspondence File 1930-1945 Rio Grande Basin – Rio Grande Rectification 201.-500.1, NARA, Denver, RG 115 FY 13, Entry 7, Box 946, Folder 223.01 – Lease and Sale of Lands.

³⁹³ Records of the IBWC, U.S. Section, El Paso, Texas, Folder 2.22.2/2.

individuals or community owners had the granted privilege of ownership, but that could be revoked in the public interest. The Mexican state was responsible for promoting the social benefits of conservation and protecting the environment and had the authority to establish right-of-ways for infrastructure, but also had to compensate property owners through purchase.

The USIBC, using contract labor under the supervision of their engineers, began the actual construction for rectification on the U.S. side of the river on March 26, 1934. The first step was clearing and grubbing (using shovels or machinery to remove trees, brush, stumps, and roots) land along the path the rectified river would take. In April L.M. Lawson notified the Federal Projects Division, overseen by the PWA, that the USIBC would need \$540,000 to purchase land for the Rectification Project and \$290,000 to purchase land for the Caballo Reservoir. The USIBC started moving earth for rectification on June 4 when the first dragline excavator (a large, mobile, crane-like machine that removes earth using a winch and a bucket; see illustration later in this chapter) arrived, and the USIBC signed the first contract to purchase land on June 5. By June 30, of the estimated 6,589.41 acres needed for the project that had to be purchased or condemned, the USIBC had acquired 79% by contract, 16% by condemnation, with 5% still outstanding. By July, 1934, the USIBC was in charge of four federal projects. Federal Project No. 1 addressed monument repair and beautification in Arizona; Federal Project No. 2 included flood control works in the Lower Rio Grande Valley; Federal Project No. 3 authorized flood control construction in Arizona; and Federal Project No. 4 encompassed rectification along the Rio Grande in El Paso and Hudspeth Counties as well as building Caballo Dam. By July the USIBC had revised their plans for Caballo Dam, proposing a higher dam that would be more

efficient at generating electricity, increasing the estimated cost to \$2,500,000. On July 19 the PWA allocated an additional \$500,000 for Federal Project No. 4.³⁹⁴

Technically, the USBR was authorized to conduct all work in the territorial U.S. dealing with reclamation, and only the IBC had the mandate to address any changes to the Rio Grande that might affect the location of the international boundary or impact international treaties associated with the river. Correspondence between the two agencies in the early 1930s indicates more concern over budgets than over who supervised specific construction sites. Secretary of State Cordell Hull forwarded requests from L.M. Lawson in March of 1934 to Secretary of the Interior Harold Ickes asking if the USBR would provide some funding to the USIBC because the Bureau's reclamation work upstream would affect the river in the El Paso Valley. Hull urged Ickes to accept interagency cooperation. In June, 1934, L.R. Fiock, Rio Grande Federal Irrigation Project Manager, sent Lawson a copy of an interagency agreement between the Departments of Interior and State. By December, the two agencies agreed the USBR would be in charge of all the work on Caballo Dam. They had a Memorandum of Agreement in place by January 17, 1935, regarding transferring any funds for the dam to the USBR received by the USIBC from the PWA. Commissioner Elwood Mead, USBR, stressed the importance of keeping separate accounts when the Bureau also began receiving funds from the National Industrial Recovery Fund.³⁹⁵

In March of 1935 the USIBC transferred \$20,000 to the USBR to begin design and specification plans for Caballo Dam and transferred an additional \$1,500,000 in December. During 1935, the joint IBC met and determined the sovereignty over 19 parcels that would be

³⁹⁴ Records of the IBWC, U.S. Section, El Paso, Texas, Folder 2.22.2/2; IBWC Subject Files, NARA, Ft. Worth, F12.1.16-F12.1.20, RG 76 GS 1 HM 2007, Box 30; IBWC Subject Files, NARA, Ft. Worth, B 13.2 (1917-1932), RG 76 GR 5 HM 2007, Box 3.

³⁹⁵ Bureau of Reclamation Project Correspondence File, 1930-1945, Rio Grande Basin – Rio Grande Rectification 301-4-223, NARA, Denver, RG 115 FY 13, Entry 7, Box 945, Folder 223.

affected by changes to the final river channel alignment. The PWA also expanded the scope of the USIBC's rectification work in 1935. Federal Project No. 5 put the USIBC in charge of improving 125 miles of river channel from Elephant Butte Dam downstream to the head of the rectification work in the El Paso/Juárez Valley in order to ensure compliance with the 1906 agreement to deliver water to Mexico. The USIBC estimated that work would require four years to complete, cost \$6,000,000, and employ 500 men per year. Federal Project No. 6 included surfacing roadways atop the levees the USIBC would build as part of rectification. The USIBC projected a cost of \$1,000,000 to complete the roads in three years employing 200 men per year. The USIBC estimated construction work on Federal Project No. 4 would be completed by 1938, and would require approximately \$2,000,000 above the \$3,300,000 already received in 1935. In early 1936, Congress removed the PWA classification for the USIBC's six federal projects and put them under the authority of the State Department. This caused a temporary delay in rectification work while the USIBC waited for the funds to be transferred.³⁹⁶

As of June 30, 1935, the rectification work was well underway. USIBC workers cleared 3,391.9 acres of floodplain, and of those acres had grubbed 2,715.2 acres, plowed 2,516 acres, and re-grubbed 293 acres. They moved 1,902,826 cubic meters of earth, built 49.66 km. of levee and 18.8 km. of new river channel, and made 18 new river cuts through meanders and bancos. The USIBC employed 465 laborers and 113 supervisors in the month of June alone. Workers employed by the Mexican Department of Communications and Public Works, supervised by the MXIBC, cleared and grubbed 316 hectares (781 acres), plowed 266 hectares (657 acres) and moved 396,400 cubic meters (518,491 cubic yards) of earth for levee construction. The *El Paso Herald Post* reported in July that 31 miles of levee were complete and in October that the entire

³⁹⁶ IBWC Subject Files, Records of the IBWC, NARA, Ft. Worth, RG 76 F12.1.16-F12.1.20, Box 30; "Daniels Predicts Victory for FDR," "Change Status of River Work," *El Paso Times*, 11 and 16, 1936.

project was 20% complete, by then having 47.8 miles of levee in place. The newspaper expressed concern that the workforce, which totaled 561 at that time for the U.S. side, would be reduced after December due to a lack of funding but, as seen above, the State Department took over the project in early 1936, and the USIBC received \$1,500,000 from that agency to continue the work.³⁹⁷

The joint IBC held meetings to transfer parcels of land from one nation to the other during 1936, and as this work proceeded the commissioners notified their respective governments of changes to the location of the border. Because U.S. agencies were particularly concerned about illegal entry into the U.S., the USIBC kept the Bureau of Customs, the Immigration and Naturalization Service, and the Bureau of Entomology and Plant Quarantine up to date regarding all changes in sovereignty. The USIBC continued to survey plats for right-of-ways in Hudspeth County for drains parallel to the proposed levees, plotted and metered levee sections at San Elizario Island, finalized plans for a sluiceway at the Riverside Canal Heading, prepared a bill for materials to build the Ft. Hancock-El Porvenir Bridge and began that construction in December, and completed studies for roadway surfacing on the U.S levee and grade control structures near the Alamo, Diablo, and Guayuco Arroyos (for arroyo locations see the illustration for gradients and arroyos above in this chapter). By December of 1936, the workers hired by the USIBC since the project began had cleared and grubbed 3,795 acres of land, used dragline excavators and motor graders to dig the channel and move 6,662,351 cubic meters of earth to build the levee, and placed 11,848 cubic meters of roadway topping to finish 17,374 linear meters of roadway. During the latter half of 1936, the USIBC employed an average of 252 laborers and 86 salaried USIBC employees. From June to December, the MXIBC plotted

³⁹⁷ Records of the IBWC, U.S. Section, El Paso, Texas, Folder 2.22.2/2, "31 Miles of Levee Already Built Along River – Big Flood Control Project 15 Per Cent Finished Engineers Say," *El Paso Herald Post*, 26 July, 1935; "River Project Now Completed 20 Per Cent," *El Paso Herald Post*, 25 October, 1935.

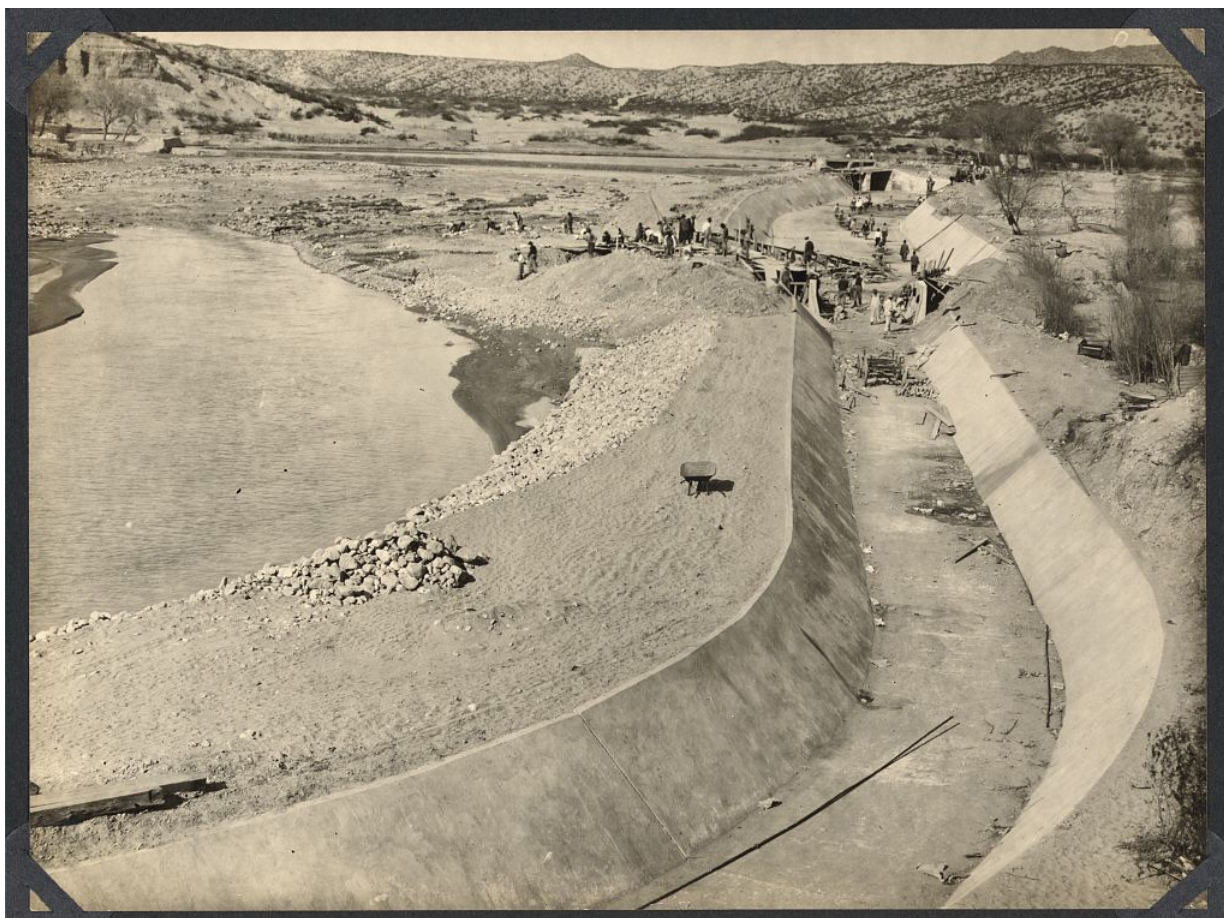
their levee from the lower end of San Elizario Island to the county line and laid the grades. Mexican workers cleared and grubbed 1,624 hectares (4,012 acres) of right-of-way and used draglines and other equipment to move 63,000 cubic ft. of earth, constructing 30 km. of levee. The joint IBC also agreed to certain cross-border work over the year. This was a common practice and sped up the progress of the work. Available men and machinery frequently switched sides of the river. The USIBC built a portion of the Mexican levee in exchange for a portion of the U.S. levee the MXIBC had built, illustrating the cooperative nature of the project.³⁹⁸ Although there is nothing in the records concerning interactions between the workers, it is hard to imagine that men working in such close proximity did not exchange pleasantries, and perhaps shared food and water in addition to conversation. In spite of the restrictive hiring policies the USIBC practiced, as well as the emphasis on deportation of ethnic Mexicans within the U.S., Mexican citizens actually did work on the U.S. side of the river on the Rectification Project. This is a prime example of how national policies dictated outside of the border zone often have little relationship to the realities of life along the international boundary.

Throughout the 1930s, farmers on the Texas side of the border in the valley continued complaining about water shortages because the 1906 arrangements for water apportionment dispersed water into the *Acequia Madre* on the Mexican side of the river first before the remainder flowed downstream. The USBR took over the Franklin Canal in 1912 and worked on improvements until 1918. A dam completed in 1918, called at that time the American Dam, diverted water into the Franklin Canal, but was 1,800 ft. below the Mexican Dam that fed the *Acequia Madre*. Mexican farmers began illegally diverting water below both of these dams as early as 1919, and a USBR study in 1923 estimated these diversions into Juárez and as far

³⁹⁸ Semi-Annual Progress Reports on Construction Projects, Jan.1-June 30, 1936, July 1-Dec. 31, 1936, IBWC Subject Files, Records of the IBWC, NARA, Ft. Worth, RG 76 GR 5, Box 34, Folder G 8.5.

downstream as Fort Quitman drew off approximately 30,000 acre feet of water per year in addition to the 60,000 acre feet annual allotment to Mexico. In 1926, the USIBC found seven illegal Mexican diversion dams and canals and proposed building a dam above the Mexican Dam to stop allowing the extra water into Mexico. In 1935 L.M. Lawson noted that Mexican farmers had continued to increase the number of illegal dams and canals since 1932, and that the MXIBC did not take action to stop these practices or even record them in their inspection reports. Another problem Lawson pointed out was that accumulated silt at the American Dam prevented diverting water into the Franklin Canal and contributed to sending more than the allotted 60,000 acre feet downstream. Lawson suggested the USIBC begin plans to build a dam and canal system above the Mexican Dam. He noted that the dam would be inside the territorial U.S., giving that nation complete control over how much water flowed downstream. But he also seemed to be unsure about the wisdom of taking this step. Lawson cautioned that the U.S. would have to bear the full brunt of construction costs. More importantly, he feared it would signal an unwillingness to work with Mexico and jeopardize negotiations already underway for jointly funded and constructed dams on the Lower Rio Grande. While the State Department considered Lawson's suggestions, in February of 1936, representatives from the USBR, the El Paso Water Improvement District No. 1, and the Elephant Butte Irrigation District, Las Cruces, met and agreed that the 1935 release of 2 cubic feet of water per acre from Elephant Butte Dam would continue during 1936. A severe drought in 1935 had limited reservoir recharge for that year. The water level in 1936 was higher than it had been in 1935, but the representatives decided to continue building up stored water in the reservoir.³⁹⁹ This decision did not please the disgruntled farmers in Texas.

³⁹⁹ "Execution of Provisions of Treaty of 1906," December 3, 1935, Records of the IBWC, Section 18, El Paso Projects, Rio Grande Rectification Project, Folder EP 2.22.2, International Boundary and Water Commission, El



Franklin Canal 1914, Mexican Dam is seen across the Rio Grande
 USBR, Library of Congress
<https://www.loc.gov/item/2008676785/>

Due to farmers' continued complaints and lobbying by the Texas Planning Board, on June 4, 1936, the U.S. Congress approved the USIBC plans for an American Dam and Canal within U.S. territory. This American Dam, built 140 ft. above the International Boundary, is a 286 ft. long concrete weir dam, has 13 radial gates, is 18 ft. high, and has a hydraulic height of 5

Paso, Texas; "Maintain 1935 Water Ratio," *El Paso Times*, 2 February, 1936; Ackerly, "Controlling Water on the Border: The American Canal System, International Boundary and Water Commission, El Paso, Texas," Prepared for United States Section, IBWC, United States and Mexico, El Paso, Texas, Contract #IBM 96-23, Submitted by Human Systems Research, Inc., Tularosa, New Mexico, November 1999, HSR Report No. 9904, 7-10.

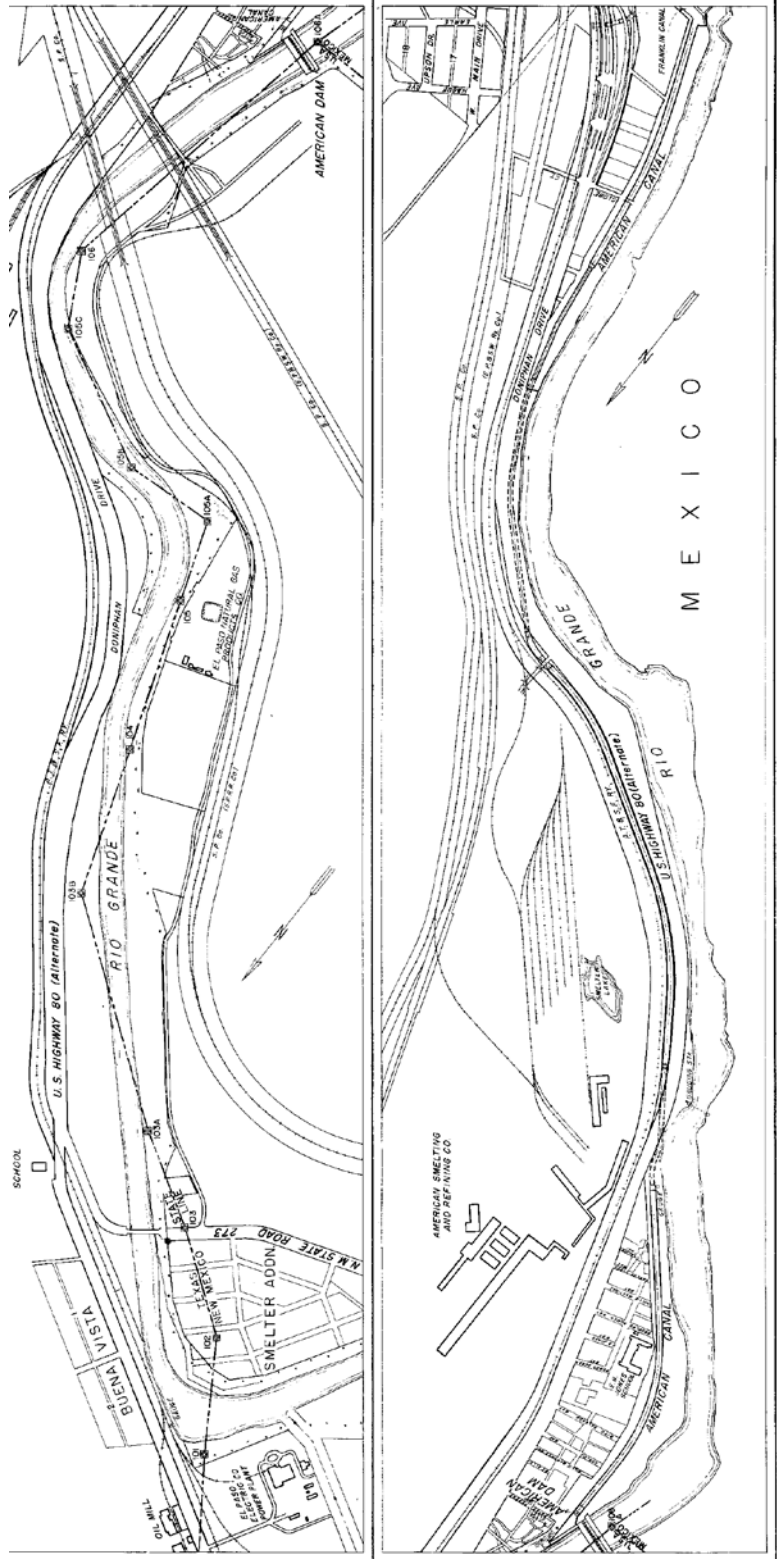
ft.⁴⁰⁰ The American Canal runs southeast entirely within the U.S. and has sections that are concrete lined and above ground, while other portions run through underground conduits until the canal connects with the Franklin Canal (see illustrations below). At the American Dam the water promised to Mexico in 1906 is released down the Rio Grande and the excess flows down the concrete-lined American Canal for two miles to the Franklin Canal. The American Dam and Canal, completed June 2, 1938, cost the U.S. government \$667,398. The U.S. State Department justified building the American Dam and Canal on the basis that the 1906 agreement only promised a set amount of water for Mexico but did not concede that Mexico had any legal claim to the water. Diverting the waters of the Rio Grande into the American Canal guaranteed that Mexico only receives up to 60,000 acre feet annually, and even less during droughts when the reservoirs at Elephant Butte and Caballo are low. The Mexican allotment flows downstream to what is now called the International Dam where the water is delivered into the *Acequia Madre*. The International Dam was a crude diversion dam made of rocks and sandbags until the USBR added concrete and radial gates in 1940.⁴⁰¹

⁴⁰⁰ A weir dam is a low barrier across flowing water designed to raise the water level upstream to a desired point. Once that point is reached, the remainder flows over the barrier. The purpose of a weir dam is to interrupt, regulate, and measure flow rates. Radial, or tainter, gates control the flow rate.

⁴⁰¹ Ackerly, 1, 4, 5, 7, 21, 40; Upper Rio Grande Flood Control Project, www.ibwc.gov/Organization/Operations/Field_Offices/URGFCP.html; Diversion Dams and Related Structures, http://www.ibwc.state.gov/mission_operations/diversion_dams.html



Mexican Dam and Head of *Acequia Madre*, August 1934, USBR, RG 115-87-0028, as found in Ackerly, 8.



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RIO GRANDE CANALIZATION PROJECT
American Dam and Canal

Exhibit B-3,
Appendix.



View southeast of excavation of American Canal
at junction with Franklin Canal. Dec. 24, 1937.



View north of construction of lower end of closed conduit section A, American Canal. December 11, 1937.



View of canal headgate works at easterly end of American Dam.
Pouring concrete in center pier. October 15, 1937.

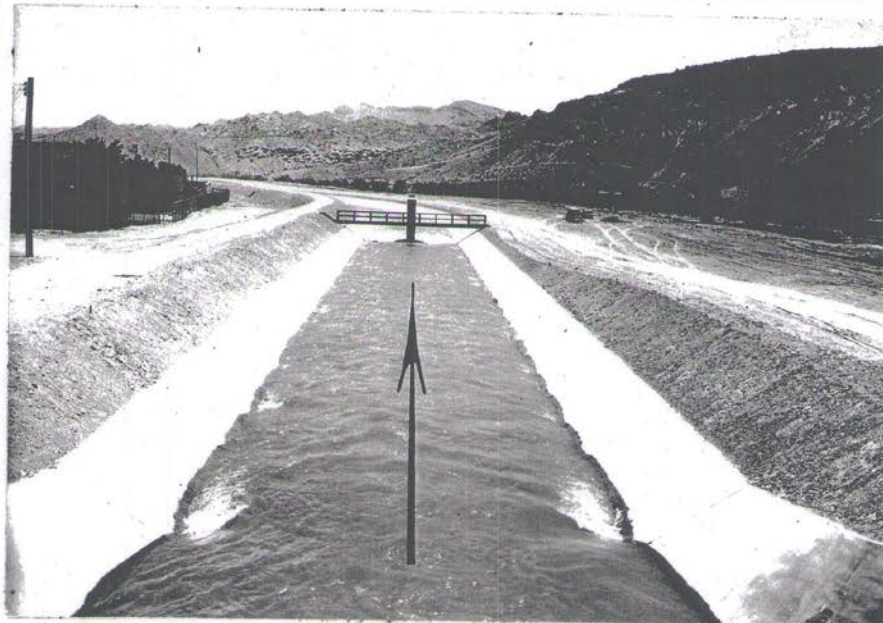
Semi-Annual Progress Reports on Construction Projects, July 1-Dec. 31, 1937, IBWC Subject Files, Records of the IBWC, NARA, Ft. Worth, RG 76 GR 5, Box 34, Folder G 8.5.



Open Section "A" Showing Configuration of Construction Joints and Gravel Drains Common in all Open Sections, December 31, 1937, as found in Ackerly, 21.



Lower Open Section "A" with Hart's Mill Road Bridge in Foreground, March 12, 1938, as found in Ackerly, 40.



American Canal. View south, showing canal immediately below American Dam. Gaging station in canal. Rio Grande in upper right.
June 3, 1938.



American Canal. View southeast, showing canal at entrance to conduit section B. Smelter bridge in foreground. State highway at right of canal.
June 11, 1938.

Semi-Annual Progress Reports on Construction Projects, Jan. 1-June 30, 1938, IBWC Subject Files, Records of the IBWC, NARA, Ft. Worth, RG 76 GR 5, Box 34, Folder G 8.5.



American Dam. View downstream, showing dam in operation. Diversion weir and two radial gates of American Canal headworks at left of dam. Partially dry bed of Rio Grande in center beyond dam. July 1, 1938.



American Canal. View downstream, showing first water from lower end of American Canal entering head of Franklin Canal. Mexican Diversion Dam across Rio Grande in right center of picture. June 2, 1938.

During the first half of 1937, rectification work in the El Paso/Juárez Valley proceeded at San Elizario Island. The joint IBC decided in Minute 158 that the rectified channel there would generally follow the existing boundary line, which was approved by both governments. Further studies included siphon structures at the Alamo Arroyo and a wasteway from the Hudspeth Canal, a culvert at the Guayuco Arroyo, a culvert at the Tornillo wasteway and drain extension, as well as an extension of the Alamo feeder canal and a grade control structure above the Alamo Arroyo.⁴⁰² They also worked on arroyo improvement and an irrigation canal extension at the Dave Gill property.⁴⁰³ The IBC also conducted studies for a rectified channel at Córdova Island and flood prevention at the Riverside Canal. Workers completed the Ft. Hancock-El Porvenir Bridge in April. By the end of June, USIBC workers had cleared and grubbed 48.4 acres of land, for a total of 3,844 since the beginning of the project, moved 1,812,754 cubic meters of earth, for a total of 8,475,105 cubic meters since the project began, placed 66,827 cubic meters of roadway surfacing material for 101,262 linear meters of roadway topping on the U.S. side of the river. Meanwhile, Department of Communications and Public Works laborers, overseen by the

⁴⁰² Siphon structures are closed conduits that carry water under an obstruction such as a roadway or railroad. They often have a drop to go under the obstruction and then a rise to reach the outlet. They depend on sufficient water pressure to push the water through the conduit. Culverts can be open or closed and are often simple metal pipes. Culverts, unlike siphon structures are level. Wasteways provide an outlet for water in case of a canal break and can also regulate water flow. They are built at the ends of canals and laterals as an outlet for unused or excess water. They are also built along sections of canals and laterals that might have breaks so that water can be drained rapidly to prevent further damage. Low gates that can be opened quickly at the head of wasteways are necessary. Gates can be installed at both the upper and lower areas along banks or, in flat terrain, as lip spillways that can serve the same purpose. Wasteways can be constructed as either pipes or surface drains. Sidney Twitchell Harding, *Operation and Maintenance of Irrigation Systems* (New York: McGraw Hill Book Company, 1917), 212-213.

⁴⁰³ The Dave Gill episode is an interesting aside to the rectification story. In 1924, the Mexican Secretary for Foreign Affairs had no objection to provisional dams, and in 1925 Gill built a rock-fill diversion dam near the mouth of the Guayuco Arroyo about five kilometers above Fort Quitman. In 1932, the Hudspeth County Irrigation District petitioned the IBC to remove the dam because it was “harmful to lands of the district due to its raising of the water level.” The District filed complaints again in 1934 and 1935. In October of 1935, the USIBC and the MXIBC agreed to remove the dam. The dam was partially washed out in September, and Gill began repairs. The district filed for an injunction in October to stop him. Gill claimed the district was only opposed to his dam because he refused to join the organization. For some reason the *El Paso Herald Post* raised the issue of Gill’s race, running the headline about the injunction hearing as “District Opposes Dam Rebuilding – Attorney Says Suit Against Negro Is Membership Move.” In the end, Gill was not allowed to keep his dam, but the IBC work improved his irrigation works and water delivery at the arroyo. *El Paso Herald Post*, 18 October, 1935; Records of the IBWC, U.S. Section, El Paso, Texas, Folder 2.22.2/2.

MXIBC, had cleared and grubbed 1,704 hectares (4,211 acres) of right-of-way, and moved 854,000 cubic meters of earth to build 46 kilometers of levee. During this period cross-border work continued. The USIBC performed levee work at four locations along the Mexican levee because the U.S. sector had access to more draglines and excavation machinery, and the MXIBC traded some handwork on the U.S. levee. The U.S. and Mexico agreed on the disposition of 33 parcels of land, 12 going to the U.S., 16 to Mexico, and 5 requiring no change, for a total of 120 parcels exchanged by the end of June. The USIBC employed an average of 297 laborers and 93 salaried employees during this period.⁴⁰⁴

In the second half of 1937, the IBC determined the final location of the rectified channel through the San Elizario Island area in Minute No. 159, signed August 20, and agreed on how to divide the work between the USIBC and the MXIBC in Minute No. 161, signed November 17. Both entities continued work on gaging stations (a site where water levels are measured systematically), and the USIBC began work on a grade-control structure opposite the Guayuco Arroyo on the U.S. levee. The joint IBC continued to trade work in informal agreements; USIBC workers worked on the Mexican levee and Department of Communications and Public Works laborers worked on the U.S. levee, supervised by the MXIBC. The IBC began studies for the Tornillo-Guadalupe Bridge as well. By the end of December, Mexican workers had cleared and grubbed 1,704 hectares (4,211 acres) of right-of-way, excavated and moved 1,590,600 cubic meters of earth, and built 47 km. of levee. Workers supervised by the USIBC had cleared and grubbed 71.7 acres of land, plowed 6.5 acres, excavated and moved 30,242 cubic meters of earth for levees, spread 14,939 cubic meters of road surfacing material, to finish 15,573 linear meters

⁴⁰⁴ To date, I only have obtained access to the USIBC records and have no figures on MXIBC employment figures. Semi-Annual Progress Reports on Construction Projects, Jan. 1-June 30, 1937, IBWC Subject Files, Records of the IBWC, NARA, Ft. Worth, RG 76 GR 5, Box 34, Folder G 8.5.

of roadway atop the levee. The USIBC employed an average of 320 employees, 228 laborers and 92 salaried personnel over this six-month period.⁴⁰⁵

From January 1 to June 30, 1938, the joint IBC finalized the disposition of the remaining 32 parcels of land in Minutes No. 162 and 163 and notified the Bureau of Customs, the Immigration and Naturalization Service, and the Bureau of Entomology Service and Plant Quarantine of the new boundary after confirmation by USBR. The USIBC also completed the Alamo grade control structure, the Alamo feeder canal heading, began the Tornillo-Guadalupe Bridge and completed it in June, and installed a stream gaging station at Fort Quitman. The USIBC employed an average of 254 workers during this period. The men cleared 11.9 acres of land, cleared and grubbed 195.7 acres, and plowed 143.6 acres. USIBC laborers excavated 15,326 linear meters of river channel, moved 1,926,233 cubic meters of earth to build 225,398 of U.S. levee, and 44,000 linear meters of Mexican levee. They applied 16,236 cubic meters of roadway surfacing material to complete 15,707 linear meters of roadway atop the U.S. levee. Under the supervision of the MXIBC, Mexican workers cleared and grubbed 140 hectares (345 acres) in the San Elizario sector, completed 209,400 cubic meters of earthwork, and 62 km. of levee. On June 29, workers turned the river into the rectified channel at San Elizario Island.⁴⁰⁶

⁴⁰⁵ Semi-Annual Progress Reports on Construction Projects, July 1-Dec. 31, 1937, IBWC Subject Files, Records of the IBWC, NARA, Ft. Worth, RG 76 GR 5, Box 34, Folder G 8.5.

⁴⁰⁶ Semi-Annual Progress Reports on Construction Projects, Jan. 1-June 30, 1938, IBWC Subject Files, Records of the IBWC, NARA, Ft. Worth, RG 76 GR 5, Box 34, Folder G 8.5.



Excavation of rectified channel of the Rio Grande at the upper end of San Elizario Island. View southeast showing six dragline excavators in operation. April 25, 1938.

Semi-Annual Progress Reports on Construction Projects, Jan. 1-June 30, 1938, IBWC Subject Files, Records of the IBWC, NARA, Ft. Worth, RG 76 GR 5, Box 34, Folder G 8.5.



Grubber attached to Caterpillar tractor, for clearing and grubbing work. March, 1938.



Caterpillar tractor with grubber, clearing trees from East Levee near station 1750.

Semi-Annual Progress Reports on Construction Projects, Jan. 1-June 30, 1938, IBWC Subject Files, Records of the IBWC, NARA, Ft. Worth, RG 76 GR 5, Box 34, Folder G 8.5.

During the second half of 1938, the joint IBC took action on the final exchange of land parcels in Minute 164, and agreed on the rules and regulations to maintain the rectified channel in Minute 165 based on recommendations by their engineers. A flood occurring from September 2-9 reached a peak of 5,000 cfs at the upper end of the project and 3,180 cfs at Fort Quitman, indicating that the project was working to prevent flooding. Survey parties established and marked the new river channel for mapping purposes, and staked locations for road approaches, levee groins (rigid extensions perpendicular to the embankment extending into the river to trap silt and interrupt water flow), revetments (sloping walls along embankments meant to absorb the energy of rushing water), and floodway and river cross sections (surveyed lines crossing and perpendicular to the river channel and floodplain used to calculate flood elevations). Inspectors checked all construction and maintenance work. Most of the work in this period consisted of enlarging the levees, leveling floodways, surfacing roads, and building structures, such as the maintenance headquarters at the Fort Hancock-El Porvenir and Tornillo-Guadalupe Bridges. The USIBC only supervised the clearing and grubbing of 3.6 acres of land, excavated 120 kilometers of river channel, and moved 288,032 cubic meters of earth to build 1,160 linear meters of levee. Workers applied 13,595 cubic meters of surfacing material to roadways to complete 15,767 linear meters of roadway. The stream gaging station at San Elizario Island was completed as was the Fabens USIBC division headquarters and warehouse. The MXIBC had already completed all clearing and grubbing prior to this period, but performed 93,000 cubic meters of earthwork to build 62 kilometers of levee. As the project wound down, the USIBC employed an average of 132 laborers, 164 government employees, and 5 men working for contractors.⁴⁰⁷

⁴⁰⁷ Semi-Annual Progress Reports on Construction Projects, July 1-Dec. 31, 1938, IBWC Subject Files, Records of the IBWC, NARA, Ft. Worth, RG 76 GR 5, Box 34, Folder G 8.5.

The majority of construction work on the Rectification Project came to an end at the conclusion of 1938. Finishing work continued until 1943, and constant maintenance continues to the present. The Rio Grande that had measured 155.2 miles along the meanders is now 85.6 miles in length. The U.S and Mexico exchanged 5,121 acres, which the IBC divided into 178 parcels; the U.S. ceded 85, Mexico 69, and 24 remained in the floodway channel. Only the sovereignty over these parcels changed, not ownership. Engineers increased the gradient from 1.82 ft. per mile to 3.20 feet per mile. Over 20 million cubic meters of earth had to be excavated and moved to build the levees. The parallel levees constructed on both banks are 591 ft./180 m. apart, except below San Elizario where the distance narrows slightly. The U.S. levee is 85.44 miles long, with a crown width of 23-29.5 ft./5 m., and an average height of 7.2 ft./2.2 m., and the Mexican levee is 83.74 miles long, with a crown width of 16.4 ft./5 m., and the same average height as the U.S. levee. In anticipation of a flood with 11,000 cfs, engineers included 2 ft. freeboards (the distance below the top of the levee water is expected to reach). After construction, the river's normal channel became 100 ft. wide, 3 ft. deep, and the extra space between the river and both levees can handle a flood capacity of 11,000 cfs. During the course of the project, IBC engineers modified the Riverside Heading and added concrete grade controls at Ysleta, Tornillo, Alamo, and Guayuco. Construction also included three international bridges, Ysleta-Zaragosa, Fabens-Guadalupe, Fort Hancock-El Porvenir. By June 30, 1940, the USIBC had spent \$4,010,887.30 on rectification in the El Paso/Juárez Valley, an additional \$2,500,411.75 for levees and canals in New Mexico, plus \$667,398 for the American Dam and Canal. Mexico spent \$591,876 on rectification in the valley, and both nations spent additional thousands on overhead, purchasing land, and contingencies, including damage claims.⁴⁰⁸

⁴⁰⁸ Minute No. 128, July 28, 1930, Minute No. 129, July 31, 1930, Records of the International Boundary and Water Commission, NARA, Ft. Worth, RG 76 E.076-FOR-01, Boundary and Claims Commission and Arbitrations,



RIO GRANDE RECTIFICATION PROJECT IN THE EL PASO-JUAREZ VALLEY



RIVER BED AND RECTIFIED CHANNEL

IBC Rectification Project, Accessed March 17, 2016, www.slideshare.net

The illustration above shows how much the location of the river changed due to rectification. The Rectification Project improved the stability of irrigation for approximately 178,000 acres of land in both the U.S. and Mexico, illustrating the belief, at the time, that engineering and science were the keys to exerting human control over the environment. However, although flood control improved, the levees were not a perfect solution, and construction had unforeseen environmental consequences, as will be addressed in Chapter 6. The original goals of the Rectification Project were ambitious enough to merit investigation and study, but the project expanded to include more federal agencies and even greater state control

Foreign Affairs Office, Minutes of the Joint Commission, 1922-1980, Box 1, Folders 1-60; History of the IBWC, Section 18, El Paso Projects, Rio Grande Rectification Project, Folder IBWC EP 2.1/3, International Boundary and Water Commission, El Paso, Texas; "Caballo Bids Expected Soon," *El Paso Times*, 4 March, 1936, A 3; Semi-Annual Progress Reports on Construction Projects, Jan. 1-June 30, 1940, IBWC Subject Files, Records of the IBWC, NARA, Ft. Worth, RG 76 GR 5, Box 34, Folder G 8.5.

over the environment. The increased scope of the project, by involving the USBR and the CCC illustrate the new directions conservation took in the 1930s, as discussed in the next chapter.

Chapter 5: The Civilian Conservation Corps, the U.S. Bureau of Reclamation, and the Rio Grande Rectification Project

When the U.S. government authorized Federal Project No. 4 in 1934, the Rectification Project only covered straightening the river and building levees in the El Paso/Juárez Valley. In 1935, Federal Project No. 5 expanded the work to include channelization and levee construction from Elephant Butte Dam to El Paso. As seen above, the Convention of 1933 included building Caballo Dam below Elephant Butte Dam. The USBR controlled the Caballo Dam and Reservoir Project and, in order to guarantee water delivery downstream, more construction on the U.S. side of the river in the El Paso/Juárez Valley. The organizational chart below illustrates the number of people hired by the USBR to supervise and participate in the Rio Grande Federal Irrigation Project that expanded due to the Rio Grande Rectification Project. From 1934 to 1940 the number of employees changed, but the basic structure remained the same. In 1933, the Civilian Conservation Corps (CCC) became the conservation work force in the U.S., and provided labor for multiple government agencies, including construction projects in New Mexico and Texas associated with the Rio Grande Rectification Project. CCC units worked on the U.S. side of the river in the valley and in New Mexico under the supervision of the USBR, and El Paso city and county entities lobbied for additional units to also conduct soil conservation and public park projects. Having the CCC units perform this work removed these jobs from local people who did not meet the qualifications to join the CCC. But because the federal government had the burden of paying for this labor force, as well as their room and board, local governments benefitted by not having to use their own tax funds for conservation or other projects their constituents wanted. The ideas about controlling the environment that had developed during the Progressive Era shifted during the Depression from the realm of elites into popular culture. The CCC became a

ORGANIZATION CHART 1934

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graph TD
    S[SUPERINTENDENT  
L.R. Flock Gr. 16  
Has charge of engineering construction and operation and maintenance of Rio Grande Federal Irrigation Project. 5 professional & sub-professional, 7 clerical, 63 registered, 116 unclassified and 141 temporary employees.]
    
    S --- OMC[OPERATION & MAINTENANCE-CONSTRUCTION]
    S --- E[ENGINEERING]
    
    OMC --- EPI[EL PASO WATER IMPROVEMENT  
DISTRICT #1 - TEXAS  
EL PASO VALLEY  
DIVISION ENGINEER Gr.12  
A.W. Bainbridge]
    OMC --- LCO[LAS CRUCES CONST OFFICE  
(O.C. Payne)  
Plans and property maps, Profiles, tracings and land classification; John Matthews, Gr. 8]
    OMC --- YCO[YSLETA CONST. OFFICE  
Miscellaneous office work accomplished by the Division Engineer or General Foreman.]
    
    EPI --- R[RESERVOIR  
SUPERINTENDENT  
Geo R. Shannon, Gr. 9]
    EPI --- H[HYDROGRAPHY  
HYDROGRAPHER  
W.F. Resch Gr. 10]
    EPI --- I[INSPECTION  
I. A. Hynd, Hydrographer (Vac) Reg.]
    EPI --- S1[SURVEYS  
Land classification & Misc. field work: Carl Peacock Gr. 8 3 Assistants, Uncl.]
    EPI --- S2[SURVEYS  
Chief of Party P.H. Redman, Gr. 9 Instrumentman (Vac) Gr. 8 1 Assistant, Reg. 2 Assistants, Uncl.]
    
    LCO --- P[PROJECT OFFICE  
Office Engineer, A.W. Bainbridge Gr. 12  
Plans, layouts & reports, Office Engineer, R.O.W. negotiations and damage claims, Gr. 9 G.W. Hoadley  
Map drafting, profiles & miscellaneous, F.R. Mosher (January to May) Gr. 9  
Property maps and land classification records, G.A. Lawley, Gr. 7]
    LCO --- F[FIELD OFFICES  
Field Engineering & Inspection O.C. Payne Gr. 10]
    LCO --- P2[PROJECT OFFICE  
Fiscal Agent, and Cost-keeper, C.L. Harris Gr. 9 Purchasing Agent, P.R. Birdwell, Jr. Gr. 8 Stenographer-File Clerk, S.K. Rodgers Gr. 7 Garage-man-janitor Uncl.]
    
    YCO --- O[OPERATION  
Division of 57,000 Acres 1 Watermaster Reg. 1 Asst. Watermaster (Vac) Reg. 12 Ditchriders Reg. 3 Gate tenders Reg. 4 Patrolmen Uncl.]
    YCO --- CM[CONSTRUCTION & MAINTENANCE  
Reg. 1 General Foreman]
    YCO --- DC[DITCH CLEANERS  
Machines 10, 12, 31 & 84 4 Operators Reg. 4 Others Uncl. 4 Laborers (Vac) Reg. 4 Others (Vac) Uncl. 5 Laborers (Vac) Temp.]
    YCO --- DR[DRAGLINES AND DITCH CLEANERS  
Machines 12, 31 & 84 6 Operators Reg. 6 Others Uncl. 6 Laborers Uncl. 4 Operators (Vac) Temp. 4 Others (Vac) Temp. 4 Laborers (Vac) Temp.]
    YCO --- CC[CONSTRUCTION & MAINTENANCE CREWS  
1 Foreman Reg. 1 Carpenter Uncl. 7 Truckdrivers Temp. 40 Laborers Uncl. 60 Laborers Reg. 60 Laborers Temp. 13 Teams Temp.]
    YCO --- WS[WORKING SHOPS  
1 Machinist Reg. 2 Mach. Helpers Uncl. 5 Spec. Laborers Uncl. 1 Garage man Temp. 1 Carpenter Reg. 2 Laborers Temp.]
    
    E --- PO[PROJECT OFFICE  
Fiscal Agent, and Cost-keeper, C.L. Harris Gr. 9 Purchasing Agent, P.R. Birdwell, Jr. Gr. 8 Stenographer-File Clerk, S.K. Rodgers Gr. 7 Garage-man-janitor Uncl.]
    E --- FO[FIELD OFFICES  
Las Cruces N.M. Costkeeper, R.V.McDonald Gr. 7 Storehouse Clerk, L.L. Hurt Gr. 6 Ysleta Tex. Costkeeper, C.A. Hutchins Gr. 8 Recorder-Water reports Reg.]
    
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The Civilian Conservation Corps Mission and Rationale

President Franklin Delano Roosevelt (FDR) had a lifetime love of nature and the outdoors. In the early 1900s he practiced scientific forestry on his estate at Hyde Park, New York, working with the New York State Forester and the State Conservation Commission. In conjunction with the New York State College of Forestry he started demonstration and experimental tree plantations on his land.⁴⁰⁹ As governor of New York, FDR started the Temporary Emergency Relief Administration in 1931, and suggested to its director, Harry Hopkins, that “slum boys” could be put to work preserving forests. Following his suggestion, Hopkins and Henry T. Morgenthau, Jr., New York’s Conservation Commissioner, put 10,000 young men to work planting trees on Bear Mountain.⁴¹⁰ By 1933, the U.S. faced both a social and environmental crisis. Unemployment rates were so high the youth of the nation seemed to have no hope for a brighter future. Of the 800,000,000 acres of forest in the U.S., only 100,000,000 acres of virgin timber remained. This deforestation had caused serious soil erosion, as flooding washed away three billion tons of topsoil every year and wind accounted for an almost equal annual loss. One-sixth of the productive land in the U.S., more than 300,000,000 acres, was either gone or disappearing.⁴¹¹

When FDR assumed office as president on March 4, 1933, he took the helm of a nation in an economic crisis. As part of his First Hundred Days, FDR paired conservation with employment by creating the CCC, an act his detractors believed permanently tied federal

⁴⁰⁹ A.L. Riesch Owen, *Conservation under F.D.R.* (New York: Praeger Publishers, 1983), 5-6.

⁴¹⁰ Jim Powell, *FDR’s Folly: How Roosevelt and His New Deal Prolonged the Great Depression* (New York: Three Rivers Press, 2003), 10.

⁴¹¹ Salmond, 4.

environmental efforts during his administration to relief, or federal welfare.⁴¹² FDR discussed creating a conservation corps with his cabinet, and together they created plans for tree-planting efforts, relief programs, and grants to the states for public works projects. Congress received the plan on March 12, 1933.⁴¹³ This initial legislation, which eventually led to establishing the CCC, had to be re-drafted twice to overcome multiple objections, in particular the cost of the program. FDR suggested Congress take the money from unencumbered public works appropriations, and Congress began deliberations on a second bill on March 21. Objections continued. Many congressmen did not like the idea of using money set aside for public works to create the CCC. Others said the plan was forced labor, that the \$1.00 per day wage was too low, that the bill did not prohibit discrimination against hiring Negro men, and that CCC work in forests and remote areas would separate married men from their families. The American Federation of Labor objected on the grounds that the CCC would take jobs away from men already working in the forestry sector and suppress wages for other skilled labor. There were fears that untrained, inexperienced men would actually destroy the forests and hinder the completion of construction projects. Because the conservation program would be organized along quasi-military lines, naysayers also worried that the plan was too much like the German Labor Service created in 1932, which created conservation camps in Germany but was quite militaristic and became a Nazi propaganda tool. After amending the bill again to address some of these objections the

⁴¹² In 1940 the CCC acquired a new director, James J. McEntee, after the death of Robert Fechner. The CCC was still quite popular with the American public, but McEntee attempted to reorganize the Corps to more heavily emphasize the aspect of citizenship training rather than a relief program. The Corps began allowing boys who were in college and whose parents were employed to enroll because the purpose of the Corps was then shifting to conservation and other public works as an aspect of national defense. However, as John A. Salmond asserts, this did not change the public perception that the CCC was a relief agency, and very few “college boys” enrolled. John A. Salmond, *The Civilian Conservation Corps, 1933-1942: A New Deal Case Study* (Durham, North Carolina: Duke University Press, 1967), 200-201.

⁴¹³ Allan M. Winkler, *Franklin D. Roosevelt and the Making of Modern America* (New York: Pearson Longman, 2006), 73.

Congress passed the Emergency Conservation Work Act by voice vote on March 31, 1933, and FDR established the CCC on April 5, 1933, in Executive Order 6101.⁴¹⁴

Robert Fechner, a labor leader and Vice President of the American Machinists Union, led the Corps from its inception until his death in 1939. The CCC, a federal agency, had an Advisory Council consisting of representatives from the Department of Labor, the War Department, the Department of the Interior, and the Department of Agriculture. Each of these agencies participated in directing the activities of the CCC. The Department of Labor selected the junior enrollees, who were unemployed, unmarried men 18-25 years of age whose families were already on state relief rolls. The men earned \$30 a month and had to remit \$22 each month to their families. Enlistment was for six-month periods, and men could reenlist for another six-month period. An amendment to the final bill prohibited discrimination against enrolling Negroes and FDR quickly expanded the CCC to include American Indians to work in the Plains areas affected by drought and soil erosion. The War Department, due to its experience mobilizing and organizing men for war, enrolled the men, fed them, provided uniforms, housed them, and transported them to Army posts for training and then to their assigned camps. CCC units also worked in support of the Army, constructing roads, buildings, and other work on Army posts. Each CCC unit had an active-duty or reserve Army officer in charge or, occasionally, a civilian hired by the CCC. The USBR, part of the Department of the Interior, directed CCC camps dedicated to work on irrigation and hydroelectric power development. The CCC also built public parks under the direction of the National Park Service, another agency within the

⁴¹⁴ Charles Price Harper, *The Administration of the Civilian Conservation Corps*, Ph.D. diss., Johns Hopkins University, 1937 (Clarksburg, W. Virginia: Clarksburg Publishing Company, 1939), 9-19; Salmond, 5; An Act for the Relief of Unemployment through the Performance of Useful Public Works, and for Other Purposes, 48 Stat. 22, March 31, 1933. For other works on the mission and scope of CCC work, see also Christine Phaff, *The Bureau of Reclamation's Civilian Conservation Corps Legacy, 1933-1942* (Denver, CO.: U.S. Department of the Interior, Bureau of Reclamation, 2010); James Wright Steely, *The Civilian Conservation Corps in Texas State Parks* (Austin: Texas Parks and Wildlife Department, 1986).

Department of the Interior. The Soil Conservation Service (SCS), under the U.S. Department of Agriculture (USDA), managed CCC camps assigned to large-scale soil conservation demonstrations, erosion control, and drainage works. The Forest Service Bureau, also under the USDA, was in charge of CCC camps dedicated to forestry work, including fire prevention, fire fighting, and tree disease prevention.⁴¹⁵

Very few enrollees served in units close to their homes. For example, in 1937 more young men enrolled in the state of Texas than anywhere else, but of the 21,992 who joined only 17,608 served in one of the 75 CCC camps in Texas. For some this was a source of homesickness and led to desertions. For others, it was a rare opportunity to travel and see more of the U.S. To help enrollees adjust to camp life, multiple types of recreation were part of the CCC experience, including indoor and outdoor games, craftwork, opportunities to play in bands, put on plays and skits, participate in book study and singing groups, and host dances. They also could learn about nature through hiking, gardening, or joining forestry clubs.⁴¹⁶

Conservation was not the only mission of the CCC. Unemployment, low education levels, poor diet, and public health issues affecting young men and women were a threat to the future of the nation. The CCC addressed all four problems, but only in the male population. In 1932, an estimated one in four Americans of both sexes between the ages of 15 and 24 had no employment at all, and only 29% could find part-time work.⁴¹⁷ Approximately 30% of the unemployed men and women in the U.S. were under the age of 25. The Federal Emergency Relief Administration (FERA) began hiring young people for public works projects starting in

⁴¹⁵ Kenneth Holland and Frank Ernest Hill, *Youth in the CCC*, Prepared for the American Youth Commission (Washington, D.C.: American Council on Education, 1942), 207-208; Leslie Alexander Lacy, *The Soil Soldiers: The Civilian Conservation Corps in the Great Depression* (Radnor, Pennsylvania: Chilton Book Company, 1976), 211-212; H.W. Brands, *Traitor to His Class: The Privileged Life and Radical Presidency of Franklin Delano Roosevelt* (New York: Doubleday, 2008), 292; Owen, 128-141.

⁴¹⁶ B.N. Timmons, "Enrollment in Texas CCC Camps Reach Total of 17,608," *Dallas Morning News*, 5 December, 1937.

⁴¹⁷ Salmond, 3.

1933. When the Works Progress Administration (WPA) replaced the FERA in June of 1935, the government created the National Youth Administration (NYA), which assumed responsibility for the student programs and out-of-school work projects the FERA had been managing. The NYA provided financial aid to boys and girls to help them stay in high school, college, and graduate school.⁴¹⁸ The CCC mission included education and vocational training, but only men could enroll in the organization. The majority of CCC enrollees had not gone beyond the eighth grade, less than 10% had a high school diploma, and 3% had four years of school or less and were functionally illiterate.⁴¹⁹

To overcome the objections of labor unions, the CCC hired Local Experienced Men (LEMs) who were frequently, but not always, union members with specific necessary skills to work alongside the enrollees. These men had to be of good character in order to mentor the enrollees, and helped train enrollees in vocational skills. CCC enrollees learned surveying, carpentry, stonemasonry, welding, logging, landscaping and tree nursery work; road, trail, bridge, telephone line, and small dam construction; how to operate bulldozers, diesel engines, drag lines, jackhammers, road graders, sawmills, tractors; as well as truck driving, tool sharpening, and wildlife management. Enrollees worked as cooks, kitchen police, dispensary orderlies, ambulance drivers, mechanics, and recreation hall and library attendants, and could earn leadership and educational roles.⁴²⁰ The men could attend vocational classes as well as receive academic instruction at the elementary, high school, and college levels. There were classes in Vocal Chorus, Motion Pictures, and Fencing. Beginning in October 1934, the CCC enrolled men as artists to create pictorial records of camp life and achievements, and many of

⁴¹⁸ Lewis L. Lorwin, *Youth Work Programs: Problems and Policies*, Prepared for The American Youth Commission (Washington, D.C.: American Council on Education, 1941), 9, 18.

⁴¹⁹ Holland, 174.

⁴²⁰ Owen, 140-141.

these men went on to obtain work in the commercial art field. By August 31, 1935, enlistment rules had changed to allow men from 17-28 years of age to enroll, and by then the Corps had already enlisted 505,782 men, 427,266 of whom were Juniors (neither LEMs nor military veterans). Men could now be re-selected even if they had 18 months of prior service. Of the men who enrolled in the fall of 1935 and spring of 1936, more than half were 17 or 18 years old, three-quarters were under the age of 21, and less than one-tenth were over the age of 23. In conjunction with the changes in the age requirements, the Department of Labor mandated that boys regularly enrolled in school could not enlist. The 1936 Annual Report on the CCC noted that “the enforced idleness of boys 17-21 years of age, who are not interested in further schooling and who are ready and anxious to work, is psychologically undesirable, and more far reaching in social consequences, than dependency in old age.”⁴²¹ By 1937 it was clear the CCC would continue its mission in spite of the expense of the agency. Congress approved a \$350,000,000 annual appropriation and allowed enrollment as high as 315,000 men per year, 15,000 of whom could be from territorial possessions.⁴²²

Unfortunately, the CCC had a mixed record in the area of education. There were continued complaints that Army camp superintendents did not set aside enough time during the workweek for education. Another problem was that there never was a clear distinction made between “training” and “education.” Enrollees attended classes at night in the camps or at local high schools. Monthly camp inspection reports list varying numbers of enrollees attending

⁴²¹ Records of the Division of Investigations, Camp Inspection Reports, Records of the Civilian Conservation Corps, NARA College Park, RG 35.3.4, Entry 115, Box 205, Folders CP-1 and BR-4, 1935-1941; Final Report, 1936, Annual, Special, and Final Reports, 1933-1943, Records of the Civilian Conservation Corps, NARA, College Park, RG 35, Entry 3, Box 3, pages 22-25. Vocational classes included Carpentry and Cabinet Making, Typewriting, Clerical Training, Cooking and Baking, Auto Mechanics, Laundry Management, Barbering, Radio Repair, Woodworking, Agriculture, as well as Hog and Poultry Raising. Academic coursework included Penmanship, Reading, Writing, Arithmetic, Algebra, Spelling, English Grammar, English Composition, U.S., World, and Negro History, Civics, Geography, General Science, Biology, Physiology, Spanish, Business Administration, Teacher Training, and Practice Teaching.

⁴²² “Bill Extending CCC for 3 More Years Approved by Congress,” *Austin American Statesman*, 25 June, 1937.

classes, and the reports accessed for this study show that participation never reached 100 percent. When Congress extended the CCC in 1937, the House mandated that each enrollee attend 10 hours of vocational training per week. In 1938, Director Fechner requested that the Department of Labor and the Office of Education create a committee to make recommendations as to how the CCC could be revamped to place education on an equal footing with technical work. The committee found that instructors were inadequately trained and that offering classes at the end of the workday, when the enrollees were tired, limited their willingness to attend. The American Youth Commission (AYC) did not conduct a survey of education in the CCC until 1938, and only surveyed ten camps with an additional ten as a control group. These investigations revealed that there was limited cooperation between educational advisors and camp superintendents. Enrollee respondents to the AYC surveys complained that the classes weren't interesting, that they already knew the material offered, and that they didn't see the purpose of the classes. Both investigations also called into question the direction of education in the U.S. in general: was academic instruction really necessary for people who would lead a non-academic life, or was vocational training alone insufficient for an increasingly urbanized society? These questions were not settled during the CCC's tenure, primarily because it never became a permanent agency. However, thanks to the CCC, 8,445 men learned to read and write and 763 earned college scholarships in the fiscal year 1938-1939 alone. During each year of its existence, the CCC produced on average 45,000 truck drivers, 7,500 men trained in bridge construction, 2,000 bakers, and 1,500 welders.⁴²³ The fact that there are more complete CCC records on vocational rather than academic achievements reflects the primacy of vocational training over academic education within the Corps.

⁴²³ Holland, 148-149, 163; Salmond, 162-168.

The CCC also attempted to unify enrollees in a common understanding of citizenship, again having a mixed record of accomplishing that goal. According to Bryant Simon, CCC backers saw the Corps as an entity that would unite disparate immigrant groups by forming them into patriotic citizens with a shared idea of civic responsibility. Ethnic barriers would be erased as Irish, Italian, Polish, Slavic, and Jewish young men put aside their cultural identities and adopted white, middle class “American” culture.⁴²⁴ Beginning in 1934 some camps offered discussion groups and discussion forums, but this was not a consistent practice throughout the Corps. Civics classes were available in most camps, but not all enrollees attended. It was not until 1940 that a special survey by the Educational Policies Commission undertook assessing citizenship training by the CCC and NYA in terms of “conforming” and “contributing.” The Commission decided that not everyone could rise to the level of “contributing,” but that “all should seek to reach that level and the success of the democratic state depended upon at least a majority of its citizens reaching that level.” The study concluded that teaching civic responsibility was problematic in the CCC camps because the men had varying educational levels, the teaching staff had inconsistent lesson plans and delivery methods, and because enrollees attended classes by compulsion “the principles of democracy [were taught] in an authoritarian atmosphere.”⁴²⁵ The study did not address how cultural difference impacted the success of teaching “citizenship.” Furthermore, the attempt to create a homogenous society based on shared civic values was impossible in the U.S. because racial discrimination was permitted by law. There was no way to erase racial difference when Jim Crow laws still held sway. African American men had a much harder time getting into the CCC in spite of the rules against discrimination. African American men served in segregated “Colored” units after the first few

⁴²⁴ Simon, 85.

⁴²⁵ Holland, 220-224.

months of the CCC, when units had originally been racially mixed. Local hostility to Colored units in some areas limited where these men could work, and Colored units were often only assigned to Army Posts. In 1930, for the first and only time, the U.S. Census classified “Mexican” as a race, the implication being that ethnic Mexicans were racially mixed. But Mexican Americans continued to claim they were white, served in “White” CCC units, and were not listed as a specific race in CCC records. However, they too often faced hostility from locals. Richard Meltzer includes in his study of the CCC in New Mexico a Hispanic enrollee’s account of a sign at El Paso’s Hilton Hotel that read “No Dogs or Mexicans Allowed.”⁴²⁶ Although not stated outright in the documents, perhaps the reasoning behind allowing Hispanics to serve in white units was that the CCC citizenship training would eliminate their cultural “otherness.”

The CCC had a better record in connecting conservation work to public health, especially undernourishment, which was a national concern during the Depression. As Neil M. Maher observes, stressing the relationship between healthy bodies and a healthy environment conveyed the message that “the CCC was conserving not only natural resources but human resources as well.”⁴²⁷ Camp mess halls served huge, high-calorie meals so men, who were underweight due to poverty, could eat as much as they wanted. Most men gained 10-12 pounds in their first few months in the Corps, not only because of the food, but also because the work they did increased their muscle mass. During its first two years in operation, the CCC spent \$78,373,474.90 on food. In 1938, CCC strength dropped to an average of 273,000 enrollees per year, but in that year the food bill alone totaled \$43,515,975.52. Buying in bulk made food procurement efficient, and the Corps spent an average of 43.67 cents a day to feed a man, or about \$159.40 a year. Camp Inspectors made careful notes on kitchen cleanliness, food orders, and noted any complaints

⁴²⁶ Meltzer, 154.

⁴²⁷ Maher, 105.

regarding the quantity and quality of meals. A.W. Stockman, who inspected Camp BR-4 at Ysleta in 1938, reported that some men complained about not getting enough to eat. Stockman reported that “hogging” occurred when kitchen staff served meals family style, but not when meals were offered cafeteria style and he recommended serving food from then on using the latter method. Enrollees at the camp also complained that meat was frequently prepared in the form of stew, and had become “monotonous.” Stockton ordered that the menu be diversified. There were no further complaints about food after that at Camp BR-4.⁴²⁸

Weekly reports listed men excused from duty due to illness or injury. Because enrollees were working with tools and machinery unfamiliar to them, the high incidence of injury, up to 20% in the early years of the CCC, was not surprising, but an emphasis on safety training and safety inspections reduced the percentage of injuries over time. Prompt attention to these inspection reports improved safety and lowered the number of preventable injuries. In 1938, injuries accounted for 12.5% of sick leave and communicable diseases for 40%. The most common diseases were the common cold, tonsillitis, pharyngitis, bronchitis, and influenza, which was to be expected in the close quarters of a barracks or dormitory setting where viral and bacterial diseases easily spread. Enrollees received an experimental pneumonia vaccine in 1934 and 1935, resulting in fewer cases of the disease. Even in years when pneumonia cases were lower in the general population, reported CCC cases were notably lower than national averages. As a result, in the fall of 1937 and spring of 1938 at least half of the enrollees received the vaccine. Mumps and measles were a problem in the Corps, especially during epidemics in the general population. During 1938, when there was an especially large outbreak in the U.S., reported cases were eight times higher in the CCC than for men in the Army because the CCC

⁴²⁸ Harper, 102; Records of the Division of Investigations, Camp Inspection Reports, Records of the Civilian Conservation Corps, NARA, College Park, RG 35.3.4, Entry 115, Box 205, Folder BR-4, 1935-1941.

enrollees were younger than the majority of enlisted military men. On the other hand, tuberculosis cases were much lower in the CCC than in the general population; doctors concluded this was because of the superior nutrition the men received along with access to medical care at the onset of the disease. Rates of death from appendicitis were also significantly lower than in the general population, again because enrollees received prompt medical care. Typhoid fever cases were extremely low because camp inspectors checked water supplies and waste disposal monthly; almost all reported cases were contracted when men were on leave. Malaria was an ongoing problem in areas with mosquitoes. Venereal diseases were also prevalent and enrollees had to be examined for these monthly. Men who contracted venereal diseases received treatment in the hospital until the infectious stage had passed, were then discharged, sent home, and their local health authorities notified.⁴²⁹

Providing young men with employment, vocational training, some academic education, an understanding of civic responsibility, and better health were not the only objectives of the CCC. FDR promised that the moral and spiritual rewards of hard work would turn boys into men. CCC proponents believed that boys eating plentiful food, getting physical exercise in the healthful outdoors, and contributing to the conservation of national resources, would shape the future of the nation. In spite of some persistent detractors opposed to the expense of the program as well as the expansion of government relief, often labeled “the pernicious dole,” the CCC quickly became the most popular program of the New Deal, as seen in the majority of the contemporary literature.⁴³⁰ Charles Price Harper’s 1937 dissertation, published in 1941,

⁴²⁹ Final Report, 1938, Annual, Special, and Final Reports, 1933-1943, NARA College Park, Records of the CCC, RG 35, Entry 3, Box 2, pages 7-35; Records of the Division of Investigations, Camp Inspection Reports, Records of the Civilian Conservation Corps, NARA, College Park, RG 35.3.4, Entry 115, Box 205, Folders CP-1 and BR-4, 1935-1941.

⁴³⁰ Amity Shlaes, *The Forgotten Man: A New History of the Great Depression* (New York: Harper Collins Books, 2007), 7.

concluded “between 1,400,000 and 1,750,000 persons derived direct benefits totaling \$7,500,000 monthly [when the CCC was] at maximum strength or \$33,750,000 for the first camp period [in 1933].” The bulk of this money went to the enrollees’ families and “lightened the burdens of local relief agencies.” Furthermore, Harper provides statistical evidence that CCC men found permanent work after their enlistment at higher rates than other men. The “improvements to forests, parks, watersheds and natural resources” were also very popular with the general public. Harper encapsulates the public perception of the CCC when he states:

“From an analysis of the social and economic objectives and consequences of the emergency conservation work program, one may readily conclude that the most beneficial result of the whole project has been the re-establishment of a healthy outlook on life for a civilian army of one million or more men. Imbued with such ‘spiritual values’ as faith in themselves, in their country, and in humanity, it can be expected that most of these men will return to their homes as law-abiding, useful, and respectable citizens.”⁴³¹

Happy Days, the official newspaper of the CCC, featured an article on July 1, 1933, entitled “Men of the CCC Regarded as Most Important Group in Their Generation” and quoted Francis E. Perkins, Secretary of Labor, as saying “We expect these men in reforestation camps to become the leaders of their generation when they return to their homes.” Another article in the same issue had the headline “Conservation Workers Are in ‘College’ Learning the Art of Living.”⁴³² Neil M. Maher argues that the popularity of the CCC allowed FDR to push forward other aspects of his New Deal initiatives, tied conservation to politics, and took environmentalism out of the realm of elites by involving millions of people in the work of conservation and the enjoyment of its results. He claims the work of the CCC led directly to the

⁴³¹ Harper, 98-99,104.

⁴³² “Men of the CCC Regarded as Most Important Group in Their Generation;” “Conservation Workers Are in ‘College’ Learning the Art of Living,” *Happy Days*, July 1, 1933, 1, 2. Besides the national publication, almost every CCC camp had its own newspaper written and produced by its unit. See Alfred E. Cornebise’s *The CCC Chronicles* (Jefferson, North Carolina: MacFarland & Company, 2004) and “Heralds in New Deal America: Camp Newspapers of the CCC,” *Media History Monographs*. Vol. 2, No. 1, Accessed 5/20/2009. www.scripps.ohiou.edu/mediahistory/mhmjour2-1.htm

birth of the modern American environmental movement.⁴³³ This assertion seems a bit overstated in light of the fact that concerns about the environment began to gather momentum in the late nineteenth century. However, as seen above in Chapter 3, the establishment of government agencies directing conservation during the Progressive Era became possible through outreach to interested parties already involved in irrigation, agriculture, and forestry production. The work of the CCC, on a national scale, convinced the greater public that conservation was good for the nation for multiple reasons.

CCC recruitment posters, as well as camp newspapers and news releases, invoked tropes of fitness, masculinity, and nationalism by featuring images of white, shirtless, muscular young men armed with tools and, frequently, an American flag. These young men were fighting for the very survival of the nation and were frequently referred to as Soldiers of the Soil or Mr. Roosevelt's Tree Army. Peter M. Beattie has noted, "In the late 1800s, the quasi-mystical conception of the armed forces as an embodiment of the nation or the 'nation in arms' gained ground internationally...[and] victory in warfare came to represent a nation's superiority." He also argues that "militaries...place themselves at the center of ongoing struggles to shape national memories and imaginations."⁴³⁴ As seen in the illustrations below, the quasi-military CCC became American icons. Strong, healthy men could conquer nature and save the nation by protecting national resources and rescuing their families with their wages.

Despite its imperfections, the CCC remained popular with the American public until disbanded in 1942, when the U.S. needed young men to serve in the military or work in industry to support the war effort. The CCC was not revived after World War II because of its association

⁴³³ Neil M. Maher, *Nature's New Deal: The Civilian Conservation Corps and the Roots of the American Environmental Movement* (New York: Oxford University Press, 2008), 3-15.

⁴³⁴ Peter M. Beattie, *The Tribute of Blood: Army, Honor, Race, and Nation in Brazil, 1864-1945* (Durham, North Carolina: Duke University Press, 2001), 11, 282.

with federal relief, but as Arthur M. Schlesinger, Jr. wrote, “the CCC left its monuments in the preservation and purification of the land, the water, the forests, and the young men of America.”⁴³⁵ The CCC perpetuated the idea discussed in Chapter 3: managing the environment was the purview of men. It also expanded that philosophy to include the idea that boys became more masculine when they conquered the whims of nature. These tropes are obvious in the photographs that portray young men looking fit and healthy, while physically dominating the natural world around them.

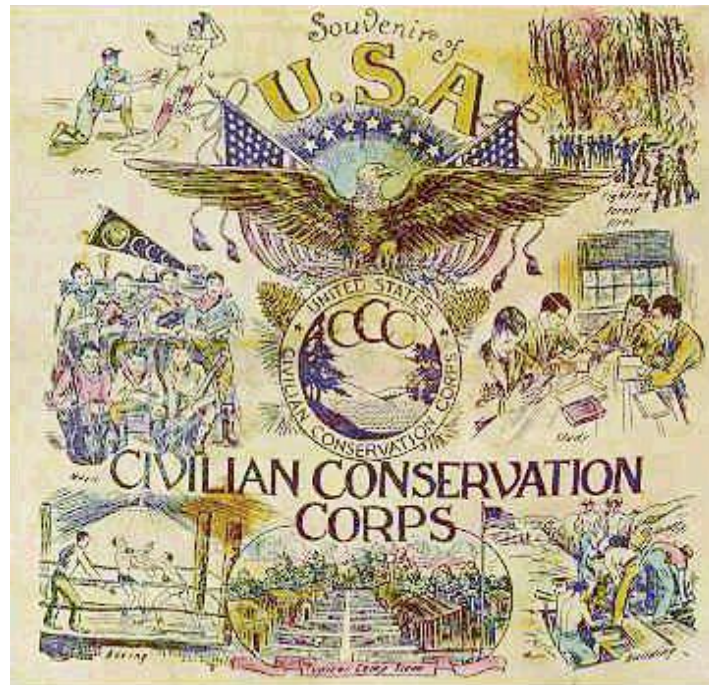


CCC Workers

[http://popista.com/civilian-conservation-corps/ccc-logo-green-\[converted\]/45771](http://popista.com/civilian-conservation-corps/ccc-logo-green-[converted]/45771)

Accessed March 17, 2016

⁴³⁵ Arthur Schlesinger, Jr., *The Age of Roosevelt: Vol. II* (Boston: Houghton Mifflin, 1959), 340, as found in Salmond, op. cit., 222.



CCC Pillowcase on display at the Michigan CCC Museum, en.wikipedia.com , Accessed July 10, 2016.



CCC Recruiting Poster, www.pinterest.com ,
Accessed March 16, 2016



CCC Recruiting Poster, www.humanities.org ,
Accessed March 16, 2016

Mexico did not have an entity comparable to the CCC, but many of FDR's and President Lázaro Cárdenas' policies regarding forestry conservation and parks were quite similar. Cárdenas, like FDR, was committed to forestry conservation and believed that setting aside forested areas as parks would have cultural benefits as well as protecting agricultural development. As Emily Wakild has shown, Mexican conservation policies during the 1930s emerged as a plan that "rather than segregate nature to distant rural landscapes and culture to the domain of cities, parks formed a special part of the far-reaching tapestry of development designed to harness nature's bounty and elevate humanity to its highest level." Areas with fragile environments or distinctive beauty would be set aside as national parks where citizens could not only commune with nature, but also celebrate the grandeur of the nation. In the first decade of the twentieth century, the *Tribus de Exploradores* formed in Mexico, modeled after the Boy Scout organizations in the U.S. and Great Britain. These young men from elite families and mentored by older males, learned about nature, science, and discipline, had their own troop flags, earned merit badges, and practiced survival skills while camping in the forests. By 1939, nearly 12,000 boys were members of the *Tribus de Exploradores*. By 1940, there were more national parks in Mexico than in any other nation.⁴³⁶ However, Andrew S. Mathews' study of Oaxaca demonstrates that the Forestry Department simply was not large enough to protect all the forests in Mexico. When Cárdenas visited Oaxaca in 1937 he exhorted school teachers to involve rural people in tree protection projects. As Mathews frames it, there were not enough officials in place to enforce forestry laws, and the government had to enlist the aid of the indigenous people and municipalities.⁴³⁷ Although conservation was popular in both nations, as was the development of young men through teaching them about nature, the Mexican government did not follow the

⁴³⁶ Wakild, 3-4, 60.

⁴³⁷ Mathews, 95-96.

same path as the U.S. by creating a national agency like the CCC. However, in both nations conservation enlisted the popular support of citizens and became a symbol of nationalism.

Race, Citizenship, and Labor in the CCC during Rectification

The CCC provided supplemental labor for the USBR, the Soil Conservation Service (SCS), and public park work associated with the Rectification Project. The racial makeup of every CCC unit was carefully recorded, as either (W) for “White” or (C) for “Colored” meaning, at that time, Negro. There was no racial or other distinction made for Hispanics. Mexican Americans served in units labeled (W) alongside Anglos and were not consigned to segregated units, making it impossible to determine their numbers in the absence of detailed personnel records. It is clear that Hispanic men worked on the USBR projects associated with rectification because camp inspection reports note that units serving in Texas and New Mexico had visiting Catholic priests and “Spanish” dishes on menus.⁴³⁸ In August of 1933, CCC Company 855, Camp E-69, 168 men (W), and 13 men (C), all of whom enrolled in Texas, arrived at Fort Bliss.⁴³⁹ Company 856, Camp E-69, 178 men (W), and 22 men (C), 188 enrolled in Texas and 12 in New Mexico, came to Fort Bliss in 1934. These units performed work in support of the Army at Fort Bliss and in Doña Ana County, including beautification work on the post and road

⁴³⁸ There are no personnel records with enrollee names in the CCC records in the National Archives in College Park. They may be accessible elsewhere, but when I checked in order to obtain them I needed social security numbers to request this specific information. “Spanish” dishes included Spanish spaghetti, Spanish sauce, and Spanish stew. Colored unit menus included grits, collard greens, and cornbread. Evidently cooks attempted to suit the palates of their diners by providing regionally specific dishes.

⁴³⁹ Note: CCC units had assigned federal camp numbers based on the type of work conducted and under whose jurisdiction. Units assigned to New Mexico and west Texas started training at Fort Bliss, then the records list camp locations as the local name of the company and specify the distance from the nearest railhead. E or EWC = Emergency Work Corps, DBR or BR = Bureau of Reclamation, SCS = Soil Conservation Service, SP = State Park, CP = County Park, P = Post (Army Post). Camp designations changed over time as EWC was dropped or the specific mission of a camp changed. Station and Strength Reports, Records of the CCC, NARA, College Park, RG 35 Entry 108, Box 1.

building on the military range.⁴⁴⁰ Company 1854, 201 men (W), and 14 men (C), all enrolled in Texas, began work for the USBR in July 1934 at Camp BR-4 near Ysleta. CCC Director Fechner ordered that all units must be racially segregated in September 1934, and supervised by “White” officers.⁴⁴¹ By 1935, all 249 men in Company 1854 were “White” and all from Texas. Camp Inspection and Station and Strength Reports do not indicate how many of these enrollees were from the El Paso or the west Texas area, but during 1935 an average of 14 men worked as LEMs alongside Company 1854 each month.⁴⁴² After 1935, LEMs only appear sporadically in the records.

Company 2872 (C), men from east Texas, took over the work at Camp BR-4 in 1937. Company 2873 (C) began working at Ascarate Park in El Paso in 1938. Locals complained at first about the African American workers, but a camp inspector wrote in 1939, “El Paso is not Negro conscious. Residents are more accustomed to Mexican peons for the same racial level,” meaning that in El Paso the racial hierarchy placed white non-Hispanics at the top, and the poorest ethnic Mexicans at the bottom. By using the word “peon” it is difficult to tell if the author was conflating Mexican Americans with peasants who were citizens of Mexico. He went on to write, “The colored enrollees...would probably feel the same way with regard to Mexicans,” insinuating that everyone saw “Mexicans” as the lowest racial classification. It is unknown what the African American enrollees actually thought, but camp inspection reports also note that these men frequently went into Juárez to play baseball against Mexican teams. Juárez was also a popular destination for other reasons, as camp doctors lamented that close proximity

⁴⁴⁰ In 1935, Unit 855 moved to BR-8 to work on projects associated with Elephant Butte, and 856 changed to Unit 2872 Army-3. In 1936, Ft. Bliss added Unit 2873 to conduct work in the Doña Ana Target Range, and both units were Colored. Station and Strength Reports, Records of the CCC, NARA, College Park, RG 35 Entry 108, Box 2.

⁴⁴¹ Salmond, 96. Although the designation “White” did not rule out Hispanics, no men with Hispanic surnames served as camp superintendents in the camps examined for this study.

⁴⁴² Records of the Division of Investigations, Camp Inspection Reports, Records of the Civilian Conservation Corps, NARA, College Park, RG 35.3.4 Entry 115, Box 205, Folder BR-4, 1935-1941.

to Mexico only increased visits to prostitutes and the high incidence of venereal diseases among all of the enrollees.⁴⁴³

Hispanics may have served in white units, leading to the assumption that this was a slightly more egalitarian microcosm within a segregated society, but their social status is reflected in other ways. Local Experienced Men (LEMs) worked with the CCC units along the river. The LEMs were not counted in the CCC Strength and Station Reports, but many of the Camp Inspection Reports listed “technical supervisors, not enrolled men” by name. These positions included the Project Superintendent, Foremen, Junior Foremen, Mechanics, Machine Operators, Tractor Operators, Tool Sharpeners, and Clerk-Typists. Although the CCC paid these men, they were hired by the particular agency in charge of the specific project; for example, Soil Conservation Service (SCS) under the USDA would hire the Project Supervisor for soil conservation work. The Project Superintendent planned and oversaw the entire project. The various Foremen directly supervised the enrollees while at work. Supervisors and Foremen had to have a college degree and at least three years of technical experience. To work as a mechanic, or in the other positions noted above, a man had to have prior experience. If the agency in charge could not fill a position, a local man could be hired at the prevailing rate of pay in that locality.⁴⁴⁴ The higher-level jobs paid very well; for example the Project Superintendents received an annual salary of \$2,400. The pay for some positions steadily increased over time. Foremen positions had an annual salary of \$1,800 in 1938, rising as high as \$2,100 by 1941. Mechanics made \$125 per month in 1938, for an annual salary of \$1,500, but that salary had not increased in 1941. There is no racial category noted in these reports, but the available documents for camps in El Paso list only four men with Hispanic surnames in 1938: Roberto M. Tercero,

⁴⁴³ Records of the Division of Investigations, Camp Inspection Reports, Records of the Civilian Conservation Corps, NARA, College Park, RG 35.3.4, Entry 115, Box 205, Folders CP-1 and BR-4, 1935-1941.

⁴⁴⁴ Harper, 57, 63-67.

Form Carpenter Helper; Franklyn F. Flores, Office Helper; Jose G. Marquez, Machine Operator Helper; Ernesto A. Lopez, Concrete Finisher Helper. The pay for these positions was \$70 per month. No men with Hispanic surnames are listed for the highest paid jobs. Due to the scarcity of records for each camp and every year it is impossible to conclusively state that Anglos held the majority of these positions, but the documents are highly suggestive.⁴⁴⁵ As seen above in the hiring practices of the USIBC, Anglos received the majority of work that either required an education or skilled labor, illustrating the lower socio-economic position of Hispanics in the U.S. at that time.

The USBR, the CCC, and Associated Rio Grande Rectification Projects

As mentioned previously, the U.S. Reclamation Service built and maintained Elephant Butte Dam and Reservoir and was responsible for delivering water from that point downstream to users in New Mexico and the El Paso/Juárez Valley. When the agency became the U.S. Bureau of Reclamation (USBR) in 1923 that responsibility continued. The USIBC was in charge of rectification, which included the El Paso/Juárez Valley and upstream into parts of the Mesilla Valley. While rectification was in progress, the USBR continued their own work, but also had to take on some new projects on the U.S. side of the river because of the changes to canals and other water delivery systems caused by the relocation of the river channel. Whenever possible, the USBR used CCC labor. The records indicate this helped the agency adhere to its budget by keeping labor costs low. Additionally, the CCC units frequently provided their own tools and machinery, another cost-saving factor. The Soil Conservation Service (SCS), the National Park

⁴⁴⁵ Records of the Division of Investigations, Camp Inspection Reports, Records of the Civilian Conservation Corps, NARA, College Park, RG 35.3.4, Entry 115, Box 205, Folders CP-1 and BR-4, 1935-1941.

Service, and the Forestry Service also used the CCC to complete projects. Because the federal government was already funding the CCC, these agencies utilized that source of labor rather than petitioning for larger budgets.

The CCC established Camp DBR-4 at Ysleta in August 1934 and Unit 1854 started work there September 27, 1934. The unit was a Junior Mixed group, with 237 men (W), and 11 men (C). The camp designation changed in 1935 to Camp BR-4 and, because units in the CCC were segregated by then, the unit consisted of 193 men (W), all from Texas. Camp BR-4 worked all during 1935 on USBR projects, placing concrete core walls in canal and lateral banks as a method to prevent breaks by gophers, cleaned and grubbed willows, built 5 masonry dams in the Five Mile Arroyo near Fabens as flood protection and practically completed building the Ysleta Bureau headquarters. Late in December this camp was making preparations to provide adequate bank protection below the Tornillo Canal checks (small dams designed to “check,” meaning slow down, water flow rates to prevent erosion).⁴⁴⁶ In 1936, Camp BR-4, 169 Juniors (W) from Texas, began work on the Vinton cutoff lateral, bringing in fill by trucks and using bulldozers to push surface material into banks, doing the final shaping by hand. The CCC added concrete lining to canals, checks, and turnouts (concrete or pipe structures that divert water from the main canal into smaller irrigation ditches), screw gates (also called sluice gates or stop gates, these can be raised or lowered by a system of large screws and are designed to control flow rates), and road culverts to complete this project in 1937. The CCC also continued bank protection work below Tornillo by extending the concrete lining along the bank, completing that work in February of 1937. By then enrollment in unit 1854 had dropped to 141 Juniors. Later that year, Unit 2872 moved to Camp BR-4, this unit consisted of 145 men (C), 142 from Texas, 1 from Arizona, and

⁴⁴⁶ Project Histories, Feature Histories, and Reports, Records of the Bureau of Reclamation, NARA, Denver, RG 115 FY 10, Box 467, 1935 Project History, Vol. 26, page 52.

2 from Oklahoma. The CCC extended the Riverside Canal checks, constructed and surfaced operating roads, and leveled old levees that had been abandoned due to rectification. They fenced all drain siphons after a man was caught in the suction and drowned. Camp BR-4 also conducted experimental work to eradicate noxious weeds, especially bindweed, by applying altacide, which turned out to only have a 25% kill rate.⁴⁴⁷ After that, the men applied old crankcase oil collected from gas stations in El Paso and diluted it with diesel fuel. This was not wholly effective either, but worked better than the altacide. They also scattered brome grass and strawberry clover seed on the banks to prevent erosion, and the brome grass seed worked quite well. Crews also engaged in experimental rodent control to prevent leakage caused by burrowing, trapping 6,716 gophers on 12,240 acres, and during the winter they inserted poisoned carrots on 16,900 acres, killing approximately 15,000 gophers.⁴⁴⁸ The obsession with actually counting the number of gophers killed or trapped illustrates the influence of science on conservation at this time, as the government wanted data on the effectiveness of the CCC's experimental work.⁴⁴⁹

While all of these USBR projects proceeded in the valley from 1934-1937, other CCC projects also took place. Throughout 1935, the residents of Fabens wrote letters and sent

⁴⁴⁷ Bindweed (*Convolvulus*), also known as field bindweed, is a member of the morning glory family (*Convolvulaceae*). It is a perennial weed that spreads by seed, and has an extensive root system that can grow as much as 30 feet deep. Altacide is the proprietary name for an herbicide that contains sodium chlorate. Applied by spraying, it kills perennial weeds by translocating to the roots and is a temporary soil sterilant. It is inexpensive, but saline soils require a high dosage. In areas of low rainfall the chemical may not penetrate deeply enough to kill roots. Nitrate concentrations also inhibit effectiveness, and in dry soil nitrates accumulate in the lower part of moist soil, especially around dormant roots. It came into use to control weeds in non-agricultural areas in the early 1930s. Alden S. Crafts and William Harvey, "Weed Control by Soil Sterilization," (Davis, CA.: California Agricultural Experimental Station, Experimental Service, Circular 446, April 1955), 10.

⁴⁴⁸ Project Histories, Feature Histories, and Reports, Records of the Bureau of Reclamation, NARA, Denver, RG 115 FY 10, Box 467, 1935 Project History, Vol. 26, 43-47; Station and Strength Reports, Records of the CCC, NARA, College Park, RG 35 Entry 108, Boxes 2 and 3.

⁴⁴⁹ During the 1930s, the Texas Game and Fish Commission was hard at work eliminating predatory and noxious animals. The Commission set out traps and poisoned bait, and paid individuals for trapping predators, such as coyotes, bobcats, and "Mexican" lions. One farmer wrote to the Commission to report he had discovered the best method for eliminating turtles from ponds – shooting them with a long bore rifle. Placed in this context, the massive kill-off of gophers does not look so odd. Administrative Files, 1928-1963, Correspondence, Texas, 1928-1963, Texas Game and Fish Commission, RG TPWD I.06, Box 1996/102-12, Texas State Archives, Austin, Texas.

telegrams to their federal representatives and heads of various agencies to request flood control work at the San Felipe Arroyo. Fabens is built at the delta formed by the arroyo. The delta is comprised of very sandy soil and the arroyo is sand-clay and gravelly clay loam about 13 feet deep overlaid with sand. Cattle ranching, along with some irrigated farming, had originally been the main economic activity in the Fabens area, and ranchers built numerous earthen dams to impound water. Although poorly constructed, they had been sufficiently maintained to prevent major flooding and had allowed the town of Fabens to grow. Drought cycles eventually drove the cattle ranchers away, most likely due to over-grazing, and from 1920 to 1935 failure to maintain the dams caused destructive flooding. A letter dated April 29, 1935, from Fabens residents to H.H. Bennett, Director, Soil Erosion Service, USDA, and copied to R.E. Thomason, U.S. Congressional Representative for El Paso County, reported the area had suffered serious flood damage in 1923, 1925, 1929, 1930, and 1931. The flood of 1925 had been so bad that two to five feet of water covered three-quarters of the town, which had 2,000 residents by then. Studies by the USIBC and the El Paso County Reclamation Service concluded that flood flows were 25% soil and that from 75,000 to 150,000 cubic yards of soil clogged irrigation systems during every flood. Flooding also impacted the city water works, railroads, highways, park, and the golf course.⁴⁵⁰

At first, El Paso County Commissioners thought the only way to get a CCC unit to do the necessary work to stop the flooding was to buy the necessary land and declare it a park. The flooding problems at Fabens were neither caused by rectification, nor would that project solve the problems caused by flows down the arroyo, so the USIBC could not help. The USBR's

⁴⁵⁰ Records of the Soil Conservation Service, Central Files, Sept. 1933-Oct. 1935, NARA College Park, RG 114 Records of the Natural Resources Conservation Service, Department of Agriculture, Entry 1, Box 242, Folder 290, Texas, El Paso County; Project Application Section Inspection Reports, 1934-1939, Records of the National Park Service, RG 79 Entry P117, Box 3, Folder Texas Deeds and Escrow.

mandate was to control the amount of water the river provided for irrigation, not to stop the water flowing into it at Fabens. The commissioners tried the option of going to the National Park Service to get a CCC unit instead. The National Park Service inspected the San Felipe Arroyo on May 17, 1935, and denied the petition, stating the necessary work required soil conservation and the area did not meet the necessary criteria to establish a park, mainly because it could not serve as a wildlife refuge. Department of the Interior engineers inspected the arroyo and delta on May 30 and 31, 1935, and B.P. Fleming wrote to the El Paso Commissioners Court on June 5, agreeing that soil conservation work was necessary and basing the request on that option, rather than establishing a park, had merit. He added that adjacent land would have to be protected from over-grazing and vegetation should be planted to hold soil in place. The study found that in spite of the fact so much topsoil had washed away, there were still patches of tobosa and other grasses as well as mesquite, indicating that the watershed had supported dense vegetation in the past. Fleming informed the court that it was too late in the fiscal year to assign a CCC camp to the work, but the court should begin forging the cooperative agreements between individuals, organizations, and political units with the Soil Conservation Service as soon as possible. He urged the court to obtain a site for a CCC camp to expedite approval.⁴⁵¹

Louis J. Ivey, El Paso County Commissioner, traveled to Washington D.C. in August, 1935, to meet with C.B. Manifold, Director, Soil Conservation Service, USDA, to discuss the necessary agreements. On October 17, 1935, Senator Tom Connally urged W.C. Lowdermilk, Associate Chief, Soil Conservation Service, USDA, to assign a camp to Fabens. Lowdermilk replied all units were already allocated, but Fabens would get first consideration in the new fiscal

⁴⁵¹ Records of the Soil Conservation Service, Central Files, Sept. 1933-Oct. 1935, NARA College Park, RG 114 Records of the Natural Resources Conservation Service, Department of Agriculture, Entry 1, Box 242, Folder 290, Texas, El Paso County; Project Application Section Inspection Reports, 1934-1939, Records of the National Park Service, RG 79 Entry P117, Box 3, Folder Texas Deeds and Escrow.

year. Louis J. Ivey, El Paso County Commissioner and J.W. Carter, County Engineer, kept up the political pressure, writing to Senator Morris Sheppard at the end of 1935, informing him that El Paso County had spent \$15,000 in 1930 to dig a ditch from a point in the arroyo to the Rio Grande to channel floodwater into the river, but this was only a temporary solution. During a two-hour rainfall in the autumn of 1930 approximately 10 million cubic feet of water ran down the arroyo carrying 90,000 cubic yards of soil. Carter recommended building a dam at the mouth of San Felipe Canyon, a series of check dams down the arroyo to the river to increase the grade, and constructing approximately 6,000 feet of rip-rapped ditch (loose stones piled up the sides and along the bottom of a ditch to prevent soil movement; the uneven surface also slows water flow). Unfortunately, the county could not afford this construction. Ivey added in the letter that Fleming's and Carter's recommendations would provide ample work for a CCC unit and that the recently completed highway in the area would make blue limestone and granite available within a distance of six miles.⁴⁵² In 1936, the U.S. Congress approved sending a unit of the CCC to Fabens to establish Camp SCS-40 for work on flood control and soil conservation projects. Congress allocated the funding for the project, but El Paso County Commissioners had to agree to use county funds to build a camp for the CCC.⁴⁵³ The commissioners also agreed to "fencing the San Felipe drainage area, providing a dragline operator, renting or purchasing all land involved to keep the area out of grazing for at least five years, and maintenance of the arroyo dams."⁴⁵⁴

⁴⁵² Records of the Soil Conservation Service, Central Files, Sept. 1933-Oct. 1935, NARA, College Park, RG 114 Records of the Natural Resources Conservation Service, Department of Agriculture, Entry 1, Box 242, Folder 290, Texas, El Paso County.

⁴⁵³ "Change Status of River Work," *El Paso Times*, 16 February, 1936; "Fabens to Get Erosion Camp," *El Paso Times*, 28 February, 1936; "Caballo Bids Expected Soon," *El Paso Times*, 4 March, 1936.

⁴⁵⁴ Louis Ivey, Jr., "Louis Joseph Ivey: Biographical Sketch and Research;" "Fabens CCC Terms Okayed," Un-sourced newspaper clipping, Arthur and Louis J. Ivey papers, Southwest Collection, Special Collections Library, Texas Tech University, Lubbock, Texas; Joanne Kropp and John A. Peterson, "Rio Vista Farms: Archaeological Testing for Sewer Line Construction," Texas Antiquities Permit Number 1796, Cultural and Environmental

CCC Unit 859, 145 men (W) from Texas, enrolled at Fort Sam Houston in San Antonio, came to El Paso on April 1, 1936, and lived at first at the 14 acre County Poor Farm at 800 Rio Vista Road in Socorro. In 1915, the county erected a main building, a house for the superintendent, a barn, and a washhouse at the County Poor Farm. From 1916 to 1929 John O'Shea had operated the County Poor Farm, which was adjacent to his property, and his wife Agnes supervised the residents. When he died in 1929, Agnes and her daughter Helen O'Shea Keleher took over. The facility was primarily a haven for the elderly with no means of support until 1929, when the county enlarged the main house to accommodate transients. In 1935, the Texas Transient Bureau began adding more buildings until WPA workers and CCC unit 1854 from Camp BR-4 took over construction, adding a total of 19 additional dormitories. The El Paso County Commissioners agreed to meet the Army specifications for CCC camps, including adding any partitions needed to accommodate officers' and technicians' quarters at Rio Vista as a temporary camp for the SCS-40 CCC unit they had been promised. The CCC Commanding Officer at Fort Bliss approved the temporary housing and the plans the commissioners submitted to build a permanent tent camp at Fabens within 60 days, including a mess hall and infirmary. The county would retain ownership of the land and "loan" the tents, cots, bedding, and cooking utensils to the War Department. By 1936 the Poor Farm housed transient workers, indigent families, and, starting in April 1936, CCC Unit 889 (W). In September, the Army committed to having the CCC fund and build a permanent camp. When CCC Unit 889 moved to that camp at Fabens later in 1936, the El Paso County Commissioners Court asked Helen O'Shea Keleher if she would begin caring for abandoned or neglected children at the enlarged County Poor Farm, which she did. When interviewed in 1984, she spoke quite poignantly about the terrible state of

the children she took in, especially the stick-thin “Spanish-American” children she compared to photographs of famine victims in Africa.⁴⁵⁵

The soil conservation work began May 4, 1936, and by the end of September, the CCC had built one large and two small dams in the San Felipe Arroyo basin, several terraces, and applied grass seed to prevent erosion, with four more dams planned.⁴⁵⁶ In addition to the conservation work, the CCC built a dam across the San Felipe arroyo where there is a small stream, creating a lake in what is now San Felipe Park.⁴⁵⁷ The camp closed on October 31, 1937, when all work had been completed.⁴⁵⁸ Interestingly, the work of the CCC in the Lower Valley at El Paso did not necessarily make a great impression on all local residents at the time. Harvey Hilley, a Socorro resident who lived near the County Poor Farm at Rio Vista, recalled that the CCC in 1936 “did a lot of bridge work and stuff like that. Bridges and culverts and things of that nature.” The CCC work that Hilley remembered above everything else was “there used to be a lot of gophers and they would come out and send up a crew to trap gophers so the water

⁴⁵⁵ El Paso County Commissioners Court Papers, C. L. Sonnichsen Special Collections Dept., The University of Texas at El Paso Library, MS 132, Box 5, Folder 3/13/36; “Camp Location to Be Chosen,” *El Paso Times*, 7 Feb., 1936 and 3 Mar. 1936; Joanne Kropp and John A. Peterson, “Rio Vista Farms: Archaeological Testing for Sewer Line Construction,” Texas Antiquities Permit Number 1796 (The University of Texas at El Paso: Cultural and Environmental Assessment Group, Institute for Policy and Economic Development, May 28, 2002), 5-6; Interview with Helen O’Shea Keleher by Rosemary Stoelzel, July 31, 1984, “Interview no. 659,” (Institute of Oral History, The University of Texas at El Paso), 18; Interview with Helen O’Shea Keleher, September 12, 1978, “Interview no. 766,” (Institute of Oral History, The University of Texas at El Paso), 13-14; Letter Percy McGhee, Architect, to J. Paul Henderson, Director, P.W.A., El Paso, Texas, August 14, 1936, El Paso County Commissioners Court Papers, The University of Texas at El Paso Library, MS 132, Box 5, Folder 8/17/36; Letter S.R. Goodwin, Captain, 7th Cavalry to County Judge Joseph McGill, September 24, 1936, El Paso County Commissioners Court Papers, The University of Texas at El Paso Library, MS 132, Box 5, Folder 9/29/36.

⁴⁵⁶ El Paso County Commissioners Court Papers, C. L. Sonnichsen Special Collections Dept., The University of Texas at El Paso Library, MS 132, Box 5, Folder 9/29/36.

⁴⁵⁷ Note: The specifications for this dam are archived in the Texas State Archives, Austin, Texas, but due to Homeland Security restrictions are not available to the public.

⁴⁵⁸ Records Relating to Camps, 1934-1942, Camp Occupancy, Natural Resources Conservation Service, Records of the Soil Conservation Service, RG 114 Entry P-D, Container No. 4.

wouldn't rise up the canal banks [because]...anytime you have ditches you have a gopher problem.”⁴⁵⁹

⁴⁵⁹ Gopher tunneling causes ditches and laterals to leak and wastes water. Interview with Harvey Hilley by Carrie Crise, November 23, 1998, “Interview no. 930,” (Institute of Oral History, The University of Texas at El Paso), 9-10.

The Rectification Project's changes to the river's location and CCC labor allowed El Paso County to obtain other amenities unaffordable otherwise. A County Commissioners Court resolution on January 23, 1936, asked the State Department to convey parcel No. 1, adjacent to Washington Park and acquired from Mexico under the rectification treaty, to the county and the Secretary of State transferred the deed on August 26, 1936. A second resolution on December 14, 1936, requested that the Secretary of State convey to the county parcel No. 3, a tract situated between the rectification right-of-way and the old river channel and named locally Ascarate Park or the Metropolitan County Park. The county held a special election and residents approved a \$150,000 bond issue to improve the park. The State Department transferred the deed on October 11, 1937.⁴⁶⁰ On June 25, 1938, the National Park Service established camp CP-1, CCC Junior Unit 2873 (C), 133 men, 30 from Arizona, 13 from Colorado, 1 from New Mexico, 88 from Texas, and 1 from Wyoming, and they began work at Ascarate Park on July 1.⁴⁶¹ The 460 acre park is bordered by the Franklin Canal to the north and east and the Rio Grande to the south. The CCC planted trees, built a 48 acre lake, roads, and support buildings, erected fencing around the entire park, and started construction of a golf course, completed after 1942.⁴⁶²

The USBR began work on Caballo Dam in July of 1936. USBR forces built an office, a laboratory, a shop and garage, three one-room houses, as well as six residences for the engineering personnel stationed at the site. They also installed plumbing, sewers, telephone lines and electrical systems. The USBR awarded the contract work to Mittry Brothers, Los Angeles, California on May 2, 1936, for \$957,018.00. Mittry Brothers built residences to house 200

⁴⁶⁰ Semi-Annual Progress Reports on Construction Projects, Jan. 1 – June 30, 1937, July 1 – Dec. 31, 1937, IWBC Subject Files, Records of the IWBC, NARA, Ft. Worth, RG 76 GR 5, Box 34, Folder G 8.5.

⁴⁶¹ Station and Strength Reports, Records of the CCC, NARA, College Park, RG 35 Entry 108, Box 1.

⁴⁶² Currently, the lake is kept full using wells and pumps to supply groundwater. In March, 2015, El Paso County and the El Paso County Water Improvement District No. 1 began discussions to study the feasibility of lining the portion of the Franklin Canal near Ascarate Park and connecting the canal to the lake. Records of the Division of Investigations, Camp Inspection Reports, Records of the Civilian Conservation Corps, NARA, College Park, RG 35.3.4, Entry 115, Box 205, Folder CP-1, 1935-1941.

laborers, and by the end of the year had constructed a concrete-lined tunnel to divert the river so the dam could be built as well as excavated a spillway and spillway outlet, completing about 18% of the contracted work. The USBR employed 45 men and the contractor 86. Total cost by the end of December was \$300,023.45, of which \$113,756.82 went to the contractor. By the end of June 1937, the concrete-lined tunnels, outlet works, Percha Arroyo diversion dam and canal were almost complete and work had started on the main dam and spillway. The project had employed 187 men, 145 working for the contractor and 45 USBR personnel, and had cost \$659,905.59.⁴⁶³

Camp BR-39 at Las Cruces, CCC Unit 3829 (W), established August 14, 1935, worked on levees, drains, and cutoffs in the Mesilla Valley as part of USBR projects. Camps BR-8, CCC Unit 855 (W), established October 11, 1934, and BR-54, CCC Unit 3830 (W), established August 14, 1935, worked in the vicinity of Elephant Butte Dam. Their primary missions were to build recreational facilities for the public and improve the USBR facilities at the reservoir that monitored water storage. Camp BR-54 was temporarily disbanded in 1936, was then reconstituted in October of 1936, and throughout 1937 continued landscaping work in recreational areas, as well as clearing land for a nursery to provide shrubs, vines, and other plants for beautification. Camp BR-8 built roads, widened and relocated culverts to improve drainage, did landscaping, and continued work on USBR facilities. On September 1, 1937, the Department of the Interior, the USBR, the Department of Commerce, and the Bureau of Fisheries, agreed to build a fish hatchery below Elephant Butte Dam, contingent upon the agreement of the involved water users associations. In early September of 1937, the Elephant Butte Irrigation District and the El Paso County Improvement District No. 1 agreed. The districts would not fund the project,

⁴⁶³ Semi-Annual Progress Reports on Construction Projects, Jan. 1-June 30, 1937, July 1-Dec. 31, 1937, IBWC Subject Files, Records of the IBWC, NARA, Ft. Worth, RG 76 GR 5, Folder G 8.5.

but would provide electricity and the water to run the hatchery at no charge. Daniel C. Roper, Secretary of Commerce, notified the Secretary of the Interior that his agency approved the Memorandum of Agreement between the federal agencies, which stated that the USBR would donate the land purchased by the government, and supervise Camp BR-8, which would build the hatchery. About half of the ponds were operational in early 1938, and the Bureau of Fisheries began running the hatchery and releasing fish into the Elephant Butte and Caballo reservoirs and downstream into canals.⁴⁶⁴ This CCC work discussed above illustrates the overlap in intergovernmental agreements. The USBR would not normally supervise parks and a fish hatchery, but because they were already in charge of Elephant Butte Dam and Reservoir and had available, in-place CCC labor, this seemed to be the most efficient solution.

The El Paso County Water Improvement District adopted a resolution in March of 1936 to request that the federal government establish a hydro-electric power plant at Caballo Dam. A March 4, 1936, editorial in the *El Paso Times* urged everyone in the district to sign the petition representatives would send to Washington, D.C. The paper reported on May 2, 1937, that L.R. Fiock, Superintendant of the Rio Grande Federal Irrigation Project, N.B. Phillips, Manager, Elephant Butte Irrigation District, and Roland Harwell, Manager El Paso County Water Improvement District, had returned from Washington, D.C. with a proposal from John C. Page, Commissioner, USBR. Page suggested that the Water Districts trade their \$2,900,000 construction debt for building Elephant Butte back to the federal government in exchange for the Bureau building a hydro-electric facility at the dam. The districts would have to relinquish their privileges to build their own hydro-electric power plant, and the Bureau would have exclusive

⁴⁶⁴ Official Motions of the Elephant Butte Water District and El Paso County Water Improvement District 9/3/1937; D.C. Roper to Ickes 9/14/1937, Bureau of Reclamation Project Correspondence File, 1930-1945, Rio Grande Basin – Rio Grande Rectification 301-4-223, NARA Denver, RG 115 FY 13, Entry 7, Box 945, Folder 131 – Rio Grande – Rectification – Fish Conservation; Bureau of Reclamation Project Histories, Feature Histories, and Reports, NARA, Denver, RG 115 FY 10, Entry 10, Box 467, Vol. 27, pages 47-50.

control of the dam for 25 years, at which point Congress would determine who controlled the dam and the power it generated.⁴⁶⁵

Meanwhile, the USBR continued to supervise the work performed by Mittry Brothers at Caballo Dam during 1937. By the end of the year, work had begun on the main dam, as workers excavated and added rock fill and rip-rapping. For the reservoir, workers removed timber and brush on 1,500 acres, and later used the timber to build fencing for sheep pasturage.⁴⁶⁶ An average of 255 men worked at the site, 189 for the contractor and 66 for the USBR.⁴⁶⁷ The USBR also supervised CCC Camp BR-39 at Las Cruces, where the men installed 2 wasteways, two lateral headings, cleaned 222,819 S.Y. (square yards) of canal and lateral channels, installed 40 turnouts and 3 stilling basins,⁴⁶⁸ cleared 8,058 S.Y. of brush from banks, erected 7.4 miles of sheep fencing along laterals, planted 549 trees, built 2 culverts, and applied poison to 4,709 S.Y. on lateral banks to kill weeds. The CCC unit built 102 miles of road on the canal, lateral, and drain banks, set 93,025 gopher traps that caught 15,753 gophers, and applied poison to 25,255 acres to eradicate them. They also completed work along the Anthony Arroyo, cleaning brush from 87,352 S.Y. of drain bank, installing 102 S.Y. of concrete lining along the east drain, and moved 9,000 S.Y. of earth to level drain banks.⁴⁶⁹

The scope of all of this work discussed above indicates that people all along the river were obtaining improvements due to federal funding. Thanks to the USBR, the SCS, and the

⁴⁶⁵ *El Paso Times*, 4 March, 1936, 2 May, 1937.

⁴⁶⁶ Property owners along the river and canals requested the fencing for sheep pasturage. The owners furnished the wire and other materials, and the CCC provided the labor. Bureau of Reclamation Project Histories, Feature Histories, and Reports, NARA, Denver, RG 115 FY 10, Entry 10, Box 467, Vol. 29, pages 35-36.

⁴⁶⁷ Semi-Annual Progress Reports on Construction Projects, July 1-Dec. 31, 1937, IBWC Subject Files, Records of the IBWC, NARA, Ft. Worth, RG 76 GR 5, Box 34, Folder G 8.5.

⁴⁶⁸ Stilling basins are necessary below wasteways, especially pipe wasteways, which concentrate and accelerate water flow. The basins dissipate the turbulence energy in these flows. Stilling basins can be plunge pools or other ponding areas. Adrian Laycock, *Irrigation Systems: Design, Planning, and Construction* (U.K.: Center for Agriculture and Biosciences International, March 2011), 153-154.

⁴⁶⁹ Project Histories, Feature Histories, and Reports, Records of the Bureau of Reclamation, NARA, Denver, RG 115 FY 10, Box 467, 1935 Project History, Vol. 28, 47-48.

CCC, El Paso got two parks, a soil conservation project, improved irrigation canals and drainage systems, and an enlarged facility to care for impoverished adults and children. On the Mexican side of the river, people obtained better irrigation turnouts, more modern diversion appurtenances, and drainage works that returned water to the river rather than saturating the ground. Due to the Rectification Project, from Caballo Dam in New Mexico down to Fort Quitman people benefitted from better flood control and improved irrigation works. However, although state and local officials as well as people living along the Rio Grande lobbied the federal government for irrigation and conservation projects, not everyone was pleased with the work performed under the Rectification Project. Both sectors of the IBC had to resolve multiple damage claims during the construction phase. The overlap between federal agencies conducting these projects also raised questions regarding the legality of agency jurisdictions.

In October and November of 1938, Leo L. Heisel, Attorney, began filing formal protests with the Department of the Interior regarding the distance between the levees in New Mexico below Caballo Dam to El Paso, even though most of this work fell under the auspices of the USIBC. Heisel worked in El Paso but owned 6.7 acres in the Mesilla Valley 1-1.5 miles west of Canutillo. In a letter to Harold Ickes, Secretary of the Interior, on October 3, 1938, that was copied to R.E. Thomason and J.J. Dempsey, Heisel's U.S. Congressional Representative from New Mexico, he stated that channeling the river between levees 600 ft. apart would cause serious weed problems. Heisel informed Ickes that in the area below Caballo Dam there had never been a flood large enough to require a river channel that wide. The levees at the time he wrote were 60-100 ft. apart, which Heisel claimed was wide enough. He went on to say that weeds "menaced" the lands in the valley, and weeds especially proliferated along the river. Heisel reminded Ickes that when the river was dry or low the increased space between the levees would

lead to an even larger weed bed and more seeds that the wind would carry to cultivated land. Heisel claimed the Vinton Canal cutoff was only 60 ft. wide with high banks and was working just fine. He protested the huge and unnecessary expenditure of money to buy more land to create a wider distance between levees, which would only increase the weed “menace.”⁴⁷⁰

E.K. Burlew, Acting Secretary of Interior, replied for Ickes, acknowledging receipt of Heisel’s concerns. Evidently Heisel was not satisfied with his answer, and wrote back to Burlew on October 11, 1938. Heisel conceded that he was no engineer, but claimed that as a property owner along the Rio Grande he certainly knew more about weeds than Burlew did. Heisel told Burlew he would continue to file complaints on the legal basis that any work above the boundary line should be supervised by the Interior Department and not the State Department. Heisel wrote again to H.W. Williams, Acting Commissioner, USBR on November 3, 1938, reiterating that the portion of the river he was writing about had no bearing on the border so the USIBC had no right to do the work, a subject he had already taken up with L.R. Fiock, Project Manager, USBR. Heisel also told Williams he had complained previously to Fiock about the distance between the levees. Fiock informed John C. Page, Commissioner, USBR, on November 19, 1938, that Heisel had indeed called him, did most of the talking, and would not allow Fiock to explain that the Vinton Canal cutoff was too small to handle anticipated floods. After the conversation Fiock sent engineers to re-survey the area and their conclusion was the plans already underway were necessary. Heisel wrote to Page on December 1, 1938, and sarcastically noted the USBR engineers could not dispute the fact that the levees were too far apart but that “I am closing my files for the present and will, in five years, call the Bureau’s attention to the menace of the 600 ft. channel on the Rio Grande River.” There is no further correspondence in the files, but Mr. Heisel

⁴⁷⁰ Heisel to Ickes 10/3/1938, Bureau of Reclamation Project Correspondence, File 1930-1945 Rio Grande Basin – Rio Grande Rectification 201.-500.1, NARA, Denver, RG 115 FY 13, Entry 7, Box 946 Folder 301 – RG Rect. – Engineering and Board Reports.

was correct that the wide levees did indeed increase weed proliferation, as will be discussed in Chapter Six.⁴⁷¹

Mittry Brothers completed Caballo Dam on September 19, 1938, for a final total of \$2,105,886.32. CCC Camp BR-39 continued their improvement work on distribution and drainage systems, as well as sheep fencing in New Mexico in 1938 and 1939. During 1939, CCC Camp BR-4 continued similar work in the Texas portion of the Mesilla Valley, including rebuilding the Texas Lateral and improving the Anthony Drain. The USIBC river canalization work was complete in that area by that time, and the CCC rebuilt the wasteway at the Vinton Cutoff Lateral to run directly into the river and reduce seepage. They also conducted bank protection work below the Franklin Canal checks, placing sand backfill and 442 SY of concrete lining. Due to the rectification changes at San Elizario Island, the old levee was no longer necessary and the CCC leveled it and cleared the laterals of brush and weeds with machinery. Rectification also meant that laterals had to be leveled and cleared at Tornillo. Rodent control continued, and the CCC trapped 16,621 gophers on 43,000 acres of the project and right-of-ways.⁴⁷²

On August 9, 1939, Fiock learned he would receive \$56,000 from a PWA allotment to fence the Franklin Canal. On September 8, Fiock sent a telegram to John C. Page asking for the funds to be transferred as soon as possible, reporting “Further drowning of a child Saturday in the Franklin Canal within city limits emphasizes the necessity for speed in constructing the

⁴⁷¹ Heisel to Burlew 10/11/1938, Heisel to H.W. Williams 11/3/1938, Fiock to Page 11/19/38, Heisel to Page 12/1/1939, Bureau of Reclamation Project Correspondence, File 1930-1945 Rio Grande Basin – Rio Grande Rectification 201.-500.1, NARA, Denver, RG 115 FY 13, Entry 7, Box 946 Folder 301 – RG Rect. – Engineering and Board Reports.

⁴⁷² Project Histories, Feature Histories, and Reports, Records of the Bureau of Reclamation, NARA, Denver, RG 115 FY 10, Box 467, 1935 Project History, Vol. 30,44-49.

fence. Press likely to become critical soon.”⁴⁷³ CCC Camp BR-4 conducted the preparatory work, removing the old metal fence, clearing and raising the banks, altering the gradient, building a stone masonry wall to support the new metal fence and to stop erosion. The erection of the metal fence was sublet to the Arro-Line Fence Company, which began that work on August 26, 1940. The company completed 6.52 miles of fence on both sides of the canal and 0.47 miles on one side only by December 13, 1940.⁴⁷⁴

In September of 1939, Fiock notified Page that the USBR’s February 2, 1939, contract with the El Paso County Water Improvement District No. 1 called for more proposed construction in the vicinity of the San Elizario Island section and near Fabens. He stated the preparatory work had reached the point that it was time to start “negotiations for the acquisition of necessary right-of-ways required for the project.” The Water District would select an appraiser, Fiock would pick one, and they would agree on a third. In December, Fiock explained the nature of the construction plans “which have been made more desirable and possible by the relocation of the river and a new channel on the international boundary line in connection with the Rio Grande Rectification Project of the International Boundary Commission.” The USBR connected the terminus of the Riverside canal near the upper end of the San Elizario Island to the head of the Tornillo Canal at Fabens, a distance of six miles, built facilities for the separation of irrigation and drain water to improve the water supply for the Tornillo section of the project, and a feeder canal from the proposed new canal extension to the Hansen Lateral on San Elizario Island, which diverts water directly from the old river channel. The riverbed in its old location had been the main carrier canal for the delivery of irrigation water to the Tornillo Canal, the last

⁴⁷³ H.W. Bashore to Fiock 8/9/1939, Fiock to Page 9/8/1939, Bureau of Reclamation Project Correspondence File 1930-1945 Rio Grande Project 430.-430, NARA, Denver, RG 115 FY 13, Entry 7, Box 934, Folder 430 Rio Grande – Acquisition of Land Jan 1930- Dec 1939.

⁴⁷⁴ Bureau of Reclamation Project Histories, Feature Histories, and Reports, NARA, Denver, RG 115 FY 10, Entry 10, Box 468 CY 1940, 39.

diversion on the Rio Grande Federal Irrigation Project, but it was meandering and circuitous in its course. Water for the entire lower end of the project was now diverted at the Riverside heading and carried in the Riverside Canal to the upper end of the San Elizario Island, and a new connection from that canal to the Tornillo Heading would be more direct and much shorter.⁴⁷⁵ This construction began late in December and carried over into 1940, and CCC Camp BR-4 assisted in the work.

Throughout 1940, Camp BR-4, CCC Unit 1854, continued improvement work on irrigation and drainage systems in the Texas portion of the Mesilla Valley and the El Paso Valley, conducting most of the work during January and February when there was no irrigation water in the canals and laterals. In addition to the work associated with the Franklin Canal discussed above, the CCC completed bank protection below three Franklin Canal checks by adding sand backfill and 870 S.Y. of concrete lining, and an additional 585 S.Y. of concrete lining outside one curve of the canal. They added 200 S.Y. of plain concrete lining to protect banks in the Salatral Lateral, and built five concrete checks in the lateral system using 82 C.Y. (cubic yards) of reinforced concrete.⁴⁷⁶ The workers also replaced timber lateral headings with concrete pipes equipped with screw lift gates. General improvement work along the river included replacing 70 additional timber turnouts with concrete pipes and screw lift gates, 34 of which were supplied by the Bureau of Reclamation and 36 by the individuals whose property was involved. El Paso County provided pipe so the CCC could replace three timber bridges that served as county road drain crossings with concrete pipe culverts. As part of the Riverside Canal Extension, the CCC brought in material to raise low sections of the canal banks and moved a

⁴⁷⁵ Fiock to Page, 9/29/1939, Fiock to Page, 12/21/1939, Correspondence File 1930-1945 Rio Grande Project 430.-430, Records of the Bureau of Reclamation, NARA, Denver, RG 115 FY 13, Entry 7, Bureau of Reclamation Project Box 934, Folder 430 Rio Grande – Acquisition of Land Jan 1930- Dec 1939.

⁴⁷⁶ The Salatral Lateral is an irrigation ditch in El Paso County located at NW 31.58° W106.20° in the 79836 zipcode. It is near the Morning Glory Manor Colonia, southeast of Clint.

portion of the old river levee to form a new, continuous canal bank. The CCC hauled 12,640 C.Y. of material by truck and moved 25,450 C.Y. by bulldozer to grade canals and lateral banks to be leveled and used as roads. A crew of 6-18 enrollees, under the supervision of the USBR's Biological Survey, killed gophers using poison, and trapped 6,695 gophers on 15,500 acres of land the Bureau controlled by right-of-ways. Camp BR-39 at Las Cruces, conducted similar work in the Mesilla Valley, and also worked on repairs to the Mesilla Diversion Dam.⁴⁷⁷

CCC work supervised by the USBR continued into the early 1940s, but by then the major construction was complete, as was the majority of the USIBC and the MXIBC work. There had been no breaks in the levees due to flooding, drains and canals were working better, and old-fashioned earthen and timber diversion dams and other appurtenances had been replaced with concrete. The Rio Grande no longer meandered at will, water delivery was assured as much as modern engineering could manage, and irrigation was as efficient as men could make it. But the river was no longer a natural formation in any way. From Caballo Dam to El Paso it runs between levees and into constructed canals. The river between the urban areas of El Paso and Juárez is now a sluggish trickle many times during the year because the water is diverted as close to the point where the Rio Grande becomes the international boundary as possible into canals on both sides of the Rio Grande. Thousands of man-hours and millions of dollars had been expended and the environment was forever altered. Jerry Mueller lamented in 1975 that "no one knows the total cost of the effort to establish and maintain the Rio Grande as a boundary during the past 125 years. The settlement of the Chamizal case in the 1960s alone cost the U.S. more than 43 million dollars."⁴⁷⁸ Expenditures continued after 1975 and are ongoing today. The positive benefits of the Rio Grande Rectification Project were flood control, some employment

⁴⁷⁷ Bureau of Reclamation Project Histories, Feature Histories, and Reports, NARA, Denver, RG 115 FY 10, Entry 10, Box 468 CY 1940, 43-45.

⁴⁷⁸ Mueller, 125.

during the Depression, a more reliable method for water delivery to the valley, and improved drainage. But the environmental impact was not all positive, as will be discussed in Chapter Six.

Chapter 6: The Constructed Rio Grande – Political and Environmental Impacts

The Rectification Project was one of many projects in the U.S. and Mexico to develop water resources during the 1930s. Due to the Depression, both nations recognized the necessity of agricultural development for economic as well as political reasons. Federal interest in conservation became an aspect of state formation, as governmental agencies continued to direct dam and irrigation projects. But development along the Rio Grande continued to spur interstate and international antagonisms over water apportionment because the Rio Grande does not always provide the same amount of water. Engineers measured the flow to determine water allocation in interstate compacts and international treaties, but when there is no rain or little snowpack the Rio Grande shrinks, and no amount of engineering or construction can change that fact. The Federal Reclamation Project that resulted in Elephant Butte Dam, and the Rectification Project's Caballo Dam, levees, and channel straightening had positive aspects, but could not completely override the dictates of nature. Population growth, increased irrigation, and altering the path and carrying capacity of the Rio Grande elevated salinity levels in the soil, the river, and the groundwater. Drought cycles and irrigation draw down the volume of water in the Rio Grande and limit recharging the Mesilla and Hueco Bolsons. Building levees and channels increased problems caused by noxious weeds, and reduced indigenous vegetation. Changes to plant life affected fish, birds, and mammals. Straightening the river led to more border enforcement because eliminating meanders made it easier for the Border Patrol in the U.S. to spot smugglers and illegal entries. Rectification also made it possible to erect fencing along the international boundary, which also impacted the environment. Rectification did accomplish the goal of flood control, but altering the

Rio Grande to achieve that result illustrates how societal desires to harness nature can have unexpected outcomes.

During the 1930s resource conservation and agricultural development became an important aspect of economic development. Presidents Franklin Delano Roosevelt and Lázaro Cárdenas were both conservationists and used the power of the state to further their goals to protect natural resources. But the two presidents differed quite a bit in their methods to support agricultural development. FDR supported efforts to improve conservation, which would make agricultural practices more efficient for people already involved in farming, ranching, and the forest industry. He also initiated subsidies to make commodities more profitable. Cárdenas wanted to expand the agricultural sector and engage more people in farming and pasturage activity, but decided to limit timber cutting and charcoal production in the forests of Mexico. To achieve more agricultural production, as well as social progress, Cárdenas advocated a return to the *ejido* system, community property holdings, in rural areas with pasturage for livestock, irrigation for crops, and forests that would protect irrigation systems from soil erosion. The Cárdenas administration supported rural schools, land redistribution, *campesino* organizations and cooperatives, and authorized direct government aid for acquiring tools, seed, machinery, and irrigation systems.

Susan R. Walsh Sanderson theorizes that land reform in Mexico became a political method for suppressing peasant unrest by creating direct dependence on the government for access to land. Land reform became part of the Constitution of 1917 and, according to Sanderson, “a central part of distributionist [sic] policy ever since.”⁴⁷⁹ The growth of the bureaucracy in Mexico after 1917 caused substantial delays in the process of applying for land.

⁴⁷⁹ Susan R. Walsh Sanderson, *Land Reform in Mexico: 1910-1980* (Orlando: Academic Press, Inc., 1984), 14, 36-37.

The rate or amount of land distribution depended on the attitudes of the president, bureaucrats, or persons with power at the state level. The sheer time it took to navigate this process led to delays, and the advent of new administrations caused even more delays, or outright denials as new bureaucrats or presidents might not approve previous decisions. According to Sanderson, this structural deficiency put “land reform out of phase with other policy decisions [and undermined] peasant political pressure.” Cárdenas authorized high quality land grants, redistributing more land in six years than had been granted in the previous eighteen.⁴⁸⁰ From 1929 to 1934, presidents Gil, Rubio, and Rodríguez granted 5,724,491 hectares to 403,656 *ejidatarios*.⁴⁸¹ During the Cárdenas administration, 800,000 peasants received 18 million hectares of land.⁴⁸² Agricultural expansion went hand-in-hand with increased irrigation in Mexico, which put pressure on the U.S. to negotiate treaties with that nation regarding water apportionment along shared rivers, as will be discussed later in this chapter.

These two presidents, in their efforts to promote agriculture, expanded the role of conservation in their respective nations and the power of the state to control and monitor what happens to the environment. Judging whether or not this was beneficial in the long term is difficult because both men, as well as their programs, have been glorified and condemned in the literature. Critics have written that both men increased the scope, power, and intrusiveness of government institutions, while admirers point out that both took actions that were extremely popular with their constituents. Many of their actions had both positive and negative effects. Cárdenas established the Banco de Crédito Ejidal to provide loans for machinery, seed, fertilizers, and other supplies for *ejidos* across the nation. The Cardenas administration spent twice as much

⁴⁸⁰ Ibid., 70, 72.

⁴⁸¹ Steven E. Sanderson, *Agrarian Populism and the Mexican State*, 232.

⁴⁸² Adrian A. Bantjes, *As if Jesus Walked on Earth: Cardenismo, Sonora, and the Mexican Revolution* (Wilmington, Delaware: Scholarly Resources Books, 1998), xi-xii.

money nationally on rural education than had any of his predecessors. Although the push for a larger *ejidal* system resulted in better education, health, and income levels for some of the rural population, from 1936-1938 production of cotton overall in Mexico dropped by almost 9,000 tons and henequen yields in Yucatán declined by 45,000 tons. Although the Cárdenas administration had some successes with agrarian reform, the economic gains were mixed.⁴⁸³ When Cárdenas nationalized the oil industry in 1938, striking workers seeking higher wages and pensions were pleased, but the action drove foreign capital investment in petroleum and mineral production out of the country. Rural peasants received multiple benefits under Cárdenas, but for the most part remained poor and national agricultural production was still underdeveloped. After Cárdenas left office, Mexico turned away from agrarian reform, although some land redistribution continued. The outbreak of World War II limited the European exports Mexico had previously depended upon, and leaders became convinced the only path toward economic inclusiveness across the nation was industrialization. Internal production, limited imports, and a more robust export economy increased GDP, and the 1940s are often called “the Mexican Miracle.”⁴⁸⁴

Yet, although the economic gains under Cárdenas were not as great as those that took place later in the 1940s, according to Luis González y González, “No period of contemporary life in Mexico has fascinated so many historians as that of 1935-1940.”⁴⁸⁵ Michael J. Gonzales argues that “Cárdenas remains Mexico’s most appealing twentieth century president” with “deft personal and communication skills” that allowed him to forge political alliances with large groups as well as individuals. Gonzalo N. Santos, a *caudillo* in San Luis Potosí, stated

⁴⁸³ Lee Stacy, ed., *Mexico and the United States* (New York: Marshall Cavendish Corporation, 2003), 276-277.

⁴⁸⁴ Meyer, et. al., 606, 611-614.

⁴⁸⁵ Luis González y González, *Historia de la Revolución Mexicana, 1934-1940: Los días del presidente Cárdenas* (México, D.F., El Colegio de México, 1981), 3. “Ningún periodo de la vida contemporánea de México ha fascinado a tal cantidad de historiadores como el de 1935.” Translation mine.

“Professional Cardenistas paint Cárdenas as a St. Francis of Assisi, but that’s the last thing he was...he was a fox.”⁴⁸⁶ Regional *caudillos* (military veterans of the revolution) had important patronage networks, and no matter what their political leanings were Cárdenas needed them and their local authority to retain his own power. Adrian Bantjes’ concludes that Cárdenas did not create an “omnipotent Leviathan state,” but had to rely on political alliances with conservatives that often opposed his reforms. Ben Fallaw’s work on Yucatán reaches similar conclusions.⁴⁸⁷

FDR had to employ the same political skills with Congress, state governors, businessmen, and labor leaders. During 1935 and 1936 the Supreme Court overturned eight of FDR’s New Deal programs, including the National Industrial Recovery Act (NIRA) and the Agricultural Adjustment Act (AAA). In 1937, FDR tried to get Congress to authorize enlarging the number of justices on the court in order to “pack the court” and protect his programs, but that effort failed. Critics accused him of executive branch overreach and failing to respect the constitutional separation of powers. Conservatives opposed the idea of a managed economy and “imposing a welfare state on a capitalist foundation.” Although FDR was elected to four terms, and is often called the greatest U.S. president of the twentieth century, he is also accused of actually prolonging the Depression in the U.S. By 1939, 17% of the workforce was still unemployed. The New Deal did help many people, but women and minorities received far fewer of the benefits.⁴⁸⁸ Conservation efforts, however, remained popular. Over the duration of FDR’s

⁴⁸⁶ Gonzales, 229, 258.

⁴⁸⁷ Ibid., 218-219; Ben Fallaw, *Cárdenas Compromised: The Failure of Reform in Postrevolutionary Yucatán* (Durham, North Carolina: Duke University Press, 2001), 5-7. For an early work that reaches the level of what Bantjes refers to as “hagiography,” see William Cameron Townsend, *Lázaro Cárdenas, Mexican Democrat* (Ann Arbor, Michigan: George Wahr Publishing Co., 1952).

⁴⁸⁸ Frank E. Gannett, “A Statement by Frank E. Gannett, Publisher Gannett Newspapers,” Records of the Justice Department, NARA, Washington, D.C., RG 60, as found in Leslie Gray and Wynell Burroughs, “Constitutional Issues: Separation of Powers.” *Social Education* 51, 1 (January 1987): 28-30; Jim Powell, *FDR’s Folly: How Roosevelt and his New Deal Prolonged the Great Depression* (New York: Three Rivers Press, 2003), 162-172; Tindall, op.cit., 1259.

presidency, Congress continued to support flood control efforts, as well as soil and tree conservation, balking only at the size of requested funding appropriations.⁴⁸⁹

As the U.S. federal government expanded its reach during the 1930s, state agencies began to work even more closely with the federal government in order to coordinate efforts for relief as well as needed public works and conservation projects. At the request of the U.S. National Resources Board (originally the National Planning Board), Governor Miriam A. Ferguson created the Texas Planning Board as an advisory council on May 21, 1934. The board members, which included the State Reclamation Engineer, the State Health Officer, a member of the State Board of Water Engineers, the Chairman of the Texas Railroad Commission, the Chairman of the Texas Highway Commission, and the Director of the Texas Forest Service, began work on long-range plans for public works and a comprehensive study of the people, environment, and natural resources of Texas in order to improve social and economic conditions. They also drafted a bill, passed by the Texas Legislature, establishing a permanent board on March 16, 1935. The board, organized by committees, continued to operate on an advisory basis and made recommendations to the governor and legislature, as well as various federal agencies, including the National Resources Board. The Planning Board worked directly with the federal government to funnel WPA money to cities, counties, and regions for relief projects in Texas until the Legislature discontinued the board on March 16, 1939.⁴⁹⁰

In their four years of operation, the board focused on many aspects of planning for Texas, but the majority of their work was on conservation and development. The board drew its authority over water from the Texas Constitution, Paragraph (b) of Article 16, Section 59, added

⁴⁸⁹ Owen, 56-57. For an analysis of New Deal politics, see also Theda Skocpol, "Political Response to Capitalist Crisis: Neo-Marxist Theories of the State and the Case of the New Deal," *Politics and Society* Vol. 10, No. 2 (1980): 155-201.

⁴⁹⁰ "Texas Planning Board - Agency History," Texas State Archives, <http://www.lib.utexas.edu/taro/tslac/20133/tsl-20133.html>

on August 21, 1917, which allows the legislature to divide the state into conservation and reclamation districts. However, an early meeting of the board illustrates how intricately conservation and relief work had become intertwined. At the board meeting on July 22, 1936, the members discussed how to allocate the funding they expected to receive from the federal government. As the discussion progressed, H.P. Drought, WPA State Administrator for Texas, pointed out that the money appropriated for the WPA was “not to put up public buildings, build parks and lateral roads and things like that over Texas, or any other state, but that it was passed for the particular purpose of putting people to work in an effort to eradicate the most serious ulcer that is now gnawing at the vitals of the United States, the ulcer of free food.”⁴⁹¹ Drought expressed the idea that bread lines and soup kitchens were akin to charity, and that in the U.S. people should work in order to feed themselves. Obtaining public works projects in Texas, necessary or not, was not the primary goal.

In 1936, The Texas Planning Board turned its attention to silt in the major rivers of Texas. Flooding across the state caused approximately \$2,222,915 in damages per year, for a total of \$124,483,247 over the previous 40 years. The Board recommended setting up 56 sampling stations following the methods developed by the Bureau of Agricultural Engineering, USDA, to measure silt levels in major rivers and tributaries, including the entire Rio Grande. They also thought that more weather stations, primarily to measure rainfall, should be established across the state in cooperation with the National Weather Bureau. They included Fort Hancock, Van Horn, Sierra Blanca, and other parts of Hudspeth County on the list. Recognizing that evaporation wasted irrigation water in reservoirs and during application, they requested the federal government supply the state with standard size evaporation pans. The Texas Agricultural

⁴⁹¹ “Minutes of Called Meeting of the Texas Planning Board Held in San Antonio, July 22, 1935,” Minutes of the Texas Planning Board, Texas State Archives, Austin, RG 017, Box 017-1, Vol. 1, pages 48-51.

Experimental Stations were also measuring evaporation, but using different pan sizes and therefore state and federal observations were not consistent. The Board also urged installing more evaporation studies stations at El Paso.⁴⁹²



Evaporation Pan⁴⁹³
https://en.wikipedia.org/wiki/Pan_evaporation

While the Rectification Project was in progress, soil conservation and flood control took on an even larger national role in the U.S. and Mexico. In the U.S., during 1937 the nation-wide drought began to abate in the eastern and far western regions of the U.S. Precipitation in the U.S. from January 6 to May 1 was over 100% of normal in the eastern and far western states, but remained 50-75% below normal in the central and plains states (see illustration below). Flooding in the Ohio Valley during January and February of 1937 killed almost 500 people and caused

⁴⁹² Memorandum by Henry G. Nickle, August 27, 1936, and Report by A.H. Dunlop, Board of Water Engineers, September 2, 1936, Statewide River Basin Projects, PWA Reports, 1936, Texas State Archives, Austin, RG 017, Boxes 15-20; Texas Planning Board Press Releases 1936-1938, Texas State Archives, Austin, RG 017, Box 24, Folder 24-10.

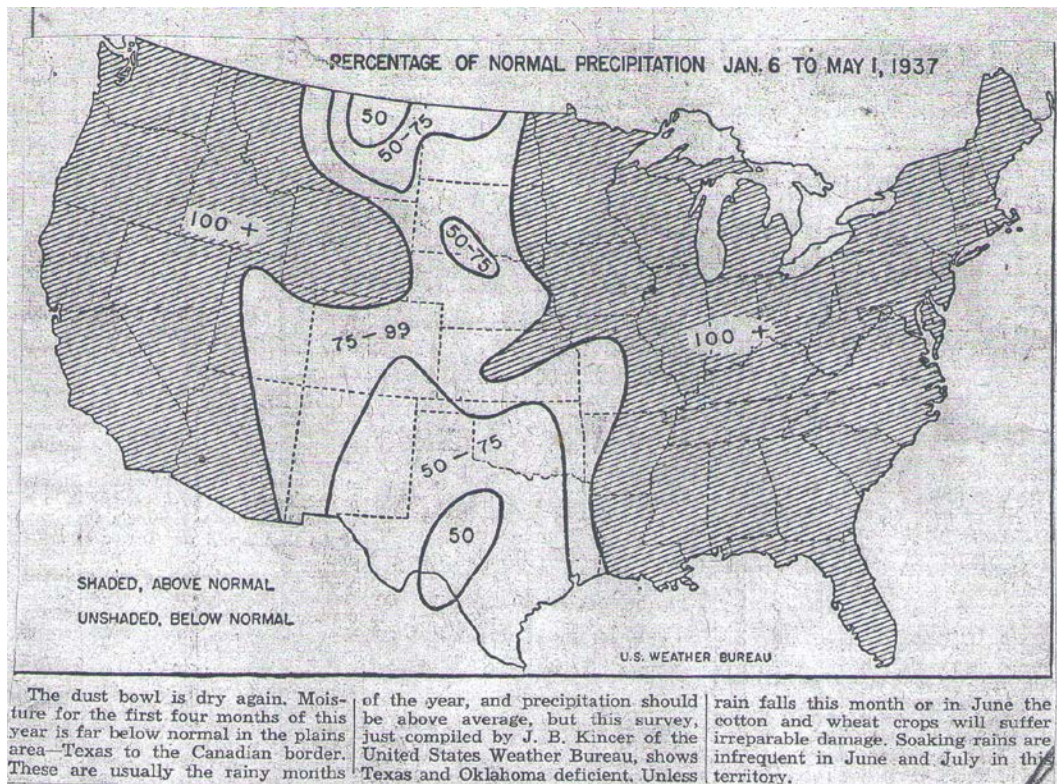
⁴⁹³ This is a modern evaporation pan, and not necessarily the same as the pans used in the 1930s. The pans measure how fast water evaporates based on the variables of temperature, humidity, precipitation, solar radiation, and wind, so cultivators know when to apply water and at what rate.

\$1,000,000,000 in property damage. Serious flooding also took place in the Mississippi and Missouri River basins.⁴⁹⁴ FDR asked Congress on June 3, 1937, to divide the U.S. into seven regions according to watersheds, creating seven regional authorities, similar to the Tennessee Valley Authority, to take charge of all flood control, power development, and soil conservation projects in their respective regions. The U.S. Congress passed a joint resolution to address flooding on a national scale on June 7. The resolution authorized the Secretary of War, who had jurisdiction over the navigable waters within the territorial U.S., to “conduct necessary surveys, assemble information, and prepare [a] comprehensive plan, which shall include provisions for the construction of levees, spillways, diversion channels, channel rectification, reservoirs, and all works necessary” to control flooding on all major rivers and tributaries.⁴⁹⁵ President Roosevelt vetoed the bill on the basis that he wanted “a thoroughly democratic process” that would start with local studies and state planning first, and then the federal government could come up with the necessary national fiscal and conservation plan.⁴⁹⁶

⁴⁹⁴ Correspondence, April 1936-December 1937, National Rivers and Harbors Congress, Texas State Archives, Austin, RG 017, Folder 9-7.

⁴⁹⁵ *Austin American Statesman*, June 3, 1937; Congress, Senate, Joint Resolution to Authorize the Submission to Congress of a Comprehensive National Plan for the Prevention and Control of Floods of All the Major Rivers of the United States, and for Other Purposes, 75th Congress, 1st sess., S.J.R. 57, *Congressional Record*, Report No. 696, Calendar No. 712, daily ed. (June 8, 1937).

⁴⁹⁶ *Dallas Morning News*, 11 May, 1937; Message from the President of the United States, “Returning Without Approval the Joint Resolution (S.J. Res.57) to Authorize the Submission to Congress of a Comprehensive National Plan for the Prevention and Control of Floods of All the Major Rivers of the United States, and for Other Purposes, Congress, Senate, 75th Congress, 1st sess., Document No. 95, *Congressional Record*, (Calendar day, Aug. 13, 1937; *Austin American Statesman*, August 13, 1937.



Dallas Morning News, 11 May, 1937.

Water Resources, January-June, Texas State Archives, Austin, RG 017, Folder 32-34

By October 17, 1937, the Texas Planning Board had a comprehensive plan for flood control and prevention ready, as well as for water and soil conservation. The board proposed spending \$220,568,000 in five Texas river basins, but did not include the El Paso Valley. The federal work already underway appeared to be sufficient, and the Board turned its attention to the Lower Rio Grande and Pecos Basins.⁴⁹⁷ The Texas Legislature set aside \$35,000 in March for the Texas State Board of Engineers to study water use along the Lower Rio Grande. In 1936 Texans had become concerned about preparations to begin a large storage dam on the San Juan River in Mexico to irrigate one million acres in the Comarca Laguna *ejido* on the Coahuila-

⁴⁹⁷ Press Releases, August 1936-May 1938, Texas Planning Board, Texas State Archives, Austin, RG 017, Folder 24-12.

Durango border.⁴⁹⁸ The Laguna *ejidatarios* produced long-staple cotton, alfalfa, wheat, and maize for the market. Rapid development in Mexico along the Lower Rio Grande had also engaged the interest of the National Resources Committee, and the *Dallas Morning News* reported that the study would be an important step toward a treaty with Mexico regarding the waters in the Lower Rio Grande.⁴⁹⁹

Mexico had been trying to get a fair apportionment of Colorado River water since 1901. The 1906 settlement that allowed the construction of Elephant Butte Dam and promised a set allotment of water to be delivered downstream to Mexico was an important step for apportionment of Rio Grande water, but the Colorado River water matter still lingered. Rectification in the 1930s exemplified the importance of cooperation over mutual flooding concerns between the two nations, but did not impact water apportionment. Building the American Dam and Canal actually ensured Mexico would not get more Rio Grande water than the 1906 treaty mandated. However, the cooperative nature of the Rectification Project seems to have paved the way for more equity in facing the problems that arise when two nations share the same rivers. The *San Antonio Express News* reported that settling the matter of a treaty with Mexico over the Colorado River was important for agricultural development along the Lower Rio Grande. The article provided details from L.M. Lawson's address to the American Society of Civil Engineers in San Antonio. Lawson advocated combining settlement of water apportionment along both the Colorado and Rio Grande Rivers as Mexico wanted, rather than separate the two matters. The Lower Rio Grande receives 70% of its water from Mexican tributaries, and only 30% from U.S. rivers. Mexico was using that fact as leverage to get more water from the Colorado River. Lawson pointed out that the 750,000 acre feet of Colorado River

⁴⁹⁸ "Irrigation Activities in Mexico Have Valley Folk Guessing a Lot," *San Antonio Express*, 25 October, 1936.

⁴⁹⁹ "Water Study Bill Will Aid Mexican Irrigation Treaty," *Dallas Morning News*, 29 March, 1937.

water the U.S. had offered to Mexico was not enough for planned development in Baja California. Lawson used the example of the Rectification Project in the El Paso/Juárez Valley as a successful method for guaranteeing set amounts of water delivery and controlling floods. Although USIBC flood control works were already underway along the Lower Rio Grande, far more dams were needed below Fort Quitman and, Lawson stated, the IBC had much more work to do along both sides of the Rio Grande.⁵⁰⁰

In 1944, the U.S. and Mexico settled the matter of dividing the water in the Colorado and Tijuana Rivers by treaty, as well as apportioning the waters in the Lower Rio Grande from the tributaries in the U.S. and Mexico. The treaty mentions the fact that the IBC had to maintain the rectified river in the El Paso/Juárez Valley and would now have the same responsibility for the other rivers along the international boundary. As a result, the treaty expanded the agency's mission to implement and enforce water distribution as well as maintain the international boundary, and the IBC became the International Boundary and Water Commission (IBWC). The commissioners from both nations were accorded diplomatic status. Unfortunately, as Norris Hundley explains, the 1944 treaty had the same inherent problems as had the earlier Rio Grande treaties. Almost immediately, in 1945, diminished upstream precipitation limited how much water reached Mexico. Moreover, the Colorado River is naturally salty and upstream irrigation compounded that salinity. When fresh runoff keeps the salt level low the water that reaches Mexico is saline, but crops can still thrive. However, when the climate limits the amount of fresh water that enters the Colorado River, and when development in the U.S. further pollutes the

⁵⁰⁰ "Problems Affecting the Border Rivers," *San Antonio Express*, 2 April, 1937.

water and raises salinity levels, Mexico has had to file protests and seek legal interventions for a solution.⁵⁰¹

These lessons concerning the quantity and quality of water could have been learned by a closer observation of the Rio Grande in the El Paso/Juárez Valley, but were not. Dam projects and increasing irrigation upstream not only impacted water availability, but also had a significant impact on salinity in the Rio Grande. On October 28, 1935, Texas filed a suit with the U.S. Supreme Court for a bill in equity against New Mexico on the basis that they were in violation of the 1929 Rio Grande Compact formed by Colorado, New Mexico, and Texas. The construction of the Vado Reservoir on the Rio Chama in New Mexico by the Middle Rio Grande Conservancy District, approved by the USBR, coincided with a serious drought in that year, and Texas claimed they were not receiving their fair share of river water. The suit also claimed that excessive diversions of Elephant Butte Reservoir water for irrigation in New Mexico created an “injurious increase of the salt contents of the water,” and the “increase of salt contents were in violation of the rights of Texas water users.” FDR learned of the proposed filing in September and ordered all federal agencies working on water projects above El Paso to halt any approvals for additional dams, drainage, or other water allotment projects. He reminded the states that the federal government was a party to the original 1929 Compact, and urged the three states to work together and with the National Resources Committee to settle the issue. The Supreme Court allowed Texas to file suit on November 11, 1935. This prompted the Rio Grande Compact Commissioners for New Mexico and Colorado to agree to negotiate a new compact with the Texas Commissioner and a representative from the National Resources Committee. The Rio Grande Compact of 1938 differed very little from the 1929 Compact. The agreement allowed

⁵⁰¹ Utilization of Waters of the Colorado and Tijuana Rivers, T.S. 994, November 14, 1944; Allie Alexis Umoff, “An Analysis of the 1944 U.S.-Mexico Treaty: Its Past, Present, and Future,” *Environs: Environmental Law and Policy Journal*, Vol. 31, No. 1 (Fall, 2008), 72; Hundley, 172.

development upstream of El Paso as long as Colorado released 800,000 acre feet of water annually to New Mexico, and both states guaranteed that Texas would receive 790,000 acre feet of water annually from the Elephant Butte and Caballo Reservoirs “of the same average quality as during the past ten years, or the equivalent of this quantity if the quality of the supply is altered by any developments upstream.” New Mexico agreed to this request, but only if, “upon completion of the All American Dam and Canal, Mexico shall be limited strictly to [the] treaty provision of 60,000 acre feet per annum for use in the Republic of Mexico.”⁵⁰²

The 1906 treaty providing 60,000 acre feet annually of river water for Mexico had a seriously negative impact on agriculture at Juárez. During the treaty negotiations the criteria for calculating distribution was the population in Juárez, which had dropped substantially due to the water crises of the 1880s and 1890s. By 1896, hectares under cultivation had dropped from 25,000 hectares (61,776.345 acres) to 6,050 hectares (14,949.88 acres). As seen above, in the 1920s and early 1930s Mexican farmers built illegal diversion dams and canals along the river to get more water. After the completion of the American Dam and Canal in 1938, Mexican farmers had to begin applying more groundwater and wastewater to crops. Expanded irrigation upstream raised the salinity levels in water returning to the river, and a study of dissolved solids in excess of 700 ppm (mg/l) indicates that from 1936 to 1994 salinity in the water diverted into the *Acequia Madre* exceeded acceptable levels 90% of the time. Agriculture and population grew significantly 1965-1994 in the state of Chihuahua, putting more demands on the groundwater supply. El Paso and Juárez both draw water from the Hueco Bolson, where the water is brackish but only slightly saline near the top, but as the water is drawn down the salinity increases. In non-drought periods most of the valley’s groundwater is shallow. Well water has a high salt concentration, as does wastewater. Cotton can withstand salt fairly well, but alfalfa cannot and

⁵⁰² Raymond Hill, 167, 169, 173, 181, 129.

salty, contaminated wastewater can ruin edible crops. A 1993 study concluded that the Juárez irrigation district was the most contaminated by salinization in the entire nation of Mexico. Consequently, crop yields steadily decreased and adversely impacted economic development.⁵⁰³ Between 2002 and 2011, 4,600 acres out of the 28,600 cultivable acres stopped any production. Edible crop production continues to decline in the Juárez area, but cotton production has increased.⁵⁰⁴ The illustration below shows the unequal development in Mexico.



Rectified Channel and Levees (Mexico bottom, U.S. above), IBWC Overview, Last Modified 3/5/14.

http://www.ibwc.state.gov/Files/CF_CR_IBWC_Overview_030514.pdf

Throughout the second half of the twentieth century, salinity in the Rio Grande became an international and interstate concern. In January of 2008, the Rio Grande Salinity Management Coalition formed, comprised of the Rio Grande Compact Commissioners from Colorado, New Mexico, and Texas. At their request, in 2009 the U.S. Army Corps of Engineers and the New Mexico Interstate Stream Commission produced a study on the impact of salinity in the Rio

⁵⁰³ Jorge A. Salas Plata Mendoza, “Water challenges arising out of the historical allocation of the water of the Rio Grande /Rio Bravo in the El Paso-Juarez region” (Ph.D. diss., The University of Texas at El Paso, 2005), 51-54.

⁵⁰⁴ *El Diario de Juarez*, 4 and 6 February, 2013.

Grande on urban and agricultural areas from San Acacia, New Mexico, downstream through Las Cruces, New Mexico, as well as from El Paso, Texas, downstream to Fort Quitman. The authors concede that the study is an underestimate of the potential costs and the extent of environmental damage, but found in the 207 mile long stretch of the Rio Grande they examined the estimated economic impact totaled \$10.2 million in annual damages in the U.S. The study found that Socorro, Sierra, and Doña Ana Counties in New Mexico, and Hudspeth County, Texas, all experience agricultural damage from salinity, but only El Paso County had both agricultural and urban damage. Of the total annual salinity monetary damages, 24% was agricultural in all counties (\$2,424,935), but the urban damages in El Paso came to 42% residential (\$4,300,712), 17% commercial/other (\$1,761,402), 12% landscape (\$1,187,516), 3% industrial/large users (\$343,903), and 1% treatment plants (\$134,844). The study did not calculate damages experienced by Juárez, but similar percentages, if not dollar amounts, can be assumed. Applying highly saline water to agriculture not only lowers yields, but also requires the application of even more water to leach salt from root zones. It also precludes planting high-value crops that are not salinity tolerant. In commercial and residential use, high concentrations of dissolved solids damage pipes and plumbing fixtures, and lower the life expectancy of machinery, appliances, and the plants and trees used for landscaping. Water treatment plants experience higher costs. The study also noted that estimates predicted that the population in Texas and New Mexico along the river would double within the next fifty years, and double in Juárez in twenty, causing the monetary damages to increase proportionally.⁵⁰⁵

Market forces, rather than a concern for water conservation, changed irrigated agriculture along the river as farmers shifted from devoting most of their acreage to grapes, wheat, and

⁵⁰⁵ Ari M. Michelsen, Tom McGuckin, Zhuping Sheng, Ron Lacewell, and Bobby Creel, "Rio Grande Salinity Management Program: Preliminary Economic Impact Assessment," Prepared for the Rio Grande Salinity Management Coalition, December, 2009, i, vi-viii, 2, 5, 10.

alfalfa, to cotton and, later, pecans. Pecan farming began in the El Paso/Juárez Valley in 1935; in fact the CCC planted 4,000 pecan trees at Ascarate Park.⁵⁰⁶ By the year 2000, El Paso County ranked second for pecan production in the Western Pecan Growing Region, the region containing the top ten pecan producing counties in the U.S.⁵⁰⁷ United States Department of Agriculture (USDA) 2002 statistics show El Paso County producing 20,212 bales of cotton, ranked number 52 for production in the state of Texas, and 10,022 pounds of pecans, ranked number 2 for production in Texas.⁵⁰⁸ Acreage devoted to these two crops continued to increase, and in 2009 El Paso County had 22,592 acres planted in cotton, and 10,525 acres of pecan orchards.⁵⁰⁹ By 2014, El Paso had 48,000 cultivated acres, 20,000 of those devoted to pecans with the heaviest concentration in the Lower Valley. However, irrigating pecan orchards has only compounded salinization problems. Pecan trees require 150-250 gallons of water per day during the growing season. Typically, farmers release water from canals between earthen berms that run between parallel rows of trees. Watering is cyclical according to designated days and times and leads to overwatering that saturates the soil and draws salt upward from the shallow groundwater table, as well as contributing to water loss through evaporation.⁵¹⁰

⁵⁰⁶ Carmack, Liz. "Texas Counties and the Civilian Conservation Corps," *County Magazine* (Online), 22 August, 2013. Accessed October 12, 2015. <http://www.county.org/magazine/departments/historicalhighlights/Pages/Texas-Counties-and-the-Civilian-Conservation-Corps.aspx>

⁵⁰⁷ Esteban Herrera, "Historical Background of Pecan Plantings in the Western Region," *Cooperative Extension Service, College of Agriculture and Home Economics* (Las Cruces, New Mexico: New Mexico State University, May 2000), 1.

⁵⁰⁸ 2002 Census of Agriculture, United States Department of Agriculture, Washington D.C., http://www.agcensus.usda.gov/Publications/2002/County_Profiles/Texas/cp48141.PDF

⁵⁰⁹ Michelsen, et. al., op.cit., 18.

⁵¹⁰ "Improved Irrigation Scheduling for Freshwater Conservation in Pecan Fields of El Paso, TX." Poster Number 1821, *Grand Challenges, Great Solutions*, American Society of Agronomy, Crop Science Society of America, Soil Science Society of America, International Annual Meeting, Long Beach, CA., Nov. 2-5. 2014.



**Typical method for irrigating pecan orchards.
“Rio Grande Scenic Byway – Pecan Reflections,” © Abigail Austin**

Historic drought and high temperatures since 2002 have forced growers to use more groundwater as the reservoirs at Elephant Butte and Caballo continue to shrink due to diminishing recharge and surface evaporation. In 2012, the Elephant Butte Irrigation District warned Mexico to expect a release of only 4,631 acre feet by February 1, “prompting two members of the Chihuahua State Legislature's environment commission to declare they [would] press the Mexican Congress...to analyze the 1906 agreement for possible revisions, and to extend more support to the farmers slammed by the drought.”⁵¹¹ As of December 2014, the El Paso/Juárez Valley had been shorted 36,000 acre feet of water and “farmers only received eighteen inches of their four-foot allotments...forcing them to repair or replace groundwater pumps [and invest in drilling wells at] \$20,000 to \$30,000 per well.” Art Ivey of Tornillo

⁵¹¹ Victor Quintana, “Double Disaster Deepens in the Juarez Valley,” *Frontera Norte Sur* (Online, U.S.-Mexico border news Center for Latin American and Border Studies New Mexico State University Las Cruces, New Mexico) March 5, 2012.

reported in 2014 that he was pumping groundwater just to keep his trees alive, even though the salty water causes permanent damage.⁵¹² Perhaps even more disturbing is the fact that the groundwater in the El Paso/Juárez region is replenished by the shrinking Rio Grande. The USDA designated El Paso as a natural disaster area in 2014 so farmers could apply for Federal Emergency Loans.⁵¹³

Another factor affecting water availability and salinity is the proliferation of phreatophytes, which are deep-rooted plants that absorb a lot of water. In their studies in preparation for building Elephant Butte Dam and Reservoir, engineers warned as early as 1913 that a proposed high-line canal diverting water from the Rio Grande at Leasburg would significantly alter the river's "natural regimen." Leaving the river bed dry or nearly dry for long periods of time would prevent scouring and allow invasive phreatophytes to grow in sandbars and diminish the carrying capacity of the natural bed, leading to flooding.⁵¹⁴ This is what happened after the construction of Elephant Butte Dam, which led to the necessity of rectification in the 1930s. Elephant Butte Dam, as well the Rectification Project's Caballo, Percha, Leasburg, Mesilla, American, and Riverside Dams, plus 139 miles of canals, 457 miles of laterals, and 465 miles of drains, seriously altered the amount of water traveling down the natural bed.⁵¹⁵ Prior to the alterations to the Rio Grande, especially the building of canals and the

⁵¹² Marty Schlagen, "Quenching Our Future, Part 5: In drought, Rio Grande irrigators feel the crunch," *El Paso Times*, 14 December, 2014, http://archive.elpasotimes.com/news/ci_27135876/drought-río-grande-valley-irrigators-feel-crunch/

⁵¹³ "USDA Designates El Paso County as a Contiguous Natural Disaster Area," U.S. Department of Agriculture, Texas Farm Service Agency News Release, 17 March, 2014, http://www.fsa.usda.gov/FSA/newsReleases?mystate=tx&area=stnewsroom&subject=stnr&topic=landing&newstyp e=stnewsrel&type=detail&item=stnr_tx_20140317_rel_247.html

⁵¹⁴ Littlefield, 155-156.

⁵¹⁵ The Percha Diversion Dam is two miles downstream from Caballo Dam and diverts water into the Rincon Valley Main Canal. The Leasburg Diversion Dam is 62 miles north of El Paso and diverts water into the Leasburg Canal, which provides water for the upper Mesilla Valley irrigation system. The Mesilla Diversion Dam is 40 miles north of El Paso and diverts water into the East Side and West Side Canals for the lower portion of the Mesilla Valley.

widening of the river bed using levees as containment, natural vegetation along the rivers consisted mainly of cottonwood and willow stands, with an underbrush of false-indigo, yerba-mansa, salt grass, sedges, and marsh grasses.⁵¹⁶ Riverine vegetation affects groundwater, soil, and river water by providing shade, which prevents evaporation, but also draws down water through metabolic use and transpiration (or evapotranspiration), the movement of water through the plant and its eventual evaporation through the leaves and flowers. Mature cottonwoods and willows metabolize approximately 100 gallons per day during periods of high heat, averaging approximately 32 gallons per day annually. Approximately 97-99% of metabolized water in plants is lost by transpiration. In order to complete the Rio Grande Rectification Project's construction works, as well as the dams listed above, native plants had to be removed. As a result, the invasive Russian olive (*Elaeagnus angustifolia*) and tamarisk (*Tamarix*) proliferated. Russian olive, native to central and western Asia, became a popular ornamental tree in the late nineteenth century in the U.S. because it thrives in poor soils and is drought resistant. It is now common along the Rio Grande in New Mexico downstream to El Paso, and is considered a noxious weed because it has an extremely high transpiration rate, grows aggressively and crowds out desirable plants by commandeering nutrients, alters native fauna habitats, is difficult to eradicate, creates dense thickets that become fire hazards, and colonizes riverbanks, interfering with natural flooding regimes. It is not clear how either Russian olive or tamarisk impact water

⁵¹⁶ John Hernandez, *Rio Grande Regional Environmental Project: A Preliminary Proposal for the Preparation of a Research Design that Will Lead to the Development and Implementation of a Model Environmental Management Plan for an Interstate-International Region* (Grant Proposal Reviewed by the Pan American Health Organization. Prepared by the New Mexico Water Resources Research Institute and the New Mexico Environmental Institute, 1972), 38.

usage, as testing has not conclusively demonstrated these species use more water than native vegetation.⁵¹⁷

However, from the Upper Valley in El Paso downstream to below Fort Quitman, tamarisk contributes significantly to soil and river water salinity. Tamarisk (salt cedar) is an invasive shrub or shrub-like tree native to Eurasia and parts of Africa. It secretes salt via its leaves; detached leaves add salt to the soil, which kills other vegetation in locations not scoured by flooding. The roots go very deep to absorb groundwater and the species can re-sprout from those roots, so chopping or cutting tamarisk for removal is ineffective. The species can withstand both high and low temperature extremes and drought. Tamarisk appeared in the U.S. in the 1800s as an ornamental tree and was common along rivers in Arizona by 1901. Tamarisk spread quickly in the American West, Southwest, and northern Mexico in the 1920s and 1930s due to dam building and irrigation projects. After construction, people purposefully introduced tamarisk as windbreaks and to prevent soil erosion. The species quickly spread from major waterways to small streams and tributaries because a single shrub can produce more than 400 seeds per year.⁵¹⁸ In 2006, the USDA released salt cedar beetles in El Paso to kill tamarisk, which had a beneficial impact in eradicating the plant, but stands of dead tamarisk have become a fire hazard.

⁵¹⁷ Pamela L. Nagler, Patrick B. Shafroth, James W. LaBaugh, Keirith A. Snyder, Russel L. Scott, David M. Merritt, and John Osterberg, "The Potential for Water Savings through the Control of Salt Cedar and Russian Olive," pages 35-37, 43-44. Accessed August 9, 2016, <http://www.tucson.ars.ag.gov/unit/publications/PDFfiles/2078.pdf> in *Salt Cedar and Russian Olive Control Demonstration Act Science Assessment*. Patrick B. Shafroth, Curtis A. Brown, and David M. Merritt, eds., 35-42 (U.S. Geological Survey Scientific Investigations Report 2009–5247, April 28, 2010) pubs.usgs.gov/sir/2009/5247/; "Autumn Olive (*Elaeagnus umbellata*) & Russian Olive (*Elaeagnus angustifolia*)," Forest Invasive Plants Resource Center, n.d. Accessed August 11, 2016, <http://www.tucson.ars.ag.gov/unit/publications/PDFfiles/2078.pdf>; "Field Guide for Managing Russian Olive in the Southwest." USDA, September 2014, pages 1-2. Accessed August 10, 2016. http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5410126.pdf

⁵¹⁸ Kris Zouhar, "Tamarix spp." In: *Fire Effects Information System*, (Online). U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer), October 15, 2015. <http://www.fs.fed.us/database/feis/>

Due to increases in upstream irrigation, groundwater has become a crucial element in irrigation as well as a source of drinking water in the El Paso/Juárez Valley. By 1977, the Texas Board of Water Development found that groundwater would play an increasingly important role in future agricultural and urban development for both cities. Their study indicated that the Hueco Bolson held 20,800,000 acre feet of fresh water and would only last at then current usage rates for fifty years.⁵¹⁹ The combined population of El Paso and Juárez reached 1.3 million by 1980, primarily because of population growth in Juárez. That year El Paso filed suit against New Mexico to take more water from the portion of the Hueco Bolson underneath New Mexico. New Mexico law prohibited exporting water to another state, and a new legal battle began.⁵²⁰ El Paso proposed drilling 21 wells over the Hueco Bolson and 261 over the Mesilla Bolson. In 1983, Federal District Court Judge Howard Bratton of Albuquerque ruled that New Mexico's prohibition of water exportation was unconstitutional because it interfered with interstate commerce. The New Mexico legislature changed the law to allow water exports, but under very tight restrictions. The U.S. 10th Circuit Court of Appeals ruled the law was not unconstitutional on its face, remanded the suit back to the lower court, and neither party appealed. El Paso then attempted to get permits for the wells from New Mexico.⁵²¹ This led to more litigation when the New Mexico State Engineer denied all requested permits. The two states reached a settlement in 1991, and some groundwater in New Mexico became available after 2000.⁵²²

As part of the 1991 interstate settlement, New Mexico State University, the Elephant Butte Irrigation District, the El Paso Water Utilities Public Service Board, the El Paso Water

⁵¹⁹ Stephen Paul Mumme, "The United States-Mexico Groundwater Dispute: Domestic Influence on Foreign Policy," Ph.D. diss., The University of Arizona, 1982.

⁵²⁰ Dan Balz, "Water Wars: Booming town of El Paso Casts an Eye on New Mexico's Trove," *The Washington Post*, 13 February, 1981.

⁵²¹ Robert Reinhold, "El Paso's Battle for Water Entering Crucial Phase," *The New York Times*, 27 February, 1987.

⁵²² G. Keith Landreth, Director of Environment, *Ft. Bliss, Texas and New Mexico, Mission and Master Plan, Final, Programmatic Environmental Impact Statement*, Prepared for Directorate of the Environment, U.S. Army Air Defense Artillery Center and Fort Bliss, 24 May, 2000, 4.7-21.

Improvement District No. 1, and The University of Texas at El Paso formed the New Mexico-Texas Water Commission. The commission conducted studies for the El Paso-Las Cruces Sustainable Water Project. Their studies reveal the level of environmental change that resulted from the Rectification Project and other construction along the Rio Grande, especially regarding fish and wildlife resources. Prior to the major construction projects of the twentieth century, the Rio Grande from Engle, New Mexico, to Fort Quitman, Texas, had a wide floodplain, marshes, and pools in the oxbows. Originally, the flow of water was perennial until the 1880s, when upstream diversions increased, although it did fluctuate depending on upstream precipitation. Cottonwoods, willows, shrubby phreatophytes, and grasses grew along the river and in the floodplain. Elephant Butte Dam, and later Caballo Dam, slowed periodic flooding, but the biggest changes to the riparian ecology resulted from the various rectification projects along the river. Rectification began in the El Paso/Juárez Valley in 1933, and continued upstream from Caballo Dam to El Paso until 1943. After that, in the late 1950s, the river between Elephant Butte Dam and the Caballo Reservoir was also rectified. The river now runs through levees and is cut off from the floodplain, and phreatophytes have replaced the willows and cottonwoods that shaded the naturally occurring pools along the banks. Salt grass and Bermuda grass supplanted most of the native grasses. Flooding, scouring, and meandering sustained the vegetative diversity that existed before channelization, but rectification halted those processes.

Rectification eliminated wetlands, which affected wildlife along the river. From November to February, very little water is released from the Elephant Butte and Caballo Dams Reservoirs. Juvenile fish prefer low flow rates, but also need quiet water, which was available when the river meandered and formed pools, or when collected debris created still water areas. Adult fish do well in deeper, moderate velocity flows, but require quiet water for spawning.

Shallow water, exposed bottom areas, and sandbars provide habitat for migratory birds, hibernating turtles, and river-crossing avenues for mammals. There were originally between 16 and 27 species of native fish in the Rio Grande in New Mexico above the location of Elephant Butte Reservoir; currently the only indigenous survivor there is the protected silvery minnow. In the stretch between Elephant Butte Dam and the Caballo Reservoir, there are 26 fish species, but of those only six are indigenous. The rest are stocked fish. These fish do well in the late fall when the irrigation releases cease, but only as long as the pools along the banks last. From Caballo Dam to El Paso, there are 22 species, but only eight of the original 18 native species still survive. There are fish in the river, and some slip into the canals and laterals, but the native species are declining. Mammal populations are lower presently than in the past, and although ducks and migratory birds are still present at times, the disappearance of the cottonwoods and willows has limited the habitat for bald eagles and the southwestern willow flycatcher, both of which are now protected under the 1973 Endangered Species Act. The canals, laterals, drains, and arroyos that replaced the natural wetlands are now the seasonal habitats for birds.⁵²³

The climate, which cannot be controlled, continues to spark conflicts over water. Drought across the American West and little snowpack in Colorado during the 2010s caused the interstate water dispute between Texas and New Mexico to become more intense. In January of 2013 Texas filed a lawsuit against New Mexico before the U.S. Supreme Court alleging that New Mexico was in violation of the 1938 Compact. The compact had determined that Colorado must release 800,000 acre feet of Rio Grande water to New Mexico and that the storage facilities in that state had to release 790,000 acre feet of water downstream for the rest of New Mexico and

⁵²³ Michael J. Buntjer, "Fish and Wildlife Coordination Act Report for the El Paso-Las Cruces Regional Sustainable Water Project, Doña Ana and Sierra County, New Mexico, El Paso County, Texas," Prepared for the International Boundary and Water Commission, El Paso Texas (Albuquerque, New Mexico: Ecological Services Field Office, U.S. Fish and Wildlife Service, 2001), 11-12, 14, 18-26.

Texas. The states agreed that neither Colorado nor New Mexico could increase the storage in any reservoirs built since 1929 if that action meant there was less than 400,000 acre feet available for release downstream to the Rio Grande Project. Additionally, New Mexico could not accrue a water debt to Texas greater than 200,000 acre feet.⁵²⁴ However, New Mexico did not regulate well drilling after 1938, and there were over 2,000 wells drilled between then and 1980. New Mexico claimed that under the terms of the compact all they had to do was guarantee delivery of a set amount of river water downstream but that they had no obligations regarding groundwater.⁵²⁵ But the drought during the 2010s reduced the amount of water in the reservoirs, and therefore in the Rio Grande, and New Mexico farmers had to use more groundwater. In 2008, the Elephant Butte Water Users District and the El Paso Water Improvement District No. 1 had reached a settlement regarding how to divide the 790,000 acre feet of water, 43% for Texas and 57% for New Mexico. Texas claimed in 2013 that the wells and diversions in New Mexico, plus the drought that was shrinking the Elephant Butte and Caballo Reservoirs, meant that New Mexico was violating all previous agreements and Texas was not getting 43% of the river's water.⁵²⁶ In July of 2016, Gregory Grimsal, the court-appointed special master, recommended that the Supreme Court deny New Mexico's petition for a dismissal.⁵²⁷ As of September 2016 the case had still not been settled.

Recognizing that the border transects ecosystems with abiotic environments inhabited by biotic communities, in 1993 the U.S. and Mexico created the North America Development Bank (NADB), which began providing loans in 1994 for infrastructure that addressed the two nation's shared environmental concerns. Both nations came together to create the Border Environment

⁵²⁴ Hill, 187, 196-197.

⁵²⁵ Michael Haederly, "Texas, New Mexico Tangle Over Water," *Los Angeles Times*, 25 January, 2013.

⁵²⁶ "Texas-New Mexico Water Dispute Headed to Supreme Court," *Silver City Daily Press*, 9 January, 2013.

⁵²⁷ Jim Malewitz, "Texas Gets Boost in New Mexico Water Fight," *The Texas Tribune*, 15 July 2016, www.texastribune.org

Cooperation Commission (BECC) in 1994 to study environmental sustainability, especially of water and the impact of salinity. El Paso Water Utilities (EPWU), the U.S. Army, and the Junta Municipal de Agua y Saneamiento de Ciudad Juárez (JMAS) began studies in the early 2000s to address salinity in the Hueco Bolson. Bi-national cooperation led to the Kay Bailey Hutchinson Desalinization Plant on Fort Bliss, El Paso, which is the world's largest inland desalinization plant. The plant began operation in 2007 and uses reverse osmosis to remove salts and other pollutants from surface water and groundwater to provide drinking water for El Paso and Fort Bliss. The plant cost \$87 million and processes 27.5 million gallons of water per day. Extracted wastes are piped to injection wells.⁵²⁸ On May 27, 2014, thanks to BECC studies as well as NADB and Mexican federal funding, the Valley of Juárez Wastewater Treatment Plant opened, which now purifies 100% of the wastewater used for irrigation in the Juárez Irrigation District.⁵²⁹ The El Paso City Council approved the Enviro Water Mineral Company's proposal to build a water production and chemical plant next to the Kay Bailey Hutchinson Desalinization Plant in October of 2015. This plant will extract the minerals from the desalinization plant's wastewater and supply 2.2 million gallons of purified drinking water per day, increasing the yield from the desalinization plant from 80-85% to 99%. This will also reduce the amount of solid waste injected into the ground that eventually re-enters the Hueco Bolson. The plant is expected to have a \$7.7 million positive economic impact and is supposed to open in early 2017.⁵³⁰ When the Rio Grande fails to supply enough water for agriculture, these efforts to keep the Hueco Bolson

⁵²⁸ El Paso Water Utilities, "Kay Bailey Desalinization Plant," 2007. Accessed April 15, 2015. http://www.epwu.org/water/desal_info.html

⁵²⁹ Border Environment Cooperation Commission (BECC). "Ciudad Juárez achieves 'White Flag' coverage status in wastewater treatment." Posted August 20, 2014. Accessed February 11, 2016. <http://www.becc.org/news/becc-news/ciudad-juarez-achieves-white-flag-coverage-status-in-wastewater-treatment#VthXLdlrJkg>

⁵³⁰ Aaron Martinez, "Council OKs deal for \$65M water plant," *El Paso Times*, October 13, 2015.

as free of saline as possible benefit people on both sides of the border. By 2017, EPWU also expects to reuse 15% of all treated wastewater.

Heavy metals are also a potential hazard for the water supply. A 2003 study of heavy metal concentrations in canal water and canal sediments found that the poorest water quality in the entire Upper Rio Grande occurs along the border between Texas and Mexico, especially in the portion below the El Paso/Juárez metroplex. Irrigation return flows, urban runoff, and high evaporation rates in open canals have caused elevated concentrations of arsenic, silver, cadmium, copper, lead, nickel, and zinc in the river. Some of these metals naturally occur in the soil, but the authors conclude that the degraded water below the twin cities was caused by anthropogenic activity, including atmospheric fallout from smelting, galvanized fencing along the river, the use of leaded gasoline prior to 1994, and the application of zinc in pecan orchards. The study cautions that as the population increases, so will the amount of heavy metals in the river.⁵³¹

Although the Rectification Project has impacted agriculture and the environment both positively and negatively, the flood control aspect has been mostly positive. Even in times of historic drought, El Paso and Ciudad Juárez are at risk for floods. A flood in 1999 clogged the Chamizal Channel with silt prompting the IBWC, the City of El Paso, and the Border Patrol to work together to clear the channel beginning in 2003, completing the work in 2004.⁵³² In September of 2006, record rainstorms overwhelmed storm drains and caused extensive damage in El Paso and Juárez. Although the levees were not overtopped, the U.S. IBWC began planning a levee-raising project in conjunction with the Mexican section. From May through July of 2007 workers raised the levees from the Chamizal Channel to below the Ysleta-Zaragosa Bridge, in

⁵³¹ N.W. Assadian, Chrisie Vogel, Zhuping Sheng, U.V. Figueroa, and Miguel Palomo, "Heavy Metal Distribution in Open Canals and Drains in the Upper Rio Grande Basin," *Soil and Sediment Contamination*, Vol. 12, No. 3 (2003), 305-306, 320.

⁵³² "Chamizal Channel Clearing," http://www.ibwc.state.gov/Files/2003_report.pdf; The IBC became the International Boundary and Water Commission (IBWC) in 1944.

places as much as 3 feet. However, the IBWC could not guarantee that the project would meet the U.S. Federal Emergency Management Agency's (FEMA) requirement of a 3 ft. freeboard along the entirety of the rectified river, meaning that many areas could see overtopping in the future. FEMA has now included El Paso in its maps of flood insurance zones. The IBWC also began raising the levees above the Chamizal Channel in 2007, installing gaging stations at the Bridge of the Americas and the Ysleta-Zaragosa Bridge, and submitted requests to fund flood control projects in the Upper Valley and Canutillo.⁵³³ Despite the environmental outcomes, the Rectification Project did effectively address flood control, which had a positive impact on development for both El Paso and Ciudad Juárez.

Settling the permanent location for most of the border in the El Paso/Juárez Valley through rectification also allowed increased border enforcement. Having a precise location for the border settled jurisdictional limits, and eliminating meanders and bancos meant that smugglers and migrants could not slip into these areas and cross the river. The roads atop the levees made it much easier for Border Patrol agents to travel along the river. Rectification also made building a fence along the border feasible. At a meeting of the Texas Game and Fish Commission in Austin on July 11, 1940, the commissioners resolved to ask U.S. Senators Morris Sheppard and Tom Connally and the entire delegation of Texas U.S. House members to support building a border fence along the Rio Grande. Livestock ranchers and Texas stage agencies had been petitioning the Commission to arrange for a fence, in order to “contribute to national defense, and control cattle ticks, prevent smuggling, prevent cattle rustling, prevent illegal

⁵³³ “USIBWC Completes Rio Grande Levee-raising Project, Sediment removal Underway,” <http://www.ibwc.state.gov/Files/LeveeUpdateJuly07.pdf>; “Rio Grande Flood Control Levees, El Paso County, Texas, Fact Sheet,” International Boundary and Water Commission, United States Section, August 2007, www.ibwc.state.gov/Files/ElPasoLeveeFactSheet_060407.pdf

immigration, and guard the international border.”⁵³⁴ Federal fencing did not take place along the border at that time, but the idea was under consideration in the U.S for the rest of the twentieth century.

In September of 1993, Silvestre Reyes, Chief Patrol Agent for the El Paso Sector, U.S. Border Patrol, started Operation Hold the Line. Prior to that time the U.S. Border Patrol in the El Paso area concentrated on apprehending people entering illegally into the urban areas; entry into the rural areas was not a priority as the assumption was they would eventually come into the city in search of transportation. There were two aspects of the operation. First, three maintenance crews repaired the holes and breaches in the existing nine mile fence running along the river in downtown El Paso. Second, Reyes stationed 400 highly visible agents in Border Patrol vehicles within line-of-sight along the border from Monument No. 1 to Ysleta. The rationale for this new method of enforcement was to stop illegal entry before it occurred, reduce street crime and panhandling in El Paso, and diminish the harassment of Mexican Americans wrongly suspected of being Mexican citizens. The operation also included helicopter patrols. From September 1993 to September 1994, apprehensions dropped an average of 12,000 per month, from approximately 66,300 to 54,500.⁵³⁵ A 1994 Government Accounting Office study reported that the new enforcement strategy resulted in a 74% reduction in apprehensions in its second year, but conceded that the operation drove illegal crossers to less controlled areas along the border. The initiative’s success in reducing crime and drug smuggling was evidently quite popular, as 84% of Democratic primary voters polled in El Paso in February of 1994 were in favor of the operation

⁵³⁴ Texas Fish and Game Commission Minutes, Texas State Archives, Austin, RG TPWD I.06, Box 200, Vol. 2, page 575.

⁵³⁵ Frank D. Bean, Roland Chanove, Robert G. Cushing, Rodolfo de la Garza, Gary P. Freeman, Charles W. Haynes, and David Spener, “Illegal Mexican Migration & the United States/Mexico Border: The Effects of Operation Hold the Line on El Paso/Juárez,” (Population Research Center, University of Texas at Austin, July 1994), 7-8, 23.

and its continuance.⁵³⁶ Rectification made this visible, line-of-sight operation possible and because it was considered effective led to the erection of a larger, longer fence between El Paso and Juárez when national security became a primary concern in border enforcement.

Fencing the border between El Paso and Juárez is, like rectification, a continuation of altering the environment to meet societal and political priorities. After the terrorist attacks against the U.S. on September 11, 2001, fencing the entire U.S.-Mexico border had gained enough popular support in the U.S., although not unanimous approval, that the U.S. Congress began deliberating bills and amendments to fence the border in 2005. President George W. Bush signed into law the Secure Fence Act of 2006, which provided for building 700 miles of fence and barriers along the border.⁵³⁷ A group of 55 experts from Mexico and the U.S. met at the Colegio de la Frontera Norte May 3-4, 2007, for a workshop organized by the Mexican Secretariat of Environment and Natural Resources (SEMARNAT) to examine the proposed fence's environmental impacts. They discussed how the fence would disrupt animal migratory patterns, alter ecosystems, change the physical environment, and that building the fence would be in violation of existing environmental laws. The legal experts also pointed out that actions in one nation along a shared border would have consequences for their neighbor, and should only take place under treaty. Unfortunately, there were no mechanisms under international law that could stop the fencing project.⁵³⁸

By the 2000s, there were multiple laws prohibiting environmental damage, unlike during the 1930s. An exception is the Migratory Bird Treaty Act, implemented between the U.S. and

⁵³⁶ United States General Accounting Office, Report to the Chairman, Subcommittee on Information, Justice, Transportation and Agriculture, Committee on Government Operations, House of Representatives Border Control, "Revised Strategy Is Showing Some Positive Results," (Washington, D.C.: United States General Accounting Office December 1994), 21, 23.

⁵³⁷ U.S. Statutes at Large, 120 Stat. 2638-2640, October 26, 2006.

⁵³⁸ Ana Cordova, and Carlos De La Parra, eds., *A Barrier to Our Shared Environment: The Border Fence between the United States and Mexico* (Ensenada, B.C. México: El Colegio de la Frontera Norte, 2007), 11, 170-171.

Canada in 1916, which prohibited hunting and killing specific species and established hunting seasons for others. The treaty was extended to Mexico in 1936, and included provisions for habitat conservation. However, the Rectification Project began prior to 1936, and destroying or altering bird habitats did take place, but was considered at the time to only be temporary. The possibility of fencing the border prompted environmental groups in the U.S. to file objections to the Secure Fence Act prior to the bill's passage. They protested the fact that the 2005 Real ID Act allowed the Secretary of Homeland Security to waive in their entirety, without judicial review, earlier acts such as the National Environmental Policy Act (1969), the Migratory Bird Treaty Act (amended in 2000 to allow lawsuits against the government for violations of its provisions), the Endangered Species Act (1973), the Clean Air Act (1970), the Clean Water Act (originally called the Federal Water Pollution Control Act of 1948, amended 1972), the National Historic Preservation Act (1966), and the Coastal Zone Management Act (1972), in order to construct barriers. Mexico formally protested the fence on the basis that it violated prior agreements to protect the environment along the border.⁵³⁹ Lawsuits in the U.S. seeking injunctions to stop the fence have so far failed. El Paso County, the City of El Paso, El Paso County Water Improvement District No. 1, Hudspeth County Conservation and Reclamation District No. 1, Ysleta Del Sur Pueblo, La Frontera Audubon Society, Friends of the Wildlife Corridor, and Friends of the Atacosa Wildlife Refuge, filed suit against Michael Chertoff, Secretary of Homeland Security, to stop the fence before construction began in Texas. The suit alleged Chertoff had improperly waived 37 federal laws that would have blocked construction and failed to produce the environmental impact studies required under the National Environmental Policy Act (NEPA) and the Endangered Species Act. The Environmental

⁵³⁹ Manuel Roig-Franzia, Washington Post Foreign Service, "Mexico Calls U.S. Border Fence Severe Threat to Environment," *The Washington Post*, 16 November, 2007.

Protection Agency (EPA) also objected to the failure to provide detailed studies. The District Court for Western Texas, El Paso Division, rejected the suit on September 11, 2008. El Paso and the other litigants appealed to the Supreme Court, naming Janet Napolitano, Chertoff's successor, as the defendant. On June 14, 2009, the court declined to hear the case.⁵⁴⁰



Border Fence, Hart's Mill area, photograph by Joanne Kropp, November 2015.

⁵⁴⁰ Jay J. Johnson-Castro, Sr., "Border Wall Battle: Bad News vs. Good News," *The Narco News Bulletin*, 12 September 2008, www.narconews.com ; Alica A. Caldwell, "El Paso County Files Appeal to Stop Border Fence," *The Houston Chronicle*, 11 December, 2008; The Associated Press, "Court Turns Down Texas Counties over Border Fence," *The San Diego Union-Tribune*, 15 June, 2009; *County of El Paso v. Napolitano*, 08-751; Lindsay Eriksson and Melinda Taylor, "The Environmental Impacts of the Border Wall between Texas and Mexico," Accessed September 10, 2016, <https://law.utexas.edu/humanrights/borderwall/analysis/briefing-The-Environmental-Impacts-of-the-Border-Wall.pdf>



Border Fence, Facing Downstream – American Canal, Photo by Erich Schlegel, September 27, 2014.
<http://therivardreport.com/rio-grande-story/>

The long-term environmental consequences of the border fence along the Rio Grande are not yet clear, but the studies conducted prior to the project warned that construction would cause soil erosion, increase flooding in some areas, allow more proliferation of noxious plants, especially tamarisk, as well as affect the migratory patterns of both endangered animals and natural predators. An apparent outcome is an increase in the proliferation of gophers. Gopher tunneling wastes water in irrigation systems and causes soil erosion. Mature gophers can have territories as large as 2,200 square feet and population densities can range from 16-20 animals per acre. Females produce one litter per year with as many as 10 offspring. The border fence blocks many gopher predators, such as coyotes, wolves, foxes, and skunks, but provides a perch for hawks and owls. Eradication methods include inserting traffic flares into burrows and baiting

with strychnine and anticoagulants.⁵⁴¹ Poisoned bait has the potential of returning to the river during irrigation discharges. It is odd that the Texas A&M Extension Service recommended using strychnine as late as 2014 since it has the potential for secondary poisoning, but the agency did caution against using it in areas accessible to children and animals. The preferred method currently is to use carbon monoxide in burrows, according to professionals in the pest control industry.⁵⁴²

Sustainable water sources in arid regions are a global concern. Bi-national local, state, and federal support and cooperation made the Rio Grande Rectification Project a reality in the 1930s. The project established the border's location in most of the valley, improved flood control, protected irrigation, addressed soil conservation, and assured agricultural development in El Paso and Juárez, but permanently altered the environment. Today, Don Juan de Oñate would not recognize the river he named El Río Del Norte in 1598. As of September 2015, the Rio Grande in the El Paso/Ciudad Juárez Valley is a mere trickle, with cement-lined canals on both sides in the El Paso/Ciudad Juárez metroplex. The current population of El Paso is 877,248 and Ciudad Juárez is 1,422,863. In Juárez drinking water is not always treated and the water supply is not considered safe. In spite of drought, upstream diversions, evaporation, and waste due to overwatering, the river water is still reliable enough to feed the agricultural, industrial, and population growth of both cities, thanks to improvements in treating the groundwater. As a reminder of the separation of the political division of two nations sharing the same water sources, a 131 mile long, 18 foot high, rust colored fence runs along the U.S. side of the border north of the Franklin and American Canals, extending into the desert. Manned green and white U.S.

⁵⁴¹ Texas A&M AgriLife Extension, "Issues in Agriculture: The Newsletter about Integrated Pest Management in for the El Paso Valley," Vol. 39, Issue 2 (March 17, 2014), Accessed August 9, 2016, <http://elp.tamu.edu/files/2010/10/140317.pdf>

⁵⁴² According to Maurice Kropp, Certified Applicator for Texas and New Mexico, Owner, Kropp's Pest Control, El Paso, Texas.

Border Patrol vehicles are parked at intervals south of the fence along the U.S. canals and levees. Major highways run parallel to the river in many places on both sides of the river, and the bridges carry millions of vehicles and pedestrians across the river on a daily basis. Outside of the built urban areas, there are miles of canals and irrigation ditches watering neat rows of cotton, alfalfa, and pecan trees along the river, with houses usually surrounded by fruit trees. The burrowing owls that used to live along the river are gone in areas of low flow or concrete, but the tamarisk provides habitat for white-winged and mourning doves. Fish slip through the river and canals when the water is high enough, but fish in any quantity can only be found in stocked lakes, such as Ascarate Lake and Fabens Lake, and the reservoirs in New Mexico. The Rio Grande water is saline and contains metals from urban stormwater runoff and wastewater discharges, as well as fertilizers, pesticides and herbicides. The Rio Grande in the El Paso/Ciudad Juárez Valley has become a constructed and degraded environment.



Oñate Crossing Marker, Photograph by Joanne Kropp, November 2015.



A typical day crossing over the river in 2014.
International Cordova Bridge of the Americas, *IBWC Overview*, Last Modified 3/5/14
http://www.ibwc.state.gov/Files/CF_CR_IBWC_Overview_030514.pdf

Conclusion

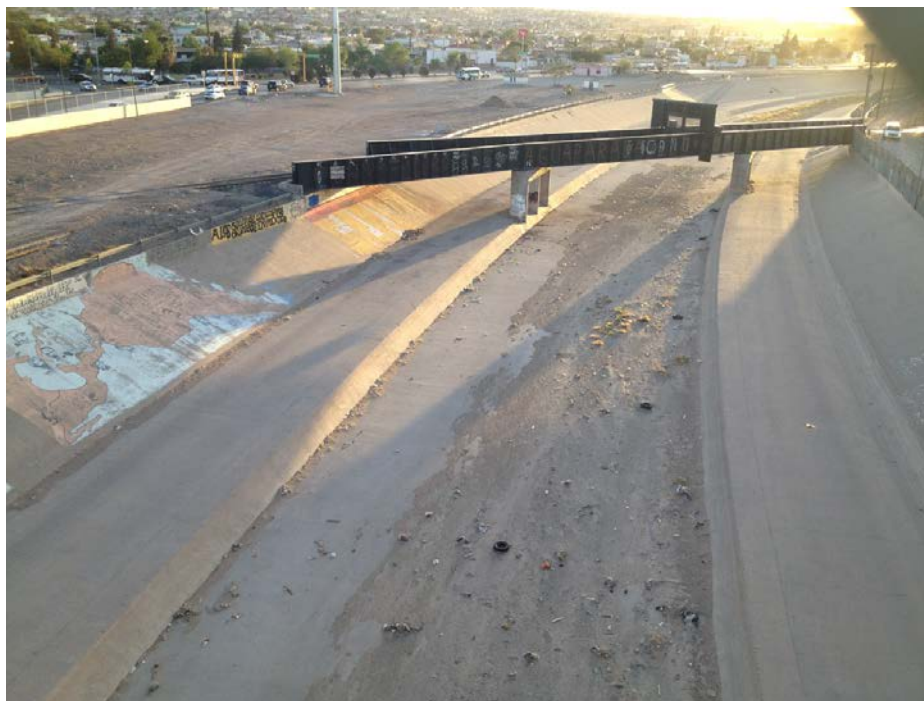
Many cities have rivers that run through them. Paris has the Seine, Rome the Tiber, Vienna the Danube, London the Thames. Even San Antonio, Texas, has the River Walk, with the San Antonio River running between shops and restaurants. These are beautiful locations that are popular tourist destinations. But these are also sites where the same political entities control both sides of their rivers, and are not twin cities on an international border. El Paso and Juárez share a cement scar that is often filled with trash and provides a canvas for graffiti. Locals still chuckle when visitors ask to see the mighty Rio Grande. Newcomers do not understand that the Rio Grande is so over-managed and so over-built that it is no longer a river, in the natural sense, at all. Due to water releases upstream sometimes there is water in the actual bed of the rectified river, and at others there is not. Most of the water runs through the canals, and even they are often empty.



Looking West, Rio Grande River, El Paso/Juárez, Photo by htabor. Last Modified June 21, 2009
<http://www.panoramio.com/photo/23678788>



*Looking west from the Paso del Norte bridge, with the Rio Grande trickling between Juárez on the left and El Paso on the right. Credit Paolo Pellegrin/Magnum for The New York Times
Andrew Rice “Life on the Line,” July 28, 2011.*



“Last Stop, El Paso and Ciudad Juárez”
Sergio Chapa/Borderzine.com, Last Modified Jan. 24, 2014.
<http://borderzine.com/2014/01/last-stop-el-paso-and-ciudad-juarez/>

Clearly, the Rio Grande in the El Paso/Juárez Valley is a geological oddity. It simply is not a river at all, in the true sense, in the valley, but rather, as noted above, “an intermittent torrential stream.” Due to climate and geology, there is not enough water to support robust agriculture that demands a lot of moisture, without immense engineering and technical work. Yet the Europeans who settled in the valley ignored that fact and introduced alien cultigens, almost immediately starting to draw more and more water from the inconsistent supply. Human beings may think they can “reclaim” arid lands and make them into something new, but not without great cost. As seen above, irrigation systems made agriculture profitable, but it took millions of dollars to make that possible. Irrigation and water delivery systems also adversely impacted the environment, and has required even more spending to ameliorate that damage.

People who settled along the entire Rio Grande thought that their legal systems could make sharing the water possible. As shown above, water law has a long history, but the Spanish law originally operative in the valley differed from the English Common law principles Anglos introduced. Legal solutions became even more complicated when the U.S.-Mexico War cut the river almost in half, leaving the headwaters and a long downstream portion entirely within the U.S. Interstate squabbles over water in the Rio Grande in the U.S. also had to deal with the inconsistent principles of prior appropriation and riparian water rights. Disputes between the U.S. and Mexico could not be resolved under international law, meaning that the two nations had to agree by treaty to settle boundary and water disputes.

Racial constructions in the U.S. justified the conquest of what is now the American Southwest, and fed into the selfish justifications for not equitably sharing water with Mexico, as seen in the treaties of 1906 and 1944. Setting the Rio Grande as the boundary between the U.S. and Mexico in 1848 further complicated the issue of water apportionment, and the meandering

nature of the Rio Grande in the El Paso/Juárez Valley made the placement of an exact location for the border impossible. Rectification helped solve that issue in part, but it was not until 1963 that the entire border in the valley became finite. The Rio Grande Rectification Project also made it possible to harden border enforcement with fencing, which has been a source of acrimony between the U.S. and Mexico. It is ironic that rectification, a rare instance of cooperation, led to more barriers, literally and figuratively, between the two nations.

The ideas that developed over time regarding conservation and reclamation melded technical and social engineering and, in the 1930s, made the Rectification Project possible. Although the project was not a perfect solution, its cooperative nature set the tone for later international efforts along the border to address shared environmental concerns. It was also an example of the culmination of the idea that nature could be controlled by men. The project was conceived and carried out by men, and the intersection of the project with the masculinity tropes categorizing the Civilian Conservation Corps illustrate the gendered aspects of environmental thought in the 1930s. These ideas were a continuation of the conceptions of dominating the natural world that evolved in the nineteenth and early twentieth centuries, and continue today.

The most negative outcome from the long history of altering the Rio Grande can be seen in the environmental degradation that has occurred over the centuries of human occupation along the river. If conservation for development was the primary objective of the Rectification Project, then these alterations can be viewed as positive. But, in the long term, the current efforts to protect and clean up the water supply along the border will have to continue the progress that has been made since the late twentieth century and into the early twenty-first. Future projections of population growth and the challenges of climate change will require measured, and equitable, solutions that address sustainability on both sides of the border. This will require bi-national

efforts, and in that regard the Rectification Project is an example that should be studied and adopted as a model.

This study asserts that the long history of settlement, irrigation, litigation, treaty negotiations, and construction along the Rio Grande is a cautionary tale that is significant in the field of Borderlands History. The environmental history of any river demonstrates ecological, economic, legal, and political issues, but rivers that serve as boundaries can teach more nuanced lessons. The focus on the Rio Grande Rectification Project is at the center of this study because it demonstrates how the history of environmental thought prior to the 1930s led to an attempt to, as E. Benjamin Andrews put it in 1904, “take nature by the throat and force her to do his [the men responsible for the project] bidding.” It retrospect, it is almost astonishing that men were able take such a long stretch of a natural formation and convert it into a piece of construction that suited their desires. In that aspect, the project was an exemplary engineering feat that proved men could do as they wished with the natural world. But, as seen above, that project, as well as the introduction of Elephant Butte Dam, are akin to letting the genie out of the bottle. Once the construction started, it required more and more efforts to correct unexpected consequences. At the time, rectification appeared to be a permanent solution for flooding, a means of stabilizing irrigation, and an end to jurisdictional disputes over the location of the border. Flooding has been greatly reduced, but rectification could not increase the amount of water in the river. Water apportionment is an ongoing issue today, and irrigators still face problems regarding allotments as well as poor quality river water.

There is more work to be done in regards to what this study has started. There are still unanswered question regarding the role of Mexico and Mexicans in the Rio Grande Rectification Project, as well as its impact on local individuals. That information was difficult to obtain for this

work, primarily due to the nature and availability of the documents. The records, compiled by technocrats, provide incredible detail regarding engineering studies, construction schematics, and reports to justify budgets, but only the merest hints about any social history. Part of the problem is the inherent nature of the IBWC, which as an entity under the U.S. State Department and the Mexican Foreign Ministry can be extremely reluctant to provide information. This is not unusual, as diplomacy is most often conducted outside the public's view. Furthermore, the IBWC has to serve two different governments and has the almost impossible task of making all parties happy. Robert J. McCarthy, former General Counsel, U.S. Section, IBWC, notes,

“scholars routinely catalogue the alleged failings of the IBWC’s dominant U.S. Section as: secretive; beholden to regional agricultural interests; indifferent to disappearing water sources; apathetic about associated ecological crises; abusive to its employees; lacking essential diplomatic and professional skills; unresponsive to the needs of a growing population; and hamstrung by a too-timid reading of treaty language. Proposals for abolition or radical reformation of the USIBWC are legion.”

McCarthy’s sources for these assertions are harsh critics, but he goes on to say that, “the IBWC generally won high praise throughout the twentieth century for its engineering expertise and ability to diplomatically resolve difficult transboundary water issues.”⁵⁴³

The IBWC, the USBR, and all of the affiliated Mexican agencies that worked on the Rectification Project deserve more attention and analysis, as does the project itself. With the exception of Jerry Mueller’s 1975 study, and some brief treatments in later studies, this moment in the Rio Grande’s long history has not gotten much attention. That is rather odd because it was an important diplomatic, legal, engineering, and environmental moment in time, and had notable ramifications. It may not be a pivotal moment, but it is as significant today as it was at the time.

⁵⁴³ Robert J. McCarthy, “Executive Authority, Adaptive treaty Interpretation, and the International Boundary and Water Commission, U.S.-Mexico,” *University of Denver Law Review*, 14/197 (Spring, 2011), 2-3, 17.

As G. Frederick Reinhardt, who worked for the USIBC as a statistician during the 1930s, noted in 1937,

“the commencement of work on the Rio Grande Rectification Project represented the undertaking of a plan which had been dismissed by many as far too complex to ever be realized. It is believed that for the first time in history, two sovereign States [sic] have entered into cooperative action to change peacefully their common boundary through an extensive area for the benefit of their citizens dwelling along that frontier.”⁵⁴⁴

In that regard alone, the peaceful imposition of a border location and the immense engineering it took to accomplish it, make the Rio Grande Rectification Project worthy of more study.

⁵⁴⁴ G. Frederick Reinhardt, “Rectification of the Rio Grande in the El Paso-Juarez Valley,” *The American Journal of International Law*, Vol. 31, No. 1 (January, 1937), 54.

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Appendix

RECTIFICATION OF RIO GRANDE

Convention signed at Mexico February 1, 1933, with annexes and exchanges of notes
Senate advice and consent to ratification, with an amendment, April 25, 1933⁵⁴⁵
Ratified by the President of the United States, with an amendment, October 20, 1933⁵⁴⁶
Ratifications exchanged at Washington November 10, 1933
Entered into force November 10, 1933
Proclaimed by the President of the United States November 13, 1933

CONVENTION BETWEEN THE UNITED STATES OF AMERICA AND THE UNITED MEXICAN STATES FOR THE RECTIFICATION OF THE RIO GRANDE (RIO BRAVO DEL NORTE) IN THE EL PASO-JUAREZ VALLEY

The United States of America and the United Mexican States having taken into consideration the studies and engineering plans carried on by the International Boundary Commission, and specially directed to relieve the towns and agricultural lands located within the El Paso-Juarez Valley from flood dangers, and securing at the same time the stabilization of the international boundary line, which, owing to the present meandering nature of the river it has not been possible to hold within the mean line of its channel; and fully conscious of the great importance involved in this matter, both from a local point of view as well as from a good international understanding, have resolved to under-take, in common agreement and cooperation, the necessary works as provided in Minute 129 (dated July 31, 1930) of the International Boundary Commission, approved by the two Governments in the manner provided by treaty; and in order to give legal and final form to the project, have named as their plenipotentiaries:

The President of the United States of America, J. Reuben Clark, Jr., Ambassador Extraordinary and Plenipotentiary of the United States of America to Mexico; and

The President of the United Mexican States, Doctor José Manuel Puig Cassauranc, Secretary of State for Foreign Affairs;

Who, after having communicated their respective full powers and having found them in due and proper form, have agreed on the following articles:

I

The Government of the United States of America and the Government of the United Mexican States have agreed to carry out the Rio Grande rectification works provided for in Minute 129 of the International Boundary Commission and annexes thereto, approved by both

⁵⁴⁵ The United States amendment called for correcting the date at the close of art. V from Nov. 20, 1905, to Mar. 20, 1905.

⁵⁴⁶ The text printed here is the amended text as proclaimed by the President. Ratified by Mexico October 6, 1933.

Governments, in that part of the river beginning at the point of intersection of the present river channel with the located line as shown in map, exhibit No. 2 of Minute 1290 of said Commission (said intersection being south of Monument 15 of the boundary polygon of Córdoba Island) and ending at Box Canyon.

The terms of this Convention and of Minute 129 shall apply exclusively to river rectification within the limits above set out.

The two Governments shall study such further minutes and regulations as may be submitted by the International Boundary Commission and, finding them acceptable shall approve same in order to carry out the material execution of the works in accordance with the term of this Convention. The works shall be begun after this Convention becomes effective.

II

For the execution of the works there shall be followed the procedure outlined in the technical study of the project. The works shall be begun and shall be carried on primarily from the lower end, but at the same time and for reasons of necessity works may be carried on in the upper sections of the valley.

III

In consideration of the difference existing in the benefits derived by each of the contracting countries by the rectification works, the probable cost of the works will be defrayed by both Governments in the proportion of eighty-eight per cent (88 %) by the United States of America and of twelve per cent (12 %) by the United Mexican States.

IV

The direction and inspection of the works shall be under the International Boundary Commission, each Government employing for the construction of that portion of the work it undertakes, the agency that in accordance with its administrative organization should carry on the work.

V

The International Boundary Commission shall survey the ground to be used as the right of way to be occupied by the rectified channel, as well as the parts to be cut from both sides of said channel. Within thirty days after a cut has been made, it shall mark the boundaries on the ground, there being a strict superficial compensation in total of the areas taken from each country. Once the corresponding maps have been prepared, the Commission shall eliminate these areas from the provisions of Article II of the Convention of November 12, 1884, in similar manner to that adopted in the Convention of March 20, 1905 for the elimination of bancos.

VI

For the sole purpose of equalizing areas, the axis of the rectified channel shall be the international boundary line. The parcels of land that, as a result of these cuts or of merely taking

the new axis of the channel as the boundary line, shall remain on the American side of the axis of the rectified channel shall be the territory and property of the United States of America, and the territory and property of the United Mexican States those on the opposite side, each Government mutually surrendering in favor of the other the acquired lights over such parcels.

In the completed rectified river channel-both in its normal and constructed sections-and in any completed portion thereof, the permanent international boundary shall be the middle of the deepest channel of the river within such rectified river channel.

VII

Lands within the rectified channel, as well as those which, upon segregation, pass from the territory of one country to that of the other, shall be acquired in full ownership by the Government in whose territory said lands are at the present time; and the lands passing as provided in Article V hereof, from one country to the other, shall pass to each Government respectively in absolute sovereignty and ownership, and without encumbrance of any kind, and without private national titles.

VIII

The construction of works shall not confer on the contracting parties any property rights in or any jurisdiction over the territory of the other. The completed work shall constitute part of the territory and shall be the property of the country within which it lies.

Each Government shall respectively secure title, control, and jurisdiction of its half of the flood channel, from the axis of that channel to the outer edge of the acquired right of way on its own side, as this channel is described and mapped in the International Boundary Commission Minute number 129, and the maps, plans, and specifications attached thereto, which Minute, maps, plans, and specifications are attached hereto and made a part of this Convention.' Each Government shall permanently retain full title, control, and jurisdiction of that part of the flood channel constructed as described, from the deepest channel of the running water in the rectified channel to the outer edge of such acquired right of way.

IX

Construction shall be suspended upon request of either Government, if it be proved that the works are being constructed outside of the conditions herein stipulated or fixed in the approved plan.

X

In the event there be presented private or national claims for the construction or maintenance of the rectified channel, or for causes connected with the works of rectification, each Government shall assume and adjust such claims as arise within its own territory.

XI

The International Boundary Commission is charged hereafter with the maintenance and preservation of the rectified channel. To this end the Commission shall submit, for the approval of both Governments, the regulations that should be issued to make effective said maintenance. Both Governments bind themselves to exempt from import duties all materials, implements, equipment, and supplies intended for the works, and passing from one country to the other.

XIII

The present Convention is drawn up both in the English and Spanish languages.

XIV

The present Convention shall be ratified by the High Contracting Parties in accordance with their respective laws, and the ratifications shall be exchanged in the City of Washington as soon as possible. This Convention will come into force from the date of the exchange of ratifications.

In witness whereof the Plenipotentiaries mentioned above have signed this Convention and have affixed their respective seals.

Done in duplicate at the City of Mexico this first day of February one thousand nine hundred and thirty-three.

J. Reuben Clark, Jr. [SEAL]

Puig [SEAL]

ANNEXES

MINUTE 129 OF THE INTERNATIONAL BOUNDARY COMMISSION DATED JULY 31, 1930, AND ANNEXES THERETO, REFERRED TO IN ARTICLE I OF THIS CONVENTION
INTERNATIONAL BOUNDARY COMMISSION
UNITED STATES AND MEXICO
MEXICO CITY

MINUTE NO. 129 July 31, 1930
Subject: Report on Rio Grande Rectification

The Commission met in the conference room at the Department of Foreign Relations, Mexico City, at ten o'clock a.m. July 31, 1930, in accordance with Minute No. 128, to complete its action in reporting and recommending a plan for Rio Grande rectification.

(1) Each section of the International Boundary Commission has been requested by the Foreign Relations Department of its Government to study and develop an international plan for the removal of the flood menace of the Rio Grande from the El Paso-Juarez Valley. Studies and investigations have now reached the point where it is possible to report to the two Governments a

definite plan with estimates of cost; and the following is the report of the International Boundary Commissioners, together with a joint report prepared by the consulting engineers and technical advisers. Minute No. 111 of the Joint Commission, dated December 21, 1928, outlined in a general way the necessities for international action and gave a general description of the areas involved, a preliminary summary of the proposed plan and recommended proceeding with the development of the final details of the plans and estimates. During the past few months a most important step taken by the Commission consisted in rendering decisions determining the national jurisdiction and dominion of a number of banco cases in the area under consideration.

(2) The plan prepared and developed by the joint Commission is attached hereto as an exhibit to this minute. In transmitting it to the two Governments the Commissioners offer it as being both practical and feasible as an engineering and economic project. In general the plan consists of straightening the present river channel, effecting decrease in length from one hundred fifty-five (155) miles to eighty-eight (88) miles, and confining this channel between two parallel levees. In addition to this channel the plan includes the construction of a flood retention dam at the only available site, twenty-two (22) miles below Elephant Butte on the Rio Grande, creating reservoir storage of one hundred thousand (100,000) acre feet. Careful studies based on actual past flood performance show the advantage of reducing the flood flow reaching El Paso-Juarez by storage in the proposed reservoir. The reduction in flood flow thru the El Paso-Juarez Valley accomplished by such storage of flood waters effects a saving of a quarter of a million dollars in the works required thru the valley by decreasing the size of the channel and reducing the area required for right-of-way and amount of yardage in levees.

(3) The meandering and uncontrolled Rio Grande below El Paso-Juarez has in recent years become a very serious menace to adjacent lands on both sides. Authorities of both countries have unsuccessfully attempted the protection of the improvements in the El Paso-Juarez Valley and the two cities. Considering the futility of providing adequate and proper protection on the present meandering river location, the two affected communities have expended the limit of a reasonable and justifiable amount in local flood protection works. A proper and sound plan for accomplishing desired results lies in a coordinated international project.

(4) Existing treaties provide for the center of the Rio Grande, except in isolated cases, being the International Boundary line. The present river channel, with excessive length, was produced by natural conditions which no longer exist. Increase in settlement, cultivation and values justify both Governments in considering means of removing the flood menace and providing an adequate flood channel.

(5) Actual field surveys were continued in the location on the ground of a rectified channel subject, of course, to some later slight modification, but generally sufficiently definite to permit estimates of right-of-way and construction costs. With office and field location of this channel line which generally follows and straightens the present meandering river, it has been possible to estimate acreages and values of the relatively small areas that would be detached from one country and attached to the other-so balanced in area that neither country would gain nor lose national territory.

(6) At the present time the bed of the Rio Grande between El Paso and Juarez is at a higher elevation than some of the streets and other properties of the two cities. Accumulations of sediment are continuing to aggravate this situation, and until proper grades and hydraulic conditions are introduced by artificial works, there are no means for carrying off these deposits which are encroaching upon the carrying capacity of the channel. The consensus of opinion of

engineers who have studied the situation is that the correction lies in the plan proposed of straightening and confining the channel. One of the principal requirements to permit such artificial rectification is the equitable adjustment of the areas which would be necessarily detached from one side of the river and attached to the other in the straightening process. The plan evolved, of having each Government acquire the private titles to these equal areas for later exchange, provides a feasible solution. These areas to be acquired are generally seeped and water-logged, and so shaped and situated as to be unsuited for proper irrigation and drainage.

(7) The benefits to be derived from the straightened and rectified channel plans are mutual to the two Governments in affording flood protection and in permitting cultivation, improvement and settlement of even larger areas adjoining the Rio Grande than are now possible under the meandering river conditions. It is of utmost importance that the Governments own and control the flood channel in order that private encroachments be definitely prevented and eliminated. Such ownership and control will also be of great assistance in the enforcement of national immigration and customs laws of both countries.

(8) In giving consideration to the determination of proper and justifiable proration of costs between the two countries, conditions other than gross and irrigated areas are necessarily included. Economic features and values in the two countries are distinct and different. While the use of areas may be entirely proper in a distribution of costs for irrigation development, this 'unit of proration for an international flood control plan is unsuitable and produces serious irregularities. The Commission has taken into consideration the facts that each country would receive according to the areas and their values to be protected rather than the benefits each would receive on the sole acreage basis. On the American side of the valley there are about fifty-three thousand (53,000) acres of land under the Rio Grande Federal Irrigation Project with water rights assured; the greater part of which is in full cultivation, and about seventeen thousand (17,000) acres in the lower portion of the valley below the project limits which are irrigated with project surplus water. The total irrigated area is seventy thousand (70,000) acres. This area is served with irrigation and drainage works, and first-class roads. Finance companies facilitate the financing of the production and distribution of agricultural products.

(9) On the Mexican side of the valley there are about thirty-five thousand (35,000) acres of land in cultivation, of which twenty thousand (20,000) acres have assured water rights under the Rio Grande Federal Irrigation Project, provided for by the Water Treaty of 1906. Practically no drainage works have been constructed and the irrigation works are largely insufficient. The productiveness of the lands on the Mexican side is under these circumstances much less than the corresponding lands on the north side of the river, and there are large areas with insignificant or no production. No major road improvements exist, and the finance companies organized to serve Mexican farmers are very limited in number and resources. The industrial plants and means for handling agricultural products are in very small proportion when compared with those in the valley in the United States.

(10) The estimated value of agricultural investments in the American part of the valley, according to figures assembled by the Bureau of Reclamation, including purchase of land and its preparation, farm improvements, equipment and live stock, is seventeen million dollars (\$17,000,000) or thirty-four million gold pesos. The value of agricultural improvements on the Mexican side as estimated by Engineer Salvador Arroyo, Chief of the Flood Protection Work, is five million four hundred thousand (\$5,400,000) gold pesos. Comparing these agricultural values in one part of the valley with those in the other it is seen that the Mexican side represents

thirteen per cent of the total and the American eighty-seven per cent. Valley lands on either side of the river without water rights and assured irrigation service have very nominal value as compared with the lands obtaining water service from project sources; a comparison of such areas on this basis results in twenty-seven per cent for Mexico and seventy-three per cent for the United States.

(11) As the cities and suburbs of El Paso and Juarez not only are included in the flood protection plan, but either directly or indirectly would receive a large part of the benefits of the rectification of the channel, the Commission has considered the proration of values which each city bears to the other and giving proper weights to various percentages, believes the justifiable proration to be twelve (12) per cent for Mexico and eighty-eight (88) per cent for the United States.

(12) With reference to the estimates (exhibit number five of the engineers report) the grand total of six million one hundred six thousand five hundred dollars (\$6,106,500) includes certain items in which the Commissioners concur as being non-proratable and properly and practically chargeable to each Government separately. These are: rights-of-way four hundred twelve thousand five hundred dollars (\$412,500), for purchase of private channel rights above Cordova seventy-five thousand dollars (\$75,000), segregated tracts two hundred sixty-six thousand dollars (\$266,000), changes in irrigation works two hundred twenty-five thousand dollars (\$225,000). The total of these items, with twenty per cent overhead and contingencies is one million one hundred seventy-four thousand two hundred dollars (\$1,174,200). This amount subtracted from the grand total leaves a proratable total of four million nine hundred thirty-two thousand three hundred dollars (\$4,932,300). Using twelve per cent (12 %) and eighty-eight per cent (88%) as the basis of proration Mexico's share of the cost of the project would be five hundred ninety-one thousand eight hundred seventy-six dollars (\$591,876) and that of the United States four million three hundred forty thousand four hundred twenty-four dollars (\$4,340,424).

(13) On the basis that this report and the engineers' statement have been prepared and submitted with the view of generally straightening the present river location between the International Dam above El Paso-Juarez and the Box Canyon below Fort Quitman, the question of using the present river at Fabens or following the boundary route on the south of the San Efizario area is left for later determination. From the data at hand, apparently there is argument in favor of both routes. Following either the present river or the boundary line route requires adjustment of detached areas, and the proposed channel below this section can be so located as to compensate for any inequalities of such areas.

(14) The following are the recommendations of the Commission:

(a) The Commissioners recommend that the two Governments approve the plan for river rectification as outlined in the attached engineering report, including the feature of the flood retention dam, the general straightening of the present river location and the establishment of a flood channel which generally will follow and straighten the present river from International Dam to the Box Canyon below Fort Quitman.

(b) That both countries in view of the serious situation proceed to an agreement, without delay, which will carry into effect the engineering and construction features as outlined in the attached report.

(c) That the International Boundary Commission be authorized to prepare detail plans, and to direct and supervise the construction and all other engineering operations, utilizing such established governmental agencies as each government may deem proper.

- (d) That each section of the International Boundary Commission be authorized to acquire for its country the necessary rights-of-way and detached areas located within its territorial limits, thru the proper governmental agencies.
- (e) That agreement between the two Governments provide for the exchange of one-half of the area required for right-of-way and the total area of detached tracts of each country.
- (f) That the total proratable cost of four million nine hundred thirty two thousand three hundred dollars (\$4,932,300) be divided between Mexico and the United States on the basis of twelve per cent (12%) and eighty-eight per cent (88%) respectively, and that each Government provide annually such required appropriations as will complete the work in four or five years.
- (g) That the agreement between the two countries provide for the jurisdiction of the International Boundary Commission over all matters concerning the rectified channel.
- (h) That this Commission be authorized to adopt such rules and regulations as it may deem necessary to the end that the preservation of the rectified channel may be perpetuated.
- (i) That each country hold the other immune from all private or national claims arising from the construction and maintenance of the rectified channel or any other cause whatsoever in connection with this project.

Respectfully submitted.

The Commission adjourned to meet again at the call of either of the Commissioners.

L. M. LAWSON

Commissioner for the United States

GUSTAVO P. SERRANO

Commissioner for Mexico

MERVIN B. MOORE

Acting Secretary of the United States Section

Jose HERNANDEZ OJEDA

Secretary of the Mexican Section

JOINT REPORT OF CONSULTING ENGINEERS RIO GRANDE RECTIFICATION EL PASO-JUAREZ VALLEY

Mexico, D.F.

July 16, 1930

1. INTRODUCTION

Outline of Proposed Plan

- a) It is proposed to reduce materially the flood flow at El Paso-Juarez by the construction of a detention dam with a one hundred thousand (100,000) acre foot (123,350,000 cubic meter) reservoir at Caballo, and to control this flood flow thru the El Paso-Juarez Valley in a shortened channel by the construction of parallel levees. The proposed artificial channel will follow and

rectify, in a general way, the present river from Land Monument Number One to the Box Canyon below Fort Quitman, and is so located as to segregate the same area from each country.

b) The general engineering features of the project involve: the reduction of river length from one hundred fifty-five (155) miles (247 kilometers) to eighty-eight (88) miles (141 kilometers); the establishment between levees of a floodway five hundred ninety (590) feet (180 meters) wide with a capacity of eleven thousand (11,000) second feet (314 cubic meters per second); and the increasing of the gradient from a slope of .00035 (1.82 feet per mile) to a slope of .00061 (3.20 feet per mile). The levees require the placement of eight million nine hundred eighty-five thousand (8,985,000) cubic yards (6,870,000 cubic meters) of earth, their average height being 7.5 feet (2.25 meters). Four million seven hundred seventy-five thousand (4,775,000) cubic yards (3,650,000 cubic meters) of earth are required to be excavated to provide artificial channel. The areas required for right-of-way for this channel are four thousand seventy-five (4,075) acres (1650 hectares) from the United States and also four thousand seventy-five (4,075) acres (1650 hectares) from Mexico.

(c) The tentative proposed location of the rectified channel segregates three thousand four hundred sixty (3460) acres (1400 hectares) from the United States and also three thousand four hundred sixty (3460) acres (1400 hectares) from Mexico.

(d) The estimated cost of the project, including Caballo Dam, is about six million (6,000,000) dollars.

(e) This project will eliminate the flood menace throughout the El Paso-Juarez Valley in both the United States and Mexico, will prevent channel changes and detachment of areas from one country to the other, and will permit the reclaiming of low-lying areas.

2. Present Conditions

(a) The Rio Grande forms generally the International Boundary between the United States and Mexico from Land Monument Number One to the Box Canyon below Fort Quitman in the El Paso-Juarez Valley, and is a meandering stream subject to changes, creating detached areas from one country to the other.

(b) The gross area of valley land in both the United States and Mexico, between El Paso-Juarez and the Box Canyon, is one hundred sixty-five thousand (165,000) acres (66,000 hectares) of which ninety six thousand (96,000) acres (38,400 hectares) are in the United States and sixty nine thousand (69,000) acres (27,600 hectares) are in Mexico. Estimated values existing in the cities of El Paso and Juarez and their valleys, including irrigation and drainage works and improved roads, are in excess of one hundred million dollars (\$ 100,000,000).

(c) Notwithstanding the fact that the present total amount of sediment annually carried thru this valley by the Rio Grande is only a very small percentage of that carried previous to the construction of the Elephant Butte Dam, the absence of the former large scouring floods has resulted in the silting up of the river channel to a point where rainfall discharges from arroyos entering the river between Elephant Butte and El Paso-Juarez menace the improved and developed properties of both cities and valley lands. Only large floods of destructive proportions are capable of eroding accumulations of sediment as they now occur in the meandering channel.

(d) The Mexican Department of Communications and Public Works and the city and county of El Paso have expended in the last few years over seven hundred fifty thousand dollars (\$750,000) to protect the cities of El Paso-Juarez and the Valley lands from floods. These works consist largely of levy built along the banks of the meandering channel, and require constant strengthening and repair on account of the raising of the river bed. A more substantial and effective plan must be adopted to secure permanent and efficient protection.

II. DETAIL REPORT

Since the joint preliminary report, dated December 1928, was submitted to the Commission, location surveys covering the entire length of river from the cities of El Paso and Juarez to Quitman Canyon have been completed. These surveys have furnished additional data, and form in a large measure the basis for the report which follows.

1. Description

(a) The Rio Grande is a sediment bearing stream and as such is constantly building up its bed, and would from this cause, in time of flood, change its channel to a lower location where it would again start building up its bed and repeat the cycle at some future flood stage. This phase of changing channel has been largely prevented thru El Paso-Juarez Valley by the construction of artificial works, such as railroad and road grades, canal and drain banks, and in late years, levees. Under these conditions the river bed has been continuously elevated. The Elephant Butte Dam was completed in the year 1916, and as a result of its function of providing an irrigation supply during years of low run-off, it stores the floods, which previous to its construction had passed on down the river. The action of these floods was to scour out the river channel, partly by carrying deposits on thru the valleys and partly by making deposits upon the valley floor whenever bank overflow stage was reached. The absence, since the completion of Elephant Butte Dam, of large scouring floods has changed the characteristics of the river channel thru the El Paso-Juarez Valley. Although large floods have been controlled behind the Elephant Butte Dam, smaller floods from the run-off area lying between Elephant Butte and El Paso-Juarez are of annual occurrence. These usually occur during the rainy season, that is, in August and September, and are generally flashy in character, the peak lasting only a few hours, and would pass harmlessly thru the valley were it not for the elevated bed.

(b) With the first release of clear water from Elephant Butte, a limited scouring of the river channel began immediately below the dam. The clear water picked up the finer particles of silt and sand and carried them downstream. This effect has reached some forty miles (64 kilometers) below Elephant Butte, and might eventually reach El Paso-Juarez and degrade the river thru the El Paso-Juarez Valley, were it not for the annual increment of sand, gravel and silt brought into the river channel from the many side arroyos which debouch into the stream along its course between the dam and El Paso-Juarez. Even this annual increment of sand might be carried on were it not for the need of diverting the flow onto lands for irrigation. Three diversions are made above El Paso, one each at Percha, the Leasburg the Mesilla Dams. The main diversions in the El Paso Valley are at the International Dam, where lands of both countries are served, and at the Riverside and Tornillo headings, where supplementary diversions to American lands are made. At each of these diversions sand skimming and canal sluicing devices are used so that a great percentage of the sand and silt is returned to the river bed, while a great percentage of the water is diverted for the irrigation of the lands. This process continuously returns the sand to the river bed while also continuously depleting the volume, and hence the carrying capacity.

2. Caballo Dam and Reservoir

(a) The uncontrolled drainage areas which lie between Elephant Butte and El Paso-Juarez total about eight thousand (8,000) square miles (20,700 square kilometers). Large parts of this area have dead drainage with no direct outlet into the Rio Grande. About two thousand three hundred (2300) square miles (6,000 square kilometers) drain directly into the river, of which some one

thousand two hundred (1200) square miles (3100 square kilometers) are above and would be controlled by a dam constructed at the Caballo site.

(b) This damsite is located in Sierra County, New Mexico on the Rio Grande about twenty-two (22) miles (35 kilometers) below Elephant Butte Dam. Studies of the Caballo Dam and the resulting reservoir have been made by the Bureau of Reclamation, Department of the Interior, United States Government, in conjunction with the proposed water power development at Elephant Butte. These studies were begun in the year 1924 and included the surveying of the site, the testing of the foundation, the design and cost estimates of structures of various heights, and the effect on water supply and flood control. Two reports were written by the United States Bureau of Reclamation engineers, covering this dam and related features, one dated December 15, 1924, and the other April 1925.

3. River Discharge at El Paso-Juarez

(a) Floods at El Paso-Juarez occurring since the completion of Elephant Butte Dam have been built up from the run-off of the area between Elephant Butte and El Paso-Juarez, supplemented by the concurrent irrigation discharge from the reservoir. There is a possibility that such floods would be increased at such times when the reservoir was full and water passing over the spillway.

4. Probable Spill at Elephant Butte Dam

(a) An estimate of the probable spill at Elephant Butte Dam has been made from a study of the spills as shown in the report of the Denver office of the Bureau of Reclamation, dated March 10, 1928 and entitled "Review of Quinton, Code and Hill Reports on Elephant Butte Power Development of July 2, 1927 and September 30, 1927". This review sets up the following assumptions:

1. Irrigation storage is to be carried to elevation 4401, leaving six feet (1.83 meters), or the elevation 4407, for flood control storage. This six feet (1.83 meters) will store two hundred thirty-nine thousand (239,000) acre feet (294.806,000 cubic meters). Additional flood control storage of about one hundred thousand (100,000) acre feet (123.350,000 cubic meters) is Available to elevation 4410, at which height a discharge of about four thousand five hundred (4,500) second feet (128 cubic meters per second) will be passing over the spillway crest.
2. Irrigation demand is to be limited to seven hundred thousand (700,000) acre feet (863.450,000 cubic meters) annually when on June 30th of any year the reservoir content is less than one million five hundred thousand (1.500,000) acre feet (1.850,250,000 cubic meters). Irrigation demand is to be limited to seven hundred eighty-seven thousand (787,000) acre feet (970.764,000 cubic meters) annually when on June 30th of any year the reservoir content is more than one million five hundred thousand (1.500,000) acre feet (1.850,250,000 cubic meters).
3. Reservoir capacity depletion thru silt deposit is at the average rate of twenty thousand (20,000) acre feet (26.670,000 cubic meters) per year.
4. San Marcial, New Mexico inflow records are corrected for changed conditions above.
5. The cycle of inflow, with the corrections, will repeat using the year 1898 as equal to 1930; the reservoir was full on January 1, 1898, and the irrigation storage capacity had been depleted by silt inflow to two million one hundred thousand (2.100,000) acre feet, (2.580,350,000 cubic meters) on that date.

(b) These assumed conditions required the theoretical use of flood storage in the years 1930, 1937, 1944, 1948, 1953, 1954, and 1956, with the maximum requirements coming in 1956. If a flow of four thousand five hundred (4500) second feet (128 cubic meters per second) was started in 1956 at the time the water reached elevation 4401 or the limit of irrigation storage a flow over

the spillway of 4500 second feet (128 cubic meters) would have been just reached at the end of the flood. This condition occurs but once in the assumed cycle of thirty years and spill has not been necessary during the fifteen years of actual reservoir operation 1915-1930. Therefore, it seems safe to assume that the probable spill from Elephant Butte Dam will not at any time be more than six thousand (6,000) second feet (171 cubic meters per second).

5. Probable Floods at El Paso-Juarez

(a) The largest flood at El Paso-Juarez since the building of Elephant Butte Dam occurred on September 1, 1925 when a peak of thirteen thousand five hundred (13,500) second feet (382 cubic meters per second) passed the gauging station at Courchesne. This flood resulted from heavy rainfall in the Black Range between Elephant Butte and Leasburg, on top of a flow of two thousand (2000) second feet (57 cubic meters per second) already released from the reservoir. If a spill of six thousand (6000) second feet (170 cubic meters per second) was occurring at the time of this flood, a peak of about eighteen thousand (18,000) second feet (510 cubic meters per second) would have occurred at El Paso-Juarez. If the Caballo Dam and reservoir had been available at the time of this flood, and if the six thousand (6000) second feet (170 cubic meters per second) of spill was occurring at Elephant Butte prior information of rain on the tributaries would have permitted the closing of the Caballo gates before the flow of the tributaries could have reached the Rio Grande, and the resulting peak at El Paso-Juarez could have been reduced to between ten thousand (10,000) and eleven thousand (11,000) second feet (283 and 314 cubic meters per second). The Caballo reservoir, by controlling one-half of the direct drainage area, and by acting as a temporary check on the spills from Elephant Butte Dam will reduce by almost one-half the probable peak at El Paso-Juarez.

6. Drainage Area in El Paso-Juarez Valley

At El Paso-Juarez

(a) The Arroyo Colorado empties into the river immediately above the city of Juarez, Chihuahua, Mexico. This arroyo has been estimated to have had a peak flood of some three thousand (3,000) second feet (85 cubic meters per second). Other smaller arroyos empty into the river directly above the International Dam. Their drainage areas are small, and their discharge, together with that of the Arroyo Colorado, cannot increase the peak floods in the Rio Grande except in the improbable event of their occurrence simultaneously with the peak flow past El Paso-Juarez. Additional freeboard has been allowed in the design to take care of this improbable occurrence.

Below El Paso-Juarez

(b) Practically no direct discharge of side drainage occurs below El Paso-Juarez until the Arroyo Alamo in Hudspeth County is reached. Below this point three large arroyos and many small ones empty directly into the river. The total drainage area on the American side between the Arroyo Alamo and Quitman Canyon is six hundred eighty (680) square miles (1760 square kilometers), of which four hundred ninety (490) square miles (1270 square kilometers) have direct discharge into the river and one hundred ninety (190) square miles (490 square kilometers) are indirectly discharged into the river. The drainage area on the Mexican side is considerably less, although, due to the absence of maps, little detail knowledge is available. However, no arroyos empty directly into the river from the south until considerably below the town of McNary, Texas, and observations of the arroyo channels below this point show that their drainage areas are probably limited and their discharges small.

(c) The three largest arroyos on the American side are: the Alamo, with a drainage area of one hundred forty-five (145) square miles (375 square kilometers); the Diablo, with a drainage area of sixth-two (62) square miles (160 square kilometers); and the Guayuco, with a drainage area

of one hundred sixty-five (165) square miles (427 square kilometers). The Alamo and the Guayuco have been known to discharge in excess of five thousand (5,000) second feet (142 cubic meters per second), and hearsay information gives probable peaks of twice that amount. If such flows should occur at the time the peak of a flood from upper river sources was passing, doubtless the designed channel would be overtaxed. Some additional safety has been provided by increasing the freeboard a short distance above and below these arroyos. However, as these arroyos empty into the river channel well below most of the area to be protected, it will be uneconomical to make any large expenditures against unlikely possibilities.

(d) The discharge from these arroyos must be taken into the channel and the location has been made at some distance from the present arroyo mouths to permit, in a measure, the deposit of detritus before the flows reach the channel.

7. The River Above El Paso-Juarez

(a) The distance by the river between Elephant Butte and El Paso-Juarez is about one hundred fifty (150) miles (241 kilometers), and the valley axial distance is about one hundred twenty (120) miles (193 kilometers). Immediately below the dam the river passes thru fifteen miles (24 kilometers) of canyon where the fall varies from .00037 (1.94 feet per mile) to .00080 (4.26 feet per mile) then thru the Palomas Valley for thirteen miles (21 kilometers) with a fall of .00080 (4.26 feet per mile), then thru three miles (5 kilometers) of canyon where the Caballo damsite is located, then thru the Rincon Valley, the first seven miles (11 kilometers) of which have an average fall of .00074 (3.93 feet per mile), and the last fourteen miles (22 kilometers) a fall of .00064 (3.40 feet per mile). The river then traverses seven miles (11 kilometers) known as the Selden Canyon, where the average fall is .00064 (3.4 feet per mile), and then reaches the Leasburg Dam which is at the head of the Mesilla Valley. From Leasburg Dam to Mesilla Dam, a distance of twenty four miles (39 kilometers), the river has a fall of .00073 (3.84 feet per mile). From Mesilla Dam to Canutillo Bridge, a distance of twenty-eight miles (45 kilometers) the river has a fall of .00070 (3.67 feet per mile), and from the Canutillo Bridge to the International Dam, some nineteen miles (30 kilometers) the river has a fall of .00048 (2.53 feet per mile).

(b) As previously stated, the effect of the release of clear water from Elephant Butte Dam has been to degrade the river bed in the upper reaches immediately below the dam, and to build it up thru the El Paso-Juarez Valley. There is necessarily a stretch of river between these two actions which is quiescent, where neither degradation nor building up is going on. Studies of river sections indicate that the river bed thru the lower Mesilla Valley rests in this state.

8. The River Below El Paso-Juarez

(a) The length of the channel of the river between El Paso-Juarez and the Quitman Canyon is about one hundred fifty-five (155) miles (250 kilometers) while the length measured along the valley axis is eighty-five (85) miles (137 kilometers). The fall of the river is about .00034 (1.82 feet per mile) while the fall of the valley is .00061 (3.20 feet per mile). It is thus seen that if the alignment of the river can be straightened a fall of approximately .00061 (3.2 feet per mile) can be obtained. It will be noted that this fall is in excess of that in the last stretch of the Mesilla Valley, or between Canutillo Bridge and the International Dam, where a fall of .00048 (2.53 feet per mile) was indicated and that this fall of .00061 (3.2 feet per mile) is somewhat under that of .00070 (3.67 feet per mile) for the upper part of the Mesilla Valley. If the lower stretch of the river in the Mesilla Valley is in equilibrium, that is, shows neither scour nor fill, with a gradient of .00048 (2.53 feet per mile) the river thru the El Paso-Juarez Valley must have a greater gradient to reach the same state of equilibrium since the quantities of water normally carried are greatly reduced at the International Dam.

III. PROPOSED PLAN

(a) The treatment to be given the river thru the valley to increase the fall from .00034 (1.82 feet per mile) to .00061 (3.2 feet per mile), in order to accelerate the velocity and to let the current of the river carry along the burden of sand and sediment, which has caused the rapid river bottom rising, so marked since the construction of the Elephant Butte Dam, consists of a general straightening following the present channel of the river wherever possible, and cutting across the bends where necessary to decrease length. Along each side of the new channel, and also along each side of the present river where followed, levees will be built of sufficient height and far enough apart to pass the floods. The channel thus created will always be kept clear of brush and other obstructions which might retard the flow. In the alignment, due consideration has been given to the general principle of the compensation of the artificially segregated areas, in order to equalize the areas which will be cut from one country with those which will be cut from the other.

(b) This treatment brings about the result that the right-of-way to be acquired by each nation will balance practically in area. In general, the water-way proposed will consist of a normal channel of similar size and capacity to the present river bed, with levees set back with a total distance of about five hundred ninety (590) feet (180 meters) between them. Levees will be wide enough on top to permit travel for inspection and repair. The alignment has been so chosen as to avoid as far as possible all highly improved and cultivated areas, but at many places this was impracticable due to the meanderings of the river channel.

(c) The above plan of shortening the river by cut-offs is feasible in this case because Elephant Butte Dam, in conjunction with the proposed Caballo Dam and reservoir, will give practically complete control of the floods. Consequently the river thru the El Paso-Juarez Valley will take on more the nature of a large central drain or canal than a river.

IV. BASIS OF ESTIMATE

1 . Cost of Caballo Reservoir

(a) The cost of the Caballo Dam, including the purchase of the lands to be submerged, has been estimated by the Bureau of Reclamation at about one million two hundred fifty thousand dollars (\$1,250,000) for the one hundred (100,000) acre feet (123,350,000 cubic meters) capacity.

(b) The volume of water passing the Caballo Damsite during the flood of 1925 was in the neighborhood of twenty-five thousand (25,000) acre feet (30,837,000 cubic meters). Storage in excess of this amount must be provided to take care of possible larger floods and silt depletion. Provision must also be made to store the probable spill from Elephant Butte during times of flood run-off below the dam. Fifty thousand (50,000) acre feet (61,675,000 cubic meters) are allowed for this item and would probably store three or four days' spill. This would permit the floods entering below Caballo to have receded.

(c) Of the total proposed storage of one hundred thousand (100,000) acre feet (123,350,000 cubic meters) approximately fifty thousand (50,000) acre feet (61,675,000 cubic meters) are allowed for flood storage and silt depletion, and fifty thousand (50,000) acre feet (61,675,000 cubic meters) for the control of spill from Elephant Butte.

2. Segregated Tracts

(a) In order that neither nation shall sacrifice national area, it is required that the total land to be segregated or cut off from one country shall equal that to be segregated or cut off from the other.

On the attached maps these tracts and their total areas have been shown. Fifty-nine (59) separate tracts will be cut from Mexico and sixty-five (65) separate tracts will be cut from the United States. Their areas vary from 0.10 hectares (.25 acre) to 151 hectares (377 acres). The approximate total area to be cut from Mexico is one thousand four hundred (1400) hectares (3460 acres) and the approximate total area to be cut from the United States is one thousand four hundred (1400) hectares (3460 acres).

3. San Elizario Island

(a) Two alternate routes for the location of the rectified channel along the San Elizario Island are shown on Exhibit No. 2. One route follows in a general way the present river while the other follows in a general way the present boundary. The two routes are almost identical in length, and have practically the same gradient and grade elevation.

(b) The river route, by following the present river, is located entirely in the United States and passes thru areas largely undrained and uncultivated, while the boundary route passes largely thru highly cultivated and valuable areas. Therefore the costs of rights-of-way will be less with the river route and no areas will be segregated in the sense of changed national jurisdiction. The alignment possible with the boundary route is considerably better than that of the river route, especially at the lower end of the Island, where a sharp curve is necessary if the river route is used.

(c) The boundary route makes more feasible the carrying thru of irrigation and drainage works needed by Mexico, as the present boundary in places is located practically against the toe of the mesa. On the other hand, the abandonment of the river requires the building in the United States of a feeder canal to reestablish water deliveries to the Tornillo Canal system.

(d) The boundary route is estimated to cost about seventy-five thousand dollars (\$75,000) more than the river route, due largely to the higher value of the lands required for the right-of-way and the segregated areas, and to the disestablishment of some of the irrigation and drainage works now constructed in the United States of America with the river in its present location. The equalizing of all the segregated tracts and the estimate submitted herewith both are based on following the boundary route along the San Elizario Island.

V. GENERAL

1. Velocities

(a) The requirements of the project indicate two important limiting velocities; namely, that the maximum velocity in the flood channel at full flow must not entail expensive bank protection, and that the minimum velocity in the normal flow channel must be high enough to carry the annual increment of sand and silt to prevent channel upbuilding.

(b) The increase in average gradient, which is from .00035 to .00061, or from 1.82 feet per mile to 3.2 feet per mile, and which is brought about by the shortening in the river length, will produce velocities of from five to six feet (1.52 to 1.83 meters) per second at full flow, depending on the cross section and the gradient of the particular section considered.

(c) These velocities can be safely carried in the channel designed for this project where the alignment is reasonably straight and the cross section relatively wide.

(d) The data on normal flow indicates that the low water channel will have a velocity of around three feet (0.91 meters) per second. Experience on the Rio Grande Irrigation Project, in the sluicing of canals in the design of sand skimming devices, has shown that such velocities are capable of carrying the usual sand and silt borne by the Rio Grande.

2. Coefficient of Roughness

(a) The value of “n” in Kutter's Formula adopted for use on this project is $n=.025$ for the normal flow channel and $n=.030$ for the flood channel. These values follow closely those determined on the Miami Conservancy District at Dayton, Ohio, taking such tests as are believed to nearly duplicate the conditions to be encountered on this project. On one particular determination where the channel was covered with weeds, and the flow was around twenty-three thousand (23,000) second feet (6520 cube meters per second) the value of “n” was determined to be .0298, whereas the values for the same channel when free from weeds varied from .023 to .0255.

3 .Cross-sections

(a) The cross-sections adopted as best suited to the requirements of the project are shown on the attached Exhibit No. 3. It will be noted that two cross-sections are shown. These are identical except in the placement of the normal flow channel. The one to be used from El Paso-Juarez to the lower end of the San Elizario Island places the normal flow channel in the center while the one to be used from the lower end of the San Elizario Island to the mouth of Quitman Canyon places the normal flow channel adjacent to the left levee. This different treatment of the two sections of the river is required because, in the upper part, the land passed thru in the making of cut-offs is generally low ground lying from only slightly above the proposed river grade to, in some cases, slightly below the proposed grade. Thru this section the amount of material to be excavated from the proposed new channel is small and can be wasted adjacent to the normal flow channel without seriously decreasing flood channel capacities. Throughout the lower section deeper cuts are encountered and spoiling into the flood channel is impracticable. This changed condition is met by placing the normal channel adjacent to the left levee where the material excavated can be placed to form the left levee or can be wasted beyond the flood channel.

(b) The proposed cross-section has levees spaced 180 meters (590 feet) apart with levee heights of about 2.2 meters (7.2 feet). In actual construction levee heights will vary from nothing, where bench lands are encountered, to four and a half meters (15 feet) where the old river channel is crossed. The levee section proposed has a five meter (16.4 feet) crown with side slopes of two to one. This will permit the use of the top as a road for inspection and repair.

(c) The normal flow channel is designed with a bottom width of twenty meters (66 feet) as this channel width seems to best fit the present channel width of the river. Side slopes are 1:1 except throughout the lower section where 2:1 slope is proposed on the side adjacent to the left levee.

(d) Gradients vary from .00045 (2.38 feet per mile) to .0008 (4.26 feet per mile) and the levee heights have been changed to conform, always adding 0.6 meters (2 feet) as freeboard.

(e) The estimated capacity below the 0.6 meters (2 feet) freeboard varies from ten thousand seven hundred (10,700) second feet (3,030 cubic meters per second) to eleven thousand five hundred (11,500) second feet (3,260 cubic meters per second).

4. Right-of-way

(a) The total right-of-way required is eight thousand one hundred sixty (8,160) acres (3,300 hectares). This is equally divided between the two countries to Mexico four thousand eighty (4,080) acres (1650 hectares) and to the United States four thousand eighty (4,080) acres (1650 hectares). In addition to the land actually occupied by the works, a strip fifteen meters (49 feet) wide outside the land tow of each levee has been included for use in levee maintenance or possible future levee widening.

5. Clearing

(a) The area to be cleared is estimated as seventy per cent of the total area required for the right-of-way. A part of the right-of-way is now cleared and in cultivation, and in addition a

considerable part is now occupied by the present river. Unit cost is sixty-two dollars fifty cents per hectare, or about twenty-five dollars per acre. The work to be done consists of brush cutting, some grubbing, and the plowing of the area between the borrow pits and the normal channel.

6. Earthwork

(a) All earthwork of both channel excavation and levee embankment is planned to be accomplished by machine methods, and the unit cost used in the estimates is eighteen cents per cubic meter which is about that developed on similar work in that locality. The machines best suited to the work are draglines equipped with one hundred foot booms, with buckets from two to three cubic yards in capacity, although on a great part of the levee work smaller equipment can be used economically. Proper provision has been made in the unit cost for full machine upkeep and depreciation, and for the hazards of the work such as untimely high water, soft and marshy ground and unusable soft material.

(b) It is planned to secure material for the levee embankment from the channel excavation in building the left levee from the lower end of San Elizario Island to the mouth of Quitman Canyon. At practically all the other locations the material will be secured from discontinuous borrow pits located on the channel side of the levees. Practically no material will require a second handling.

7. Work near El Paso-Juarez

(a) The item of one hundred twenty five thousand dollars (\$125,000) covers contemplated work on the section of river between International Dam and Cordova Island, and includes the extension and straightening of the present levees, the removal of existing obstructions, and purchase of title to all lands lying on the channel side of the present levees.

8. Changes in Canals and Drains

(a) The sum of two hundred twenty five thousand dollars (\$225,000) is carried in the estimate to cover the cost of rebuilding all constructed irrigation and drainage works where they will be interfered with by the proposed river work. This work will include the rearrangement of the irrigation systems on both sides of the river, especially in the area below Monument No. 1 of San Elizario Island, and changed drain outlets on the United States side in the same area. The sum of seventy-five thousand dollars has been allocated to Mexico and one hundred fifty thousand dollars to the United States.

9. Bridges

(a) Present bridges will either have to be lengthened or moved, depending on how they fit with the new plan and probably several more bridges will have to be built. The estimate of the amount of this item is three hundred thousand dollars (\$300,000).

10. Grade Controls

(a) Because the effects of the introduction of steeper gradients in the river channel are problematical, and considerable scour may develop, and because the irrigation supply must be diverted at certain places, there has been set up in the estimate an amount of dollars 675,000 to meet the cost of grade control structures. This amount is deemed sufficient to build ten such structures. The immediate construction of three or four is contemplated-located at such places as the need of irrigation diversion dictates. The others will be built if their need becomes apparent.

11. Engineering, Contingencies and Overhead

(a) An allowance of twenty per cent has been added to cover the cost of the above item. A relatively low engineering cost should result, due to the magnitude of the quantities involved. Contingencies are not serious, as the flow of the river is largely controlled by Elephant Butte

Dam, and no long-lasting floods are probable. Overhead should be no higher than on other similar work.

VI. COST WITHOUT CABALLO DAM

(a) During December 1928, a report was made on the probable floods at El Paso-Juarez, with and without, the additional flood control of a retention reservoir at Caballo. The data then available indicated a maximum flood of eight thousand (8,000) second feet (226 cubic meters per second) with the Caballo Dam, and a maximum flood of eighteen thousand second feet (510 cubic meters per second) without the Caballo Dam. Since that time additional data has been acquired, and restudies have shown that the assumed maximum flood with the Caballo Dam should be eleven thousand second feet (314 cubic meters per second), and that the assumed maximum flood without the Caballo Dam should be twenty thousand second feet (576 cubic meters per second).

(b) In adopting a design for the twenty thousand second feet (576 cubic meters per second) channel it was found necessary to increase the distance between levees from one hundred eighty meters (590 feet) to two hundred ninety meters (950 feet) for the upper part of the valley, or from El Paso-Juarez to Alamo Arroyo. For the lower part, or from Alamo Arroyo to the end it was found necessary to increase the size of the excavated channel from twenty meter (66 foot) base to a thirty meter (99 foot) base, and to raise the levees one meter (3.3 feet).

(c) Estimates show that the works required from Land Monument No. 1 to the mouth of the canyon below Fort Quitman will cost about one million five hundred thousand dollars more when designed for the twenty thousand second foot (576 cubic meters per second) channel than when designed for the eleven thousand second foot (314 cubic meters per second) channel. The principal items of difference are the increase in rights-of-way required due to the widening between levees in the upper part, or from El Paso-Juarez to the Alamo Arroyo; the increase in earthwork, due principally to the larger cross-section needed thru the deep cuts below the Alamo Arroyo, and to the lengthening of the grade control structures and the bridges. There is also an increase in the amount of clearing necessary.

(d) The additional area required for rights-of-way is about eight hundred hectares (2,000 acres) and will cost one hundred thousand dollars. The additional earthwork required is about four million one hundred fifty thousand cubic meters (5,424,000 cubic yards) which at eighteen cents per cubic meter amounts to seven hundred forty-seven thousand dollars. The lengthening of grade control structures and bridges will cost an additional three hundred fifty thousand dollars. The additional clearing required will cost thirty-five thousand dollars. The total of the above items is one million two hundred thirty-two thousand dollars which, when increased by twenty per cent allowed for engineering, overhead and contingencies, makes a total additional cost of one million four hundred eighty thousand dollars.

(e) Therefore, the cost (\$1,250,000) of the Caballo Dam is more than offset by the economies made possible in the works from Land Monument No. 1 to the mouth of Quitman Canyon. Indeed, a saving of two hundred fifty thousand dollars is achieved. This saving is in addition to a reduction of 800 hectares (2,000 acres) in the land used for the channel which would be otherwise irredeemably lost for cultivation, and to an unknown amount annually saved in less expensive maintenance.

VII. RECOMMENDATIONS

The following recommendations are respectfully submitted:

- (a) That the rectified channel be constructed as described and outlined in this report and the attached exhibits.
- (b) That a flood detention dam, with a reservoir of not less than one hundred thousand acre feet (123.350,000 cubic meters) capacity be built at Caballo, New Mexico.
- (c) That the areas to be detached from each country be brought into balance by such shifting of the river location as the Commission may decide.
- (d) That the areas to be detached and those required for right-of-way be acquired by each nation so that all private rights to these lands be base, and to raise the extinguished.
- (e) That the balanced detached tracts and the acquired rights-of-way be exchanged between the two nations so that each nation win have jurisdiction to the center of the rectified channel where it forms the boundary line.
- (f) That the International Boundary Commission have full control over the work during its construction, and over its maintenance when completed.

VIII. EXHIBITS

[Exhibits Omitted]

IX. ACKNOWLEDGMENTS

In the preparation of this report the Consulting Engineers have been assisted by the technical advisers, Messrs. W. E. Robertson, Chairman of the El Paso Chamber of Commerce River Rectification Committee, and Salvador Arroyo, Chief Engineer of the Juarez Flood Control Commission; and have made use of the wealth of data contained in previous reports on this problem. Acknowledgment is made to the various engineers and agencies who collected this data and made the following reports:

1. "Report on Rio Grande Rectification", by Special Committee of Engineers, El Paso Chapter, American Association of Engineers, June 5, 1922.
2. "Report of Conditions of the Rio Grande on the Rio Grande Project", by L. M. Lawson, Engineer, United States Department of the Interior, March 10, 1925.
3. "Channel Improvement of the Rio Grande below El Paso", by Salvador Arroyo, Mexican Federal Civil Engineer, March 1925.
4. "Statement to the United States and Mexican Governments and the International Boundary Commission on Rectification of a Portion of the Rio Grande, Juarez and El Paso Valleys", by Salvador Arroyo and L. M. Lawson, April 25, 1925.
5. "Joint Report on the Preceding Report" (No. 4), by Armando Santacruz, Jr. and Randolph E. Fishburn, Consulting Engineers of the International Boundary Commission, May 12, 1925.
6. "Effect of Rio Grande Storage on River Erosion and Deposition", by L. M. Lawson, Project Superintendent, United States Bureau of Reclamation, El Paso, Texas, May 1928.
7. "The Present Regimen of the Upper Rio Grande and the Problem the River has Created in the El Paso-Juarez Valley", by Salvador Arroyo, Chief Engineer of Juarez Flood Control Commission, May 1928.
8. "Statement Regarding Rectification of the Rio Grande", by J. L. Savage, Designing Engineer, United States Bureau of Reclamation, November 28, 1928.

9. "Report on Preliminary Estimates, Rectification of the Rio Grande El Paso-Juarez to Quitman Canyon", by Salvador Arroyo and C. M. Ainsworth, December 1928.
10. "Proposed Rectification of the Rio Grande from El Paso-Juarez to Quitman Canyon", by R. M. Priest, Superintendent of the Yuma Project, United States Bureau of Reclamation, May 2, 1929.

Respectfully submitted, July 16, 1930.

C. M. AINSWORTH
Consulting Engineer
United States Section

ARMANDO SANTACRUZ
Consulting Engineer
Mexican Section

To the Honorable Commissioners, International Boundary Commission, United States and Mexico.

EXCHANGES OF NOTES
The Minister of Foreign Affairs to the American Ambassador

[TRANSLATION]

MINISTER FOR FOREIGN AFFAIRS
MEXICO

FEBRUARY 1, 1933

DEAR MR. AMBASSADOR:

In proceeding to the signature of the Convention relative to the rectification of the river channel of the Rio Grande in the El Paso-Juárez valley, it is understood by both Governments that the documents annexed to the Convention, as provided in Article VIII thereof, are copies of Minute 129 of July 31, 1930 of the International Boundary Commission, and of the report, maps, plans, and specifications annexed to said Minute, and that in case any difference exists between such copies so annexed to the Convention and their originals, the originals shall control. There being nothing further to discuss, I again subscribe myself, as always, your affectionate, devoted, and faithful servant.

PUIG

MR. J. REUBEN CLARK, Jr.,
Ambassador Extraordinary and Plenipotentiary
of the United States of America, Mexico.

Mexico

The American Ambassador to the Minister of Foreign Affairs

EMBASSY OF THE UNITED STATES OF AMERICA

MÉXICO, February 1, 1933

My DEAR MR. MINISTER:

Referring to your note of even date, in which you set out that in proceeding to the signature of the Convention providing for the rectification of the river channel of the Rio Grande in the El Paso-Juárez valley, it is understood that the documents attached to the Convention, as provided in Article VIII thereof, are copies of Minute 129 (July 31, 1930) of the International Boundary Commission, and of the report, maps, plans, and specifications attached to that Minute, and that in case any difference exists between such copies so attached to the Convention and their originals, the originals shall control, I beg hereby to confirm such understanding.

Please accept, Mr. Minister, the renewed assurances of my highest consideration.

J. REUBEN CLARK, Jr.

His Excellency

Señor Doctor Don JOSÉ M. PUIG CASAURANC,

Minister for Foreign Affairs,

Mexico.

The Minister of Foreign Affairs to the American Ambassador
[TRANSLATION]

MINISTRY FOR FOREIGN AFFAIR

UNITED MEXICAN STATES

MEXICO

Mexico, September 8, 1933

MR. AMBASSADOR:

In order to facilitate the early exchange of ratifications of the Convention signed between Mexico and the United States for the rectification of the Rio Bravo (Rio Grande) in the Juarez Valley, dated February 1, 1933, and in order to establish clearly the understanding of both Governments with respect to the question of rights and use of waters of the Rio Bravo (Rio Grande) along the stretch covered by said Convention, the two Governments declare through this exchange of notes that the spirit and terms of the Convention of February 1, 1933, do not alter the provisions of Conventions now in force as regards the utilization of water from the Rio Bravo (Rio Grande) and that, consequently, these matters remain entirely unaffected and in exactly the same status as existed before the Convention of February 1, 1933, was concluded.

I avail myself of this opportunity to renew to Your Excellency the assurances of my high consideration.

PUIG

His Excellency
MR. JOSEPHUS DANIELS,
Ambassador Extraordinary and Plenipotentiary
of the United States of America,
Mexico.

The American Ambassador to the Minister of Foreign Affairs

EMBASSY OF THE UNITED STATES OF
AMERICA MEXICO, September 8, 1933

EXCELLENCY:

In order to facilitate the early exchange of ratifications of the Convention signed between Mexico and the United States for the rectification of the Rio Grande (Rio Bravo) in the Juárez Valley, dated February 1, 1933, and in order to establish clearly the understanding of both Governments with respect to the question of lights and use of waters of the Rio Grande (Rio Bravo) along the stretch covered by said Convention, the two Governments declare through this exchange of notes that the spirit and terms of the Convention of February 1, 1933, do not alter the provisions of Conventions now in force as regards the utilization of water from the Rio Grande (Rio Bravo) and that, consequently, these matters remain entirely unaffected and in exactly the same status as existed before the Convention of February 1, 1933, was concluded.

Accept, Excellency, the renewed assurances of my highest and most distinguished consideration.

JOSEPHUS DANIELS

His Excellency
Señor Doctor Don JOSÉ MANUEL PUIG CASAURANC,
Minister for Foreign Affairs,
Mexico

Vita

Joanne Kropp earned a B.A. in Theater from Texas State University in 1977. In 2001 she received her M.A. in History from The University of Texas at El Paso (UTEP). She joined the doctoral program in Borderlands History at UTEP in 2002. Her subfields are History of Latin America and World History.

Ms. Kropp received numerous awards from UTEP, including a Dodson Research Grant, the George A. Krutilek Memorial Graduate Fellowship Fund, the W. Turrentine Jackson Graduate Scholarship, the Richard E. Dunlap Memorial Graduate Scholarship, and a UTEP Library Information Literacy Course Enhancement Grant. Her 2001 M.A. thesis, "Taxes, Patronage, and the Codex Theodosianus," won UTEP's College of Liberal Arts Outstanding Thesis Award and UTEP's Outstanding Thesis Award in the Humanities and Social and Behavioral Sciences.

Ms. Kropp has worked full-time at UTEP starting in 2001 as a lecturer for the Entering Student Program and also teaches courses for the Department of History and Women's Studies.

Ms. Kropp presented her doctoral research at the Sixth International Conference on the Constructed Environment in April of 2016. Since 2001, she has also presented numerous times at the Annual Conference on the First-Year Experience. Her publications include a forthcoming article in the *International Journal of Interdisciplinary Environmental Studies* entitled "Working on the Levees: The Rio Grande Rectification Project, the Civilian Conservation Corps, and the Making of the U.S.-Mexico Border." Ms. Kropp is also the co-editor of the textbook *Borders: Crossing into Your Future*.

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This dissertation was typed by Joanne Tortorete Kropp.