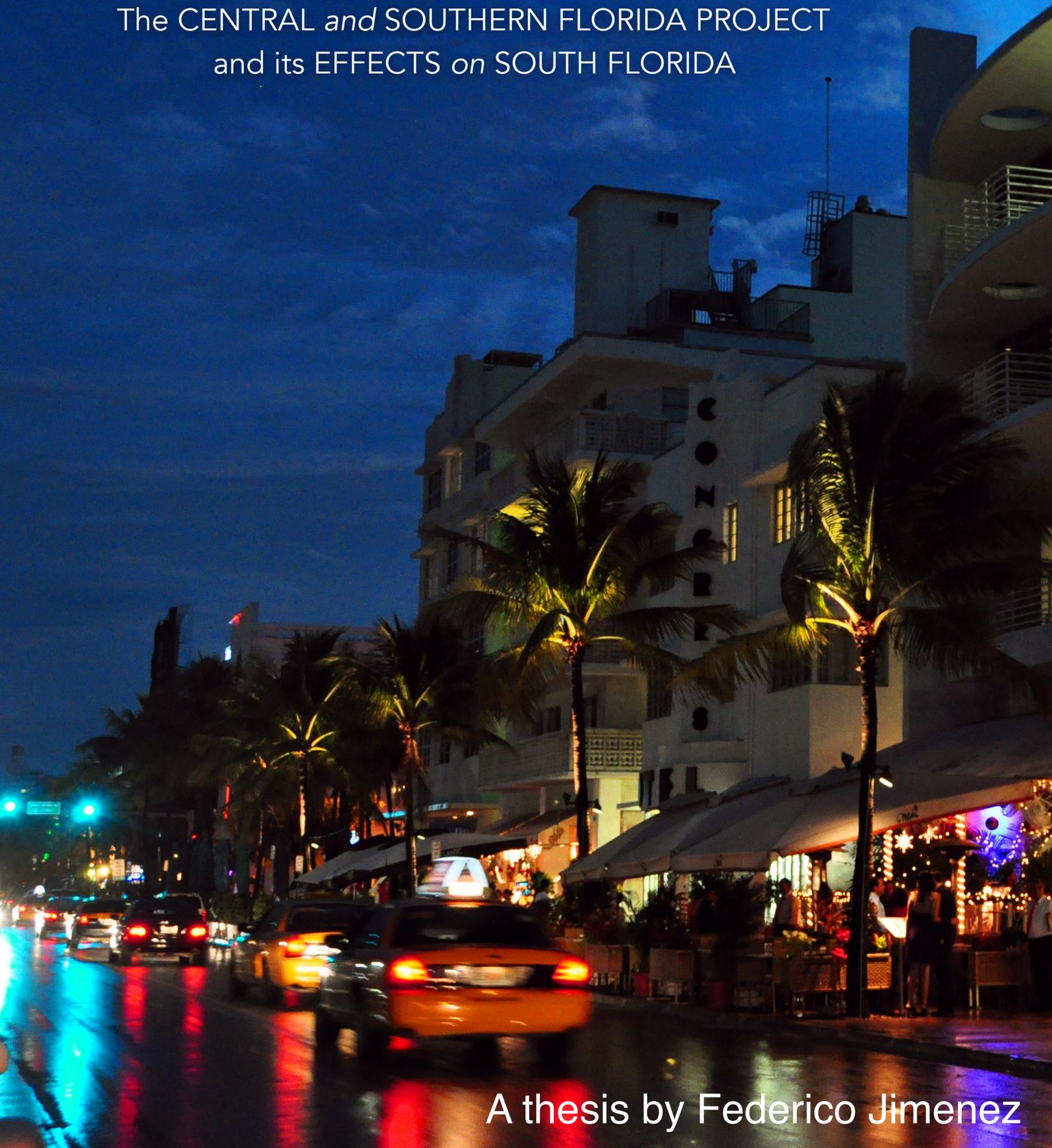


Building Paradise

The CENTRAL *and* SOUTHERN FLORIDA PROJECT
and its EFFECTS *on* SOUTH FLORIDA



A thesis by Federico Jimenez

Dedicated to my mother, who immigrated from Colombia in search of a better education for my two siblings and I. In writing this thesis, I hope that your efforts have proven to be justified.

Special thanks to my thesis advisor, Dr. Steven Noll, who ignited my love for history and guided me through my mission of writing a thesis. He expressed nothing but the highest levels of dedication and care, and for that alone, I am eternally grateful.

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Introduction

Zora Neale Hurston's *Their Eyes were Watching God* contains a chapter in which a devastating hurricane ripped apart a small town and killed the majority of its residents. Amidst that chaos, the plot develops. That fictional hurricane was based on a real storm in 1928 that cost the lives of over two thousand people. Not only was it a massive hurricane, it also flooded Lake Okeechobee over a dike and ripped apart houses, families, and lives.

Nathaniel Reed, former assistant secretary of the Department of the Interior and a leading Florida environmentalist recalled a story about a survivor from that 1928 hurricane. The survivor was put in the attic by his father when suddenly, a wave crashed into the home and killed his entire family; father, mother, and siblings. He survived, but of course, being a young child, was severely affected by this.

South Florida is land covered in water. The Kissimmee River fed water from Florida's summer rains south to Lake Okeechobee. Then, the lake gently spilled water over southward towards Florida Bay, creating a wide, shallow, slow-moving river called the Everglades. When Florida gained its statehood in 1845, discussions started about the possibility of taming the waters of the region to make the land usable, either for settlement or agricultural use. Glistening with potential and dug by motivation, early entrepreneurs tried digging drainage canals in South Florida to remove the water.

While it proved to be difficult, it also proved that South Florida could be a place for settlement and agriculture.

By the early 20th century, some settlers moved to South Florida and started producing crops in a climate that proved to be consistent throughout the year. However, this region was also susceptible to flooding, and the canals dug to remove water out of the land were insufficient for removing flood waters. When the heavy rains came, the region still flooded, threatening the new settlers.

Over time, the idea of living in South Florida was refined. Coupled with years of drought in the 1920s and 30s, South Florida seemed like a place that was finally free of flooding. However, as multiple storms came in after the periods of drought ended, it proved that South Florida was not only not suitable for living, but also costing crops and even lives.

Now that there were more people settled in South Florida, a comprehensive control of the water was necessary. The 1930s brought a severe drought to the State of Florida, drying up much of the water supply, damaging the soil, and ironically igniting fires throughout the Everglades.¹ Suddenly, in 1947, Fort Lauderdale was hit by a series of hurricanes, including a Category 4 one which brought severe flooding to the area, dropping over one hundred inches of rain to a state where the land had dried over the last decade.² Such scale of flooding made then-U.S. President Truman declare a state

¹ Michael Grunwald, *The Swamp*, p. 220

² *Ibid.*, p. 218

of emergency, leading to the creation of the Central and Southern Florida Project, the largest civil works project in American history, under the auspices of the Army Corps of Engineers.³ The project created levees and canals for flood-control, serving two main goals: to create land to farm in the west, and to keep the land from flooding in the east. If the state could sell land from the Everglades after draining it, it could make a profit. If it could keep southeast Florida from flooding and suffering during hurricanes, then its industry could remain unaffected by nature.

The Central and Southern Florida project did in fact solve the general issue of flooding, leading to a population boom and an agricultural production boom that was larger in scale than anyone foresaw. The water demand grew and different interests fought on their behalf for what they considered necessary. Throughout the years since construction of the project began, Florida has gone from having too much water, to having too little, and now is heading back to having too much.

This thesis explores the history of flood control in Florida and its effects on South Florida. Within that, I will explore the role of necessity and the negotiations between the different interpretations of necessity through the history of the Central and Southern Florida Flood Control Project. The project itself was a necessity to protect the lives of residents. As it was being built, the agricultural industry and the municipalities tried to persuade the Army Corps of Engineers to meet most of their respective needs.

³ David McCally, *The Everglades: an Environmental History*, University Press of Florida, 1999. p. 138

One particular interest, the protection of the Everglades itself, was not taken as a serious necessity. In this thesis, I interpret these necessities as the agent for change, shaping critical moments in the history of South Florida. Without the Central and Southern Florida project, South Florida would not be the area it is today. The mission of developing this area as “paradise” proved to be a challenging one, one that involves the story of managing Florida’s waters.

Chapter 1: In Pursuit of the Florida Dream

The Central and Southern Florida Flood Control Project of 1948 did not change a pristine environment. Instead, the Corps of Engineers and other agencies involved had to construct projects in a land that had already been extensively modified in the previous century. The Corps were in essence attempting to correct the mistakes from every previous drainage attempt. The environment was not the only challenge for the Corps, as federal interests such as the National Park Service and U.S. Fish and Wildlife Service had their own perspective as to how the water should be managed. Local county commissioners and Florida's own Internal Improvement Fund also developed their own visions of water management.¹ None of these interests were new, instead, they stemmed back to the beginning of Florida's earliest drainage attempts.

When Congress granted Florida statehood and allowed it to enter the United States as the twenty-seventh state in the union on March 3rd, 1845, it began to explore options for new settlements for state growth. The state legislature passed a resolution describing a region in the southern portion of the state "wholly valueless in consequence of being covered with water."² This resolution asked for an evaluation of the region and for the appointment of engineers to examine the region for a possibility of drainage.

¹ Matthew C. Godfrey, *Rivers of Interest*, Government Printing Office, 2011, p. 3.

² "Resolution by the Legislature of Florida," *Everglades of Florida*, 62d Cong., 1st sess., 1911, S. Doc. 89, Serial 6108, p. 34.

In 1848 attorney Buckingham Smith received an appointment to survey South Florida and subsequently submitted a report that described the environment found in the Everglades. With the description of the region, Smith also proposed ideas on how to drain it. He believed that canals would have to be built from Lake Okeechobee to nearby rivers, such as the Caloosahatchee and Loxahatchee Rivers. This would allow the water from the lake to spill into these rivers and thereby lowering the water level of the lake, preventing the water from flowing southward into the Everglades.³ If the water were to be directed into the Atlantic Ocean or the Gulf of Mexico, the land south of the Okeechobee will go from being valueless to “being able to produce limes, lemons, oranges, bananas, plantains, figs, olives, pineapples, coconuts, cotton, corn, rice and tobacco.”⁴ Such land productivity would be key to expand the state’s population.

To make this vision become reality, the Florida legislature created the Internal Improvement Fund, an agency with trustees that consisted of the governor’s cabinet and the governor himself and would have authority over all state land sales and reclamation matters. In order to promote the settlement of South Florida, the IFF began to grant land to railroad companies in exchange for completed rail lines. The plan failed since most rail companies faced extreme financial troubles after the Civil War.⁵ Looking elsewhere, the IFF found itself a new investor: Hamilton Disston.

³ “Report of Buckingham Smith,” New York University, p.46-47.

⁴ Michael Grunwald, *The Swamp*. Simon & Schuster, 2006, p.41

⁵ *Ibid.*, p. 67.

Disston, a resident of Philadelphia and member of a wealthy family, visited Florida in 1877 on a fishing trip, becoming obsessed with the potential that the Everglades had if it were drained. Similar to Smith, Disston proposed building canals that would lead the water from Lake Okeechobee to the Caloosahatchee, but also proposed the St. Lucie and Miami rivers and then straightening the Kissimmee river to ensure that water would flow. The IFF was intrigued, giving Disston half of the reclaimed land that belonged to the state, as well as four million more acres for just one million dollars in exchange for the drainage.

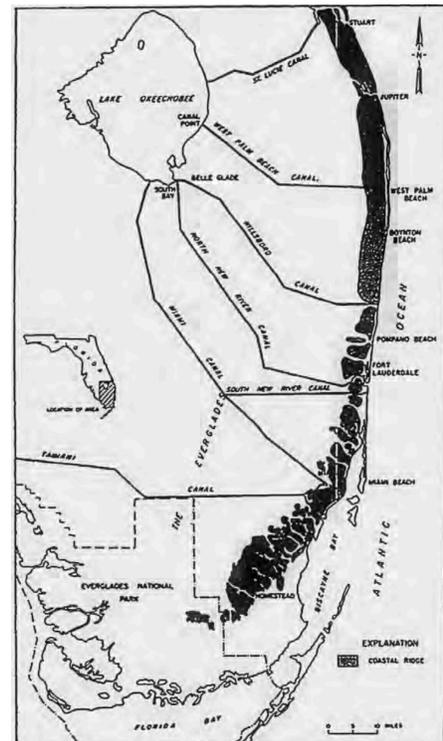
In September of 1881, the Atlantic Gulf Coast Canal and Land Sales Company, a company Disston created, began deepening and straightening the Kissimmee River. He was able to drain portions of the area and sell it as grazing land to cattle owners. He also deepened and connected the Caloosahatchee River to Lake Okeechobee. As he began to reclaim surrounding land, he began to promote it, creating model cities, hotels, and established sugar and peach cultivations. However, such initiatives proved to be costly, and in the Panic of 1893, Disston suffered a catastrophic blow to his finances. The Panic led to banks recalling their loans, drying up more of Disston's finances than the land he was draining. Then, suddenly, Disston died on April 30th, 1896. It is unknown whether he died from a heart attack or suicide, but regardless, the Everglades proved to be too much for Disston, having only reclaimed one-hundred-thousand acres and led to his financial ruin.

Despite the small amount of drained land, Disston did demonstrate to the public the agricultural potential of South Florida. His efforts on the Caloosahatchee River and its new connection to Lake Okechobee also became the first significant step in draining the Everglades. This small success cemented the vision of canals and drainage on entrepreneurial minds. Henry L. Flagler, a millionaire from Standard Oil, developed the Florida East Coast Railroad and built a line from St. Augustine to Miami Beach after seeing the potential for South Florida. It was this rail line that led South Florida to its first settlement boom and the establishment of West Palm Beach, Fort Lauderdale, and Miami. Yet in the 1890s, despite the granting and sale of millions of acres in South Florida to railroad corporations and other buyers, successful land reclamation had not been achieved. In 1902, Governor William S. Jennings compared the drainage attempts to "the man who undertook to lift himself".⁶ Pessimism with South Florida's possibilities remained rampant, however, things changed in the early 1900's. The Federal Government was undergoing a progressive movement, creating the concept of clever land usage and resource planning through the usage of "experts." Drainage of wetlands would once again be seen as a valuable idea and a clever usage of land. This, coupled with populist notions in the American South regarding the reclamation of land

⁶ "Message of Governor. W. S. Jennings to the Legislature of Florida Relative to Reclamation of Everglades," in Senate, *Everglades of Florida*, p. 84.

from railroads for the benefit of farmers influenced the state to once again pursue drainage of the Everglades for agricultural use.⁷

In 1903, the federal government provided the IFF patent to over two million acres of the Everglades, entitling the state to even more land to drain. Napoleon Bonaparte Broward, a Jacksonville sheriff and steamboat operator, ran for governor, promising to "Save and reclaim the people's land!,"⁸ financing the new drainage attempts by selling reclaimed land for only five dollars an acre.⁹ Upon winning the election in 1904, Broward persuaded the legislature to create the Everglades Drainage District, allowing the state to collect taxes from private land within the drainage district, allowing draining to be financed, but claiming benefits for the private land owners. For the next several years, the state allowed numerous private parties to construct five major new canals, the St. Lucie, North New River, South New River, Miami, Hillsboro, and West Palm Beach Canals.



⁷ Nelson. M. Blake, *Land into Water*, Orange Grove Texts, 1980, p. 88.

⁸ Grunwald, p.131.

⁹ Blake, p. 95.

With the new canals completed, agriculture began to form south of Lake Okechobee. Settlements such as Moore Haven and Lake Harbor appeared, and the land began to be productive. Then, in the 1920s, the United States Sugar Corporation came to Florida and began producing what would become the United States' most valuable crop: Sugar.¹⁰

With the construction of the canals, land was reclaimed and made productive. However, flooding still occurred periodically in the area. In 1924, high levels of rainfall led the Everglades Drainage District to construct a small dike around the southern end of Lake Okechobee. The dike failed when a hurricane swept Moore Haven with winds that reached a hundred-and-fifty miles per hour. With over four-hundred people killed and thousands of dollars in property damage, the IIF was determined to find a solution to the inadequate drainage. Further deepening of the St. Lucie river and a "greatly enlarged and highly safeguarded levee" would be built. However, financial issues delayed the implementation of the plan until disaster struck again. In 1928, the lake had once again risen to a high level due to heavy rainfall, and to the misfortune of the residents of the region, was hit by another hurricane on September 16th. With winds of over one-hundred and thirty-five miles an hour, the hurricane produced waves over twenty-nine feet high and spilled over the dikes into Belle Glade, killing over two-

¹⁰ Blake, p. 130-132.

thousand people and swept houses from their foundations.¹¹This was the hurricane immortalized in Hurston's *Their Eyes Were Watching God*.

In response to the tragedy, the state legislature created the Okeechobee Flood Control District (1929) to investigate possible solutions to the inadequate drainage. The Okeechobee district began to work closely with the U.S. Army Corps of Engineers, the nation's leading civil works agency. The Corps was primarily involved in navigation projects for lakes and rivers, and in the 1930s, the federal government saw flood control as a local issue. To rectify this, Congress passed a general river and harbor bill in 1930 that included provisions for flood control and navigation for the Corps. With permission to "improve navigation and provide incidental flood protection,"¹² the Corps of Engineers built over sixty-seven miles of dikes along Lake Okeechobee's south shore, naming it Hoover Dike. The Corps of Engineers also deepened the Caloosahatchee River, assuming control of regulating the water level of the lake.

The drainage improvements, followed by periods of drought, allowed the improvements to be considered a success and brought confidence in South Florida back. By the 1930s, almost ninety years after the decision to drain South Florida, the land itself had changed dramatically. Several new canals were built, settlements

¹¹ Godfrey, p. 8.

¹² United State Senate, *Rivers and Harbors: Hearings Before the Committee on Commerce*, United States Senate, Seventy-First Congress, Second Session, Part 1, 71st Cong., 2d sess., 1930, 203

formed, and agriculture began. The population now reached 228,000 people, up from 22,961 in 1900.¹³ When Hoover Dike was built, sugar cane production doubled. The vision of draining South Florida to make it productive and settled was becoming viable. Then, in 1947, two devastating hurricanes struck the region, resulting in catastrophic flooding.

¹³ Godfrey, p. 14.

Chapter 2: A Comparison with California

As discussed in the previous chapter, South Florida remained largely uninhabited and undeveloped for the entire first century of the state's existence. The population in South Florida did begin to grow after the first World War, but not to a large extent. Despite this slow growth, potential for land development was seen by the state's government and its American settlers since its establishment in 1845. "The Florida Dream," as described in the previous chapter, sought to sell land to average people and make it productive.¹ However, in order to make South Florida productive, it needed to be drained. Numerous attempts to drain the land were conducted, but in the end, draining South Florida always proved too large to handle.

But why, when different governors of Florida lusted after California's impressive water management system, seeing that it was indeed possible to control water, did draining the land ultimately fail? After all, water control was the major limiting factor of the "Florida Dream", and it was one of the last frontiers man had left to conquer. The answer to this is simple: Draining South Florida was at first just a desire, not a necessity.

This thesis explores the role of necessity and the negotiations between the different necessities through the history of the Central and Southern Florida Flood Control Project. But to provide a contrast which will exemplify the role of *necessity* in

¹ Michael Grunwald, *The Swamp*, Simon & Schuster, 2006, p. 221

the construction of a public project, one must compare California's water management to the one which the Corps of Engineers would develop in Florida.

California's Water Management sought to do the exact opposite of Florida's water management projects. While California seeks to conserve the quantity of water for its uses, Florida seeks to expel water out of the land. California's water system is also the world's largest, most productive, and most contested due to it being a limited supply of water in one of the largest economies in the world.² Today, such a system provides water to over 30 million Californians and irrigates almost six million acres of productive farmland. With such a large population and such a vast amount of farmland to irrigate, California experiences some of the most intense water rights debates in the world.³

California's water supply consists of a limited amount of surface (rivers, lakes, streams) and groundwater. It also consists of desalinated water, water which has been pulled from the ocean and put through an extrusion process by which the salt is extracted. The state's surface water is mostly concentrated in the northern portion of the state, while groundwater is more evenly distributed throughout. Approximately thirty percent of the water supply comes from groundwater, a low number due to fears of over-drafting, a high cost of pumping, and poor quality.⁴ California also lacks

² State of California Department of Water Resources, *California Water*, 1978. p. 2

³ *Ibid.*, p. 70

⁴ David Carle, *Introduction to Water in California*, University of California Press, 2004. p. 203

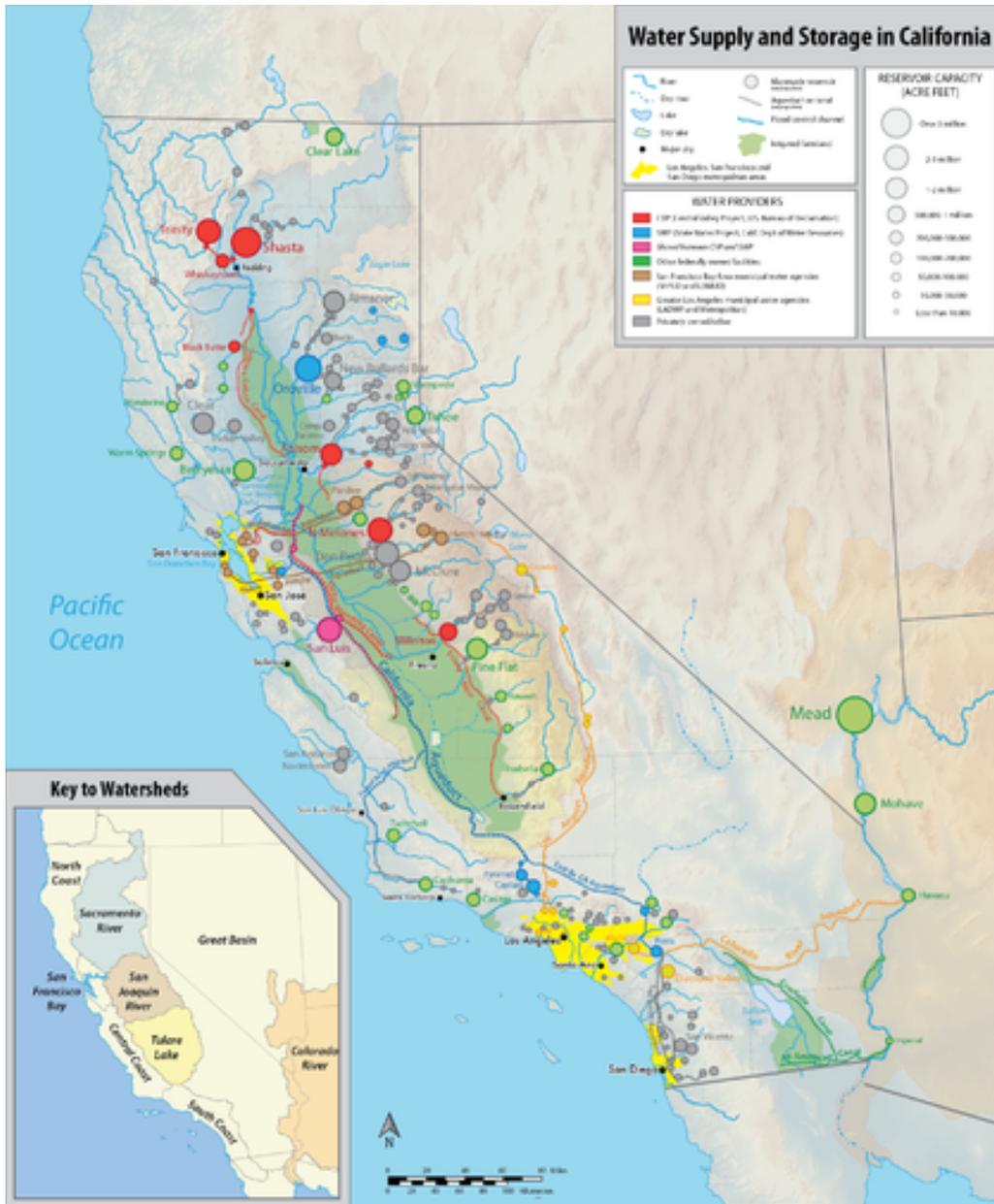
statewide laws governing the usage of groundwater, leaving water rights to land ownership, creating the possibility of virtually unlimited groundwater pumping in private land. In some cases, the large quantity of groundwater and the limited amount of it used has led some of the population to believe that groundwater is renewable and unlimited, something it is not. Even with such a belief, the quality of the water remains poor, maintaining the consciousness of California's water troubles.

But where the issues really begin to develop is the concern over the state's surface water. It is the largest provider of water to the state, mostly concentrated in the northern section of California where precipitation is highest. Yet, the largest of the watersheds flows uncontrolled into the Pacific Ocean.⁵ Other water sources, such as the Colorado River, originate in sources outside the state, creating serious issues when it comes to water rights. With such a limited supply, you can begin to see where California struggles. But that's just the beginning.

Not only does California have a severely limited supply of water, it also over-consumes it and has a population that is distributed away from the sources. This led the state and the federal government to create the world's largest water management system. How necessary is it to control and distribute the water? Seventy-five percent of all of California's water supply comes from an area north of Sacramento. Of this,

⁵ Carle, p. 42

seventy-five percent of the precipitation in the state happens north of Sacramento. Yet an astonishing eighty percent of the demand comes from south of Sacramento.



Map of California's Water Supply locations, showing the uneven distribution between north and south, along with the manmade canals made to connect the areas.

Courtesy: calwater.com

To redistribute this water, the federal Central Valley Project and the California State Water project transport water down south through aqueducts and canals, storing it in a complex system of retention ponds. When this water does make it into the population, it is distributed into three main uses: Environmental (51%), agricultural (39%), and urban (11%).⁶ The environmental use of water is mostly for scenic and wild rivers where the water cannot be recovered in a practical way to be used for agricultural and urban uses. Agricultural use of water varies by the amount of rainfall per year, but is essential to irrigate over twenty-nine million acres, six million of which produce 350 different crops.⁷ This portion of water usage is considered critical for maintaining "America's fruit bowl", an important economic sector of the state.

Perhaps the most controversial and important use of water in the state is the urban, or personal, use. After all, water is an essential substance for life, something every human needs. With a limited water supply, the appropriation of water supply for residential use is critical. Yet somehow, the average annual total water use per home in 2011 was 132,000 U.S. gallons per year.⁸ That is three-hundred and sixty-two gallons of water a day. Imagine stacking three-hundred and sixty-two gallons of milk in your home. Where could you fit that? That is an enormous amount of water use per home. To add to the problem, approximately fifty-three percent of this water is used for

⁶ State of California Department of Water Resources, *California Water*, p. 10-11

⁷ *Ibid.*, p. 18

⁸State of California Department of Water Resources, *California Water*, 2011. p. 14

landscaping, twenty percent to toilet flushes, and up to eighteen percent to leaks in plumbing.⁹

Lastly, and by far the most difficult water issue California faces, is the possibility of a drought. The state already has difficulty distributing the limited amount of water supply to all of its needs, but it also has to make sure it conserves water in case of a drought. Such droughts are unpredictable and can last for an undetermined amount of time.¹⁰ When that does happen, the state then must readjust how it distributes the water.

Recently, in 2012, California entered one of the worst droughts in its history. Since then, the state has constrained water use, installed water meters in cities that previously did not require them in homes, and has proactively negotiated water rights.¹¹ In times like these, some people begin to ask if California really does need to grow some of the crops it grows, if some of its agriculture can be relocated, or if typically arid San Diego needs lush green landscaping.

The issue of water is so important and central in California that it comes up every single election. Residents are conscious that their state has a serious water issue, fighting for their water rights, and voting for a government they believe will manage the water the way they believe is necessary. Counties dispute each other over the

⁹ State of California Department of Water Resources, *California Water*, 2011. p. 15

¹⁰ State of California Department of Water Resources, *California Water*, 1978. p. 2

¹¹ CalWater Drought Resources - 2016 Conservation Progress Update, Oct. 2016

supply, enraging in water wars. As the population continues to increase, the demand will keep outgrowing the supply. Water management is a necessity to all Californians, not just for biological reasons, but also economically and even aesthetically. The shortage of water raises its importance.

That is not the case in Florida. Draining South Florida for its entire first century as a state was purely an economic vision, not a necessity with a strong sense of urgency from the public. Necessity eventually became the agent of change for South Florida when two hurricanes hit South Florida in 1947. In the next chapter, I will demonstrate how Florida's history would soon change in a dramatic way when flood control becomes a necessity, acting as the agent of change for the the entirety of South Florida. Comprehensive action finally arrived at the sunshine state.

Chapter 3: Bring in the Federal Government

By the late 1940s, thousands of acres of land dedicated to agriculture and settlements existed in South Florida, something that was only possible through the drainage of Everglades land. The 1930s were a period of drought in Florida, keeping the water out of South Florida and further allowing the population to grow. However, living in this region at this time period was not necessarily easy. Drainage exposed large amounts of muck soil to the air, easily catching fire when it became too dry. The ground itself became too dry, oxidizing bacteria in plant remains, leading to a decomposition of much of the plant life. With such loss, the soil loss increased as there were fewer plants to hold the soil in place. According to Matthew C. Godfrey, an observer claimed in 1942 that the city of Belle Glade was "six feet farther down than it was 25 years ago" and that Clewiston residents "add a new step to their front stoops every two or three years so they can reach the sinking ground."¹ Perhaps the worst consequence of the removal of water was the development of saltwater intrusion; saltwater from the Atlantic Ocean intruded into fresh water wells because the loss of surface water allowed the salt water to flow into creeks during periods of high tide.²

Such contamination led to a significant water-supply shortage in South Florida, particularly the Miami area. In 1939, a USGS geologist Garald Parker suggested that

¹ Matthew C. Godfrey, *Rivers of Interest*, Government Printing Office, 2011, p. 19

² McCally, *The Everglades*, University Press of Florida, 1999 p. 145

the groundwater table of South Florida must be higher than the sea level, therefore careful control of the freshwater drainage at the canals was needed.³

Yet despite these alarming issues, South Florida continued to grow throughout the 1940s. Settlements and economic developments increased, particularly on the east coast. Tourism and businesses were thriving in the coastal areas of South Florida, while agricultural communities grew around the lake. Cattle and dairy farms proliferated, vegetables such as cabbage and celery became lucrative practices, producing \$67 million in just vegetables around the lake. In 1934, Congress passed the Sugar Act, creating quotas that divided sugar production, raising prices to eventually become the most profitable crop in the United States.⁴ The construction of the Hoover Dike around the lake coupled with years of drought reassured settlers that the region was safe from flooding. If another hurricane like the 1926 and 1928 hurricane struck, the refined drainage systems would prevent the devastating effects of those previous hurricanes. Or so South Florida residents thought.

The drought ended within the first months of 1947 when rain began falling on the Everglades in unprecedented amounts. By the first of March, rains had gotten so severe that Miami reported six inches of rain in one day. As summer approached, the rain became even stronger, reaching up to one-hundred inches of rain.⁵ With such a

³ McCally, *The Everglades*, p. 146

⁴ Nathaniel Reed, Interviewed by Federico Jimenez, March 23rd, 2017. 37 minutes: 32 seconds

⁵ Press Release, Corps of Engineers, Jacksonville, Fla., District, November 2, 1947.

massive and sudden amount of rainfall, Lake Okeechobee reached dangerously high water levels. Then, on September 17th, a hurricane hit Florida from the



Flooded fields, September 17th hurricane, 1947. Retrieved via Google.

southwest, crossing the Lake and dropping large amounts of rain on most of the agricultural area south of Lake Okeechobee.

Most of the damage from the hurricane was a result from flooding because of the failed drainage system. Before the area even had a remote chance to rebuild itself, another hurricane moved into South Florida from the Atlantic Ocean and through Fort Lauderdale. This time, most of the rain fell on the coastal cities; about fifteen inches in Fort Lauderdale within twenty-four hours, and Hialeah received six inches of rain in just two hours.⁶ The flooding was worsened since the Everglades Drainage District kept the drainage canals open to maximum discharge to prevent flooding of the agricultural area, but rushed too much water to the coastal area. Although the Hoover

⁶ Godfrey, p. 22

Dike held throughout the hurricane, over two-thousand square miles of land were flooded by water up to seven-feet deep. The Corps of Engineers estimated that the storms caused \$59 million in property damage in the region.⁷ Worse, it shattered



Flooded runway, Ft. Lauderdale hurricane of 1947. Retrieved via Google.

the belief that South Florida's environment was finally tamed. Faced with destruction, residents of South Florida demanded a change.

Upon reviewing potential solutions, the state legislature decided that the problem was simply too large for local and state governments to fix by themselves. The Army Corps of Engineers were already investigating flood control measures south of Lake Okeechobee before the first hurricane struck. As South Floridians continued to express their despair, both of Florida's U.S. Senators, Claude Pepper and Spessard Holland (a member of the Senate's Public Works Committee) decided to act upon the outcry. Upon further review, Claude Pepper became convinced that only the Corps of Engineers could provide the solution for the problem associated with water, just like

⁷ Senate Committee on Public Works Subcommittee, *Rivers and Harbors—Flood Control Emergency Act*, p. 141

how they did when they built the Hoover Dike. This time however, it would not be a solution to a certain area that floods more than others. Instead, a plan that would “deal with the flood situation in the Peninsula of Florida, as a whole” was needed, and it would be a plan that “approached as a single problem with a single comprehensive program” since it was all “fundamentally one single problem.”⁸ A complete flood control system that would control the waters from the headwaters of the Kissimmee River down to the south of Miami would be born.

Before such plan could be implemented, a study would need to be submitted to Congress. The Corps’ Jacksonville district engineer Willis Teale held public hearings to determine the desires of the general public and local agencies. Throughout several hearings, almost all of the witnesses discussed the devastating damage of the 1947 floods and the necessity of preventing such a disaster from happening again, placing flood protection as the primary goal of the Corps of Engineers’ work.

When the Corps of Engineers’ Jacksonville district office finalized the project, Florida’s congressional delegation convinced the Senate to include the Corps of Engineers’ project in its Flood Control Act of 1948, officially naming the project the Central and Southern Florida Flood Control Project. After heavily debating the appropriated funding amount, the House of Representatives passed the bill and President Truman signed it on June 30th, authorizing seventy million dollars for the

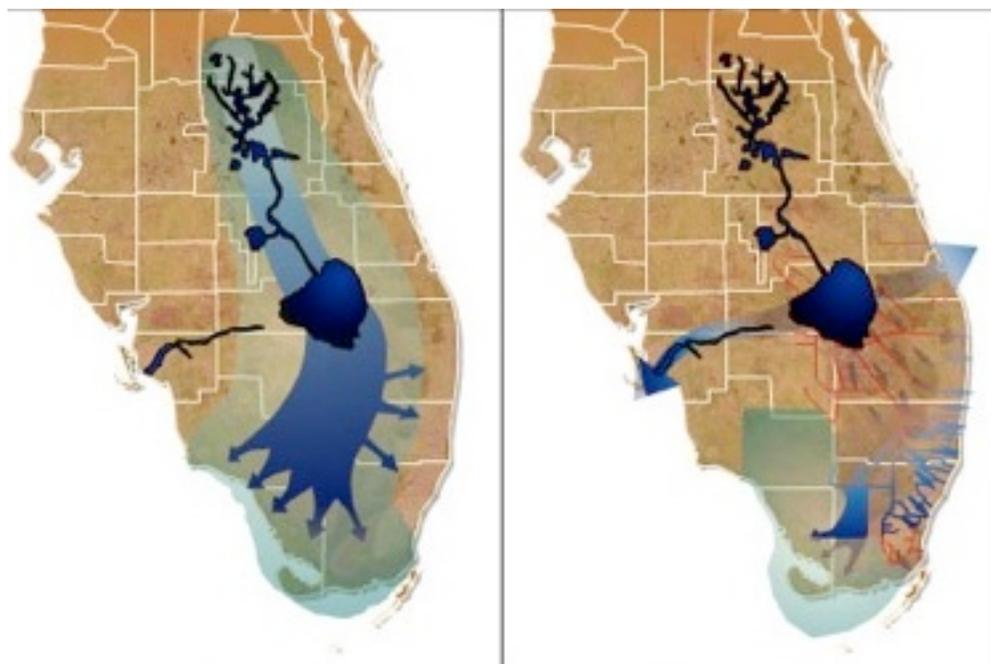
⁸ Godfrey, p. 23

first phase of the project.⁹ This phase consisted of developing most of the works necessary to finally create comprehensive flood protection for the agricultural development south of Lake Okeechobee and the highly developed urban area along the lower east coast of the State. This phase also focused on water level control, water conservation, prevention of salt water intrusion, and preservation of fish and wildlife.¹⁰ Most importantly, the necessity for flood control led to a cooperation between the Corps of Engineers and local, state, and federal governments in a way that has never been witnessed before. Within just one year, a highly bureaucratic project was initiated, something that seemed beyond the wildest dreams of South Floridians. The project also proceeded quickly through its inception since Floridians appeared willing to pay part of the cost (roughly 15%) of the plan, fulfilling Congress' wishes. Necessity raised the idea of flood control from a vision in entrepreneurial minds to the biggest public works project in United States history. Previous attempts to control the water led to an imbalance of water, leaving South Florida either with too much water, or too little water, both of which were considered unacceptable by the new inhabitants of the region. The project would also add conservation areas with water storage facilities, fixing the inhabitant's needs and providing the vehicle by which South Florida settlement could once again boom. Only this time, it would boom at a rate that no

⁹ Central and Southern Florida Flood Control District, *Ten Years of Progress: 1949-1959*, p. 6

¹⁰ Jacksonville District, *Comprehensive Report on Central and Southern Florida for Flood Control and Other Purposes*, p. 36

one foreshadowed. With a growing population, the interests behind controlling the decision made throughout the construction of the project would change. The following chapter discusses the fight between all involved interests to manipulate the results of the CSF project.



South Florida's natural water flow compared to the water flow created by the Army Corps of Engineers during the Central and Southern Florida Project.

Chapter 4: Building According to Interests

The Central and Southern Florida Project was drafted and included in the Flood Control Act of 1948 with unprecedented speed. Throughout the 1950s, the state worked with the Army Corps of Engineers to construct the majority of the project's engineering works. Nathaniel Reed, former Assistant Secretary of the Department of the Interior, believed this large scale project was created and passed so quickly because "it was in a time period where the war (World War II) had just ended and there were many engineers that needed work and was paired with a victorious and ambitious federal government."¹ Throughout the construction, the Corps and the newly created Central and Southern Florida Flood Control District attempted to coordinate the project with local, state and federal agencies in mind, but quickly realized that all of the different entities had divergent views on how the water should be distributed. The rapidly growing urban areas demanded more water. Agricultural areas wanted to secure their own amount of water for their crops.

Initially, the Corps decided that it needed to build the major components for the first phase of the program that prevented flooding. To do so, the Corps built a levee from northwest Palm Beach County to the south of Dade County along the east coast, thereby preventing flooding from the Everglades to inundate coastal cities. Second, the Corps would modify control facilities and levees around Lake Okeechobee in order

¹ Nathaniel Reed, Interviewed by Federico Jimenez, March 23rd, 2017. 12 minutes: 40 seconds

to create more water retention areas, and it would increase the discharge capacity from the lake in order to prevent flooding. Third, the Corps would create three water conservation areas in Palm Beach, Broward and Dade counties for water storage. Fourth, the Corps would construct canals, levees, and pumping stations to protect 700,000 acres of agriculture south of Lake Okeechobee in an area to be known as the Everglades Agricultural Area (EAA). Fifth, the Corps would build canals and water control structures to handle drainage in Dade, Broward, Palm Beach, Martin, and St. Lucie counties.²

The Corps first had to contend with the acquisition of lands that would be used as water conservation areas. It turned out that while the general population supported the idea of flood control out of necessity, they were much more resistant towards the sale of their private property to achieve that end. Most landowners generally did not accept the appraised value of their lands, leading to most of the lands being acquired by condemnation.³ Amazingly, some landowners refused to sell their land at all and felt that they should be able to keep their land since there was a possibility, however remote, that their properties, may contain oil or gas. To appease these landowners and proceed with construction, the Flood Control District opted instead to only acquire flowage rights in the private land that it could not condemn. In all, the FCD completed

² Central and Southern Florida Flood Control District, *Ten Years of Progress: 1949-1959* p. 11

³ Matthew C. Godfrey, *Rivers of Interest*, Government Printing Office, 2011, p. 37

its land acquisitions by 1954, purchasing approximately 860,000 acres of land and acquiring foliage rights for roughly ten percent of the conservation areas.⁴

Left out of the first phase of construction was the Kissimmee Valley, where many residents showed their discontent when they realized that the flood protection would not be provided to them right away. The FCD attempted to have meetings in the town of Kissimmee to discuss concerns and the proposed solutions to flooding, but maintained that since Kissimmee work was not part of the CSF project's first phase, the Corps were not allowed to act until Congress funded further phases. Despite the project's swift implementation, construction and land acquisition was slow. Florida senators Spessard Holland and George A. Smathers criticized the Corps for delays in constructions and made funding difficult until an acceptable rate of progress was accepted.⁵ Eventually, funding was rectified by the 1954 Flood Control Act, an act that determined that local interests would be responsible for thirty-nine percent of the total cost of the project, allowing for the extra funding required for the project to be collected.⁶

Meanwhile, agricultural and urban growth was expanding considerably throughout the entire 1950s, leading to huge increases in demands for water.

⁴ Godfrey, p. 37

⁵ "Florida Senators Charge Flood Control Job Delayed", *St. Petersburg Times*, June 24th, 1953.

⁶ U.S. Army Corps of Engineers, Jacksonville District, *Central and Southern Florida Project: Special Report on Local Cooperation in the Part of the Project Authorized by the Flood Control Act of 1954*.

Agricultural production escalated as the Corps built the levees, canals, and pumping stations that walled off floodwaters and allowed for irrigation in times of drought around the Everglades Agricultural Area. Vegetable production continued to increase in the agricultural area, staying as the main crop in the winter months.

Urban populations, especially Miami, expanded in the 1950s at an unprecedented rate. Senior citizens were migrating to Miami Beach in the 1940s in record numbers. New Yorkers came as tourists during the winter, and wealthy Cubans as a summer escape. Both resident and tourist populations were booming. The area was considered desirable since the 1920s, but it was not until after World War II with air conditioning's invention and the CSF project, that Miami would seem as a enticing place to live. By 1950, Miami had a population of two-hundred and fifty thousand people, becoming the largest city in the state, with no signs of growth slowing down.⁷

With such tremendous growth, the demand for water grew. Dade County officials started to claim that the Corps of Engineers was turning their back to Dade's growing needs, placing agricultural interests above urban needs. The county argued that it accounted for nearly half of the population included in the CSF project area and paid nearly two-thirds of the tax. Upon requesting an examination, it was found that "well over fifty percent of the total benefits claimed for the Central and Southern Florida project are based to on land to be reclaimed for agricultural purposes."⁸ Turner

⁷ Godfrey, p. 45

⁸ *Ibid.*, p.45

Wallis, chief engineer for the Flood Control District, called for the unification of all interested parties in Dade County to pressure the Corps to address the concerns of the county and to justify its investment in the project. Despite proposals, it was becoming apparent to the Corps that the county's needs for water would conflict with the requirements of other interests outside the county. The Corps concluded that "sufficient water is not available to supply all demands, and methods to conserve water will have to be developed."⁹

Despite the project's initial slow development, the end of the 1950s saw a significant increase in the pace of construction, having built or improved 128 miles of channels and canals, 300 miles of levees, and six pumping stations to serve flood control and water conservation, mostly along the Atlantic coast and Lake Okeechobee. As 1960 rolled around, growth in South Florida would be exponential, making the conflicts between the different interests unavoidable.

Throughout the 1960s, the population increased along the southeast coast, while sugar production boomed in the Everglades Agricultural area more than any other agricultural activity. It remained relatively small up until the 1959 when Fidel Castro overthrew the Cuban government of Fulgencio Batista. In response to this communist revolution, the United States government severed all ties with Cuba and placed a trade embargo, cutting off the majority of the supply of sugar for the United

⁹ Godfrey, p. 45

States. Cuba was not the only supplier that was not contributing to the supply, as Puerto Rican growers also struggled to meet production quotas. Since demand greatly outweighed the supply, sugar production was greatly increased in South Florida to compensate. Some vegetable growers also switched to growing sugar, finding it to be a much more reliable crop than vegetables since it was a year-round crop and not solely a winter one. With such demand, the U.S Sugar Company and newer, smaller sugar companies (such as the Osceola Farms Company, Sugar growers Cooperative of Florida, Atlantic Sugar Association, and the Glades County Sugar Growers) blossomed. As sugar became the dominant crop in the Agricultural Area,¹⁰ its growers became increasingly interested in how the water was distributed by the Corps.

The Cuban revolution also contributed to a tremendous growth of the urban population. Cuban refugees escaping communism moved to Miami, and by 1970, consisted of over three-hundred-thousand people of the county, a staggering growth of twenty-two percent in just one decade. This increase was on top of the already booming resident and tourist population of South Florida. By 1970, all three of the southeastern counties (Palm Beach, Broward, and Miami Dade) had a combined population of two million residents.¹¹ Miami itself was attracting most of the new people, combining more new hotels on the beach, with permanent residents who saw economic opportunities in the hospitality industry, economic trade with Miami

¹⁰ Michael Grunwald, *The Swamp*. Simon & Schuster, 2006, p. 230

¹¹ "How the Florida Boom is Changing," *U.S. News & World Report*, May 5th, 1969.

International Airport and the Port of Miami, and booming corporations such as Burger King.¹² By the end of the 1960s, the developed areas of South Florida reached six-hundred square miles, quadruple what it was in 1955.¹³

With such immense growth, the Corps had to evaluate its allocation of their water supply to South Florida, as it contemplated building more canals to drain more water to the east. The Corps also determined that new “methods to conserve water will have to be developed.”¹⁴ In general, the Corps opted to pump excess floodwater first to water conservation areas before discharging it to the Atlantic Ocean and the Gulf of Mexico, but also to back-pump excess water back to Lake Okeechobee to maintain an appropriate level of available water. Farmland would also have access to water in project canals near their property, but were held responsible to pump that water privately into their own property. They would also be responsible for pouring excess water back into the canals, sending it down to the conservation areas of the southeast urban areas.¹⁵

While municipal and agricultural interests played a game of tug of war with the available water supply, the Corps of Engineers was quick to point out the benefits the Central and Southern Florida Project to retain the general public’s support. In the late

¹² Godfrey, p. 50

¹³ Grunwald, p. 232

¹⁴ Godfrey, p. 51

¹⁵ ¹⁵ U.S. Army Corps of Engineers, *Waters of Destiny*, Florida Memory, 15 minutes : 10 seconds

1950s, the Corps of Engineers produced a melodramatic documentary called *Waters of Destiny*, a twenty-six minute documentary showcasing for the first five minutes actual footage from storms and floods previous to the project, demonstrating what the project will prevent. The documentary then shifted to show off the manpower and equipment used to change Florida's environment, placing emphasis on the good intentions of the project. The result: a productive, habitable region. The documentary shows footage of workers plowing the land, the Pratt and Whitney Aircraft research and development center, and many other industries that would not have existed in a flooded land. "Water that once ran wild, made headlines, took lives and land, now it just waits there waiting to do the bidding of man."¹⁶ As a result, "Central and Southern Florida is no longer nature's fool."¹⁷

Necessity brought a comprehensive federal program that finally tamed the waters of South Florida. The dangers that such waters posed to the public drove the necessity to tame the water, leading to near universal support for the idea of flood control. However, as the project was being built, different needs stated by different interests in the land negotiated how much of the project would benefit them. The Corps of Engineers tried to balance these interests to satisfy all parties and maintain funding. That is, except for one interest: The Everglades National Park.

¹⁶ U.S. Army Corps of Engineers, 15 minutes: 50 seconds

¹⁷ *Ibid.*, 17 minutes : 35 seconds

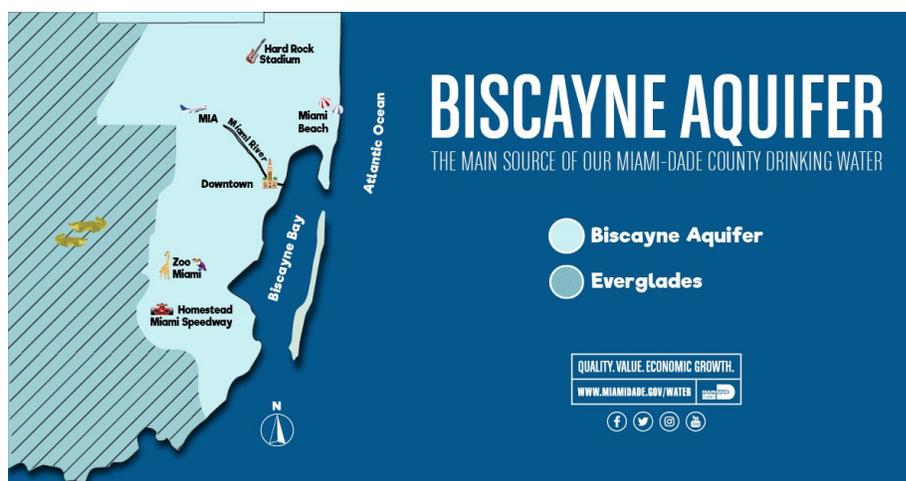
Chapter 5: An Ecological Disaster

The U.S. Army Corps of Engineers built the Central and Southern Florida project with consideration of all involved interests, with the exception of the Everglades National Park. When Florida gained statehood in 1845, the Everglades, a region of sawgrass and water located between Lake Okeechobee and Florida Bay, provided potential in the eye of many entrepreneurs. What, they asked, could you make out of this land? Was it destined to remain uninhabited, or was there a possible way to make it suitable for settlement and agriculture? Unappreciative of the plethora of flora and fauna in the region, most Floridians could see only a wet swamp that had to be drained and converted into habitable land. As discussed in the previous chapters, the State of Florida, entrepreneurs, and the federal government experimented with ways to try to tame the Everglades' water flow. After numerous attempts by Hamilton Disston and different Florida governors, the land was still susceptible to floods. Federal action was required to solve the region's flooding problems. However, conservationists feared that such flood control could result in a tremendous loss of habitat in the region. The Everglades consisted of a vast series of ecosystem that consisted of mangroves, orchids, magnolia, cypress, mahogany, lignum vitae, rubber trees, orchids, egrets, cranes, herons, amingos, spoonbills, alligators, turkeys, bear, deer, fox, wildcats, panthers, raccoons, and opossums. However, with decades of drainage, settlement, and hunting, humans were slowly on their way to destroying the ecosystem permanently.¹

In 1947, author Marjorie Stoneman Douglas, after much research on the Miami River, published *The Everglades: A River of Grass*, a book that went on to show to Floridians that the

¹ McCally, *The Everglades*, University Press of Florida, 1999 p. 176

Everglades was not a simple swamp, but rather a wide, shallow, slow moving river that was home to a vast ecosystem and was a vital component to the state's water cycle.² She explained the fragility of its ecosystem and the threats to its existence from drainage, development, and agriculture. Most importantly, she explained that the river's flow was a result of a complex water cycle, where water would originate in Central Florida near Kissimmee, travel down the Kissimmee River to Lake Okeechobee, and then spills over slowly down the Everglades to Florida Bay.³ In the Everglades, the water either evaporated into the sky and went back north to Central Florida, or it recharged the Biscayne Aquifer, a fresh water aquifer underneath the city of Miami.



Location of Biscayne Aquifer - Recharged by Everglades Water



Original flow of Water prior to drainage

Douglas' book changed the public's perspective on the Everglades from an area of nothing but a swamp into a perspective of appreciation. Ernest Coe, a landscape architect from Connecticut and Senator Spessard Holland convinced Congress that the area, at the time not

² Marjorie Stoneman Douglas, *The Everglades: A River of Grass*, Pineapple Express, 1997, p. 6

³ Jack E. Davis, *An Everglades Providence*, University of Georgia Press, 2009, p. 29

including the area of Big Cypress, should become a national park.⁴ Then, on December 6th, 1947, President Harry Truman dedicated the park, coincidentally the same year as when the Corps of Engineers began planning the Central and Southern Florida Project and Douglas published *A River of Grass*.

When the Corps of Engineers first proposed the CSF project, both the National Park Service and the U.S. Department of the Interior were concerned about the lack of specifics on the water supply to Everglades National Parks. The Corps repeated that it took into account the necessity of providing adequate water to the park, but did not give specifications. Over the next several months, Pepper, district engineer Willis Teale, and Holland, held numerous public hearings with local interests to hear their comments about the plan. Few individuals, if any, expressed any anxiety about the plan's effects on Everglades National Park.⁵ Instead, most were more interested in the procedures taken to safeguard South Florida from future floods.

The only person in the hearings speaking solely as a representative of plant and wildlife interests was Eustace L. Adams, who represented the Dade County Conservation Council and the Florida Wildlife Federation; no officials from Everglades National Park, the FWS, or even the Florida Game and Fresh Water Fish Commission testified at this time. As the project's construction progressed and South Florida's agriculture and population increased, the Corps considered enlarging Conservation Area No. 3 for municipal use instead of the proposed storage for the national park. Concerned that the Everglades would be further robbed of water, officials from the National Park Service protested.

⁴ Davis, p. 381

⁵ Matthew C. Godfrey, *Rivers of Interest*, Government Printing Office, 2011, p. 25

The Corps listened to the official's concerns, but also reiterated that its major responsibilities were to provide water for municipal uses. B. F. Hyde, Jr., executive director of the Flood Control District, insisted that the FCD's policy was "to preserve or enhance natural resources values wherever such is possible consistent with accomplishment of its prime responsibility," namely "water control in the interest of all public needs and values."⁶ Unlike the willingness of the Corps to negotiate with urban and agricultural interests, it was reluctant to cooperate with NPS. As fears grew of the loss of water flow into the park, the NPS petitioned Congress to restrict CSF project funds until an agreement was reached. The Corps insisted that the NPS needed to deal with the Flood Control District directly, and continued on with construction. As a result, the Everglades was beginning to enter an era of not having enough water instead of having too much.

Nathaniel P. Reed, former assistant secretary to the Department of the Interior and former Florida Cabinet officer discussed his experiences of dealing with the Corps of Engineers on behalf of the Everglades National Park. When asked about the extent of consideration that the park received from the Corps, Mr. Reed responded, "In every single negotiation I ever had with multiple interests and the Corps of Engineers, the Everglades always came out last."⁷

Matthew Godfrey points out on his historical analysis of the CSF project that the "Corps and FCD representatives insisted that fish and wildlife benefits were secondary to flood control and water supply."⁸

⁶ Godfrey, p. 44

⁷ Nathaniel Reed, Interviewed by Federico Jimenez, March 23rd, 2017. 46 minutes: 4 seconds

⁸ Godfrey, p. 45

The continued demands from park officials, coupled with the efforts of a growing environmental movement in South Florida, led to the passage of a congressional mandate in 1970 that the C&SF Project deliver a certain amount of water to the park each year.⁹ This came about in a very strategic era: the 1960s. With the release of Rachel Carson's *Silent Spring* and the creation of the Friends of the Everglades by Marjorie Stoneman Douglas, the environmental movement began to coalesce in South Florida. In 1969, a proposed jetport in Big Cypress, just north of the Everglades National Park, was a culmination of growth in South Florida and man's ambitions to build a large, supersonic airport to serve Miami. The location, however, was a huge issue. Big Cypress contained approximately fifty percent of the surface water that normally runs into the Everglades and it housed seventeen different endangered species. Marjorie Stoneman Douglas and Nathaniel Reed became heavily involved in the efforts to try to stop the construction of the jetport. They both knew that City of Miami and state officials were supportive of the proposal, so the environmentalists focused on high level federal officials, particularly U.S. President Richard Nixon. Of course, the Dade County Port Authority was not pleased with such attempts, telling environmentalists that "Big Cypress Swamp is just typical South Florida real estate" and that "a new city is going to rise up in the middle of Florida whether you like it or not." Port Authority officials even disregarded the information about the threat that the jetport posed for animals, saying that "they make nice shoes and pocketbooks."¹⁰

⁹ Godfrey, p. 49

¹⁰ John G. Mitchell, "The Bitter Struggle for a National Park", *American Heritage* no. 3, p. 22

The group led to the creation of the Leopold Report, named the *Environmental Impact of the Big Cypress Jetport*. With mounting evidence to support the environmentalist's causes, even state officials began to question the quality of the jetport's development. Then, seeking political capital, Richard Nixon embraced environmental issues as an important part of his early presidency and stopped the construction of the jetport in Big Cypress in 1970. The successful defeat of the jetport, coupled with a second defeat of the Corps of Engineers' Cross Florida Barge Canal in Central Florida, and environmentalist's usage of environmental law (such as the National Environmental Policy Act of 1969) led to a new era of interactions between the Corps of Engineers and environmentalists. The environmentalists, coupled with Miccosukee and Seminole residents, created the Big Cypress National Preserve, bringing the hotly contested Big Cypress region under the control of the National Park Service.

Politics would then take an odd turn in the 1980s, as Bob Graham became governor of Florida and Ronald Reagan became President of the United States. Governor Graham gave state planners more influence in shaping the state's budget by creating the Office of Planning and Budgeting, while President Reagan used the federal budget to restrict and shape federal policy.¹¹ Conversely, President Reagan was quick to defund federal programs he did not like, including many environmental programs that affected South Florida's future.

Meanwhile, the Everglades and Lake Okeechobee degraded. The Everglades was not receiving enough water, relying mostly on precipitation rather than the traditional water flow from the Kissimmee River south. Lake Okeechobee now had a dam that prevented the original natural flow and coastal cities were using most of the water allocated for the Everglades. Lake

¹¹ Godfrey, p. 112

Okeechobee itself had degraded too. Backpumping of water to maintain water levels introduced pesticides and other chemicals from the agricultural area into the lake.¹² The Kissimmee River, a river which was channelized in the early 1970s as part of the CSF project to become a straight river in order to increase the speed of its flow, was losing almost ninety percent of its wildlife and dried out the Kissimmee flood plain.¹³ Suddenly, in attempts to prevent flooding, a region that had too much water turned into a region that did not have enough water because of human activity.

All of the issues required careful environmental reviews to determine a solution. Since environmentalists now had the knowledge of dealing with both the Corps of Engineers and private interests, they began exploring ways of correcting the issues. In 1989, nearly 110,000 acres were purchased on the eastern side of Everglades National Park to expand the park and secure an area through which water flows into the Everglades system. Then, in 1992, Congress authorized a restoration of the Kissimmee river to its original flow. Working with the South Florida Water Management District, previously the Flood Control District, land was acquired along the Kissimmee River to begin restoring the flow of water to Kissimmee floodplains and slow down the rate of flow to Lake Okeechobee.

In spite of these nascent attempts, the Everglades and the Biscayne Aquifer were still not receiving enough water. Multiple different studies were launched to explore how water flow could be restored in multiple different areas of the Everglades. In 2000, Congress passed the

¹² U.S. Army Corps of Engineers Jacksonville District, *Notice of Public Hearings on Improvements for Water Resources for Central and Southern Florida*, October 1967, p. 3

¹³ Michael Grunwald, *The Swamp*. Simon & Schuster, 2006, p. 267

Comprehensive Everglades Restoration Plan, a plan that consolidated numerous different studies conducted and started in the 1990s.¹⁴

CERP sought to accomplish three different things:

- 1) to provide flood control
- 2) to store water for future use
- 3) provide water to the natural Everglades system

It sought to provide eighty percent of the retained water to the Everglades by reversing water flow that exits into the ocean back down to the Everglades. This was meant to maintain the water provided to agricultural and urban interests, but provides the Everglades water that was

being wasted. However, providing water was not the sole solution. Both the amount of water and the *timing* of its delivery were critical for sustaining the Everglades, therefore, careful management by the South Florida Water Management District is also crucial. It is estimated that CERP's total implementation will be done around 2045, costing approximately \$9.6 billion.¹⁵



Provided by Kevin Kotun, Everglades National Park

¹⁴ National Park Service, *Restoration of Everglades National Park*, p. 2

¹⁵ National Park Service, *The Future of Everglades National Park*, signage located in park.

As I was doing my research on the Everglades National Park, I interviewed Kevin Kotun, chief hydrologist at the Everglades National Park, on the progress of CERP. When I asked about CERP's progress, he told me that it depends on where and who is involved. He gave the example of the Caloosahatchee Estuary restoration, where "no one has a problem with our modifications and progress was made swiftly. However, when you get to efforts near the Agricultural area, you begin to have a lengthy negotiation that requires satisfying the involved parties. This makes these restoration areas take much longer to restore."¹⁶ I then asked him if he believes that CERP is enough to restore the Everglades' water flow and habitat, to which he replied, "We firmly believe that this plan will help restore the Everglades to a more natural state."¹⁷

I also interviewed Nathaniel Reed during my research, a former assistant secretary of the Department of the Interior and state cabinet member and one of the most important activists in the Everglades' history. Like I did with the hydrologist, I asked Mr. Reed if CERP is enough to restore the Everglades' flow and habitat, to which he replied with optimism, "I absolutely believe that this time, all of the right people are involved and the Everglades will have a chance. It is not a luxury, it is a necessity."¹⁸

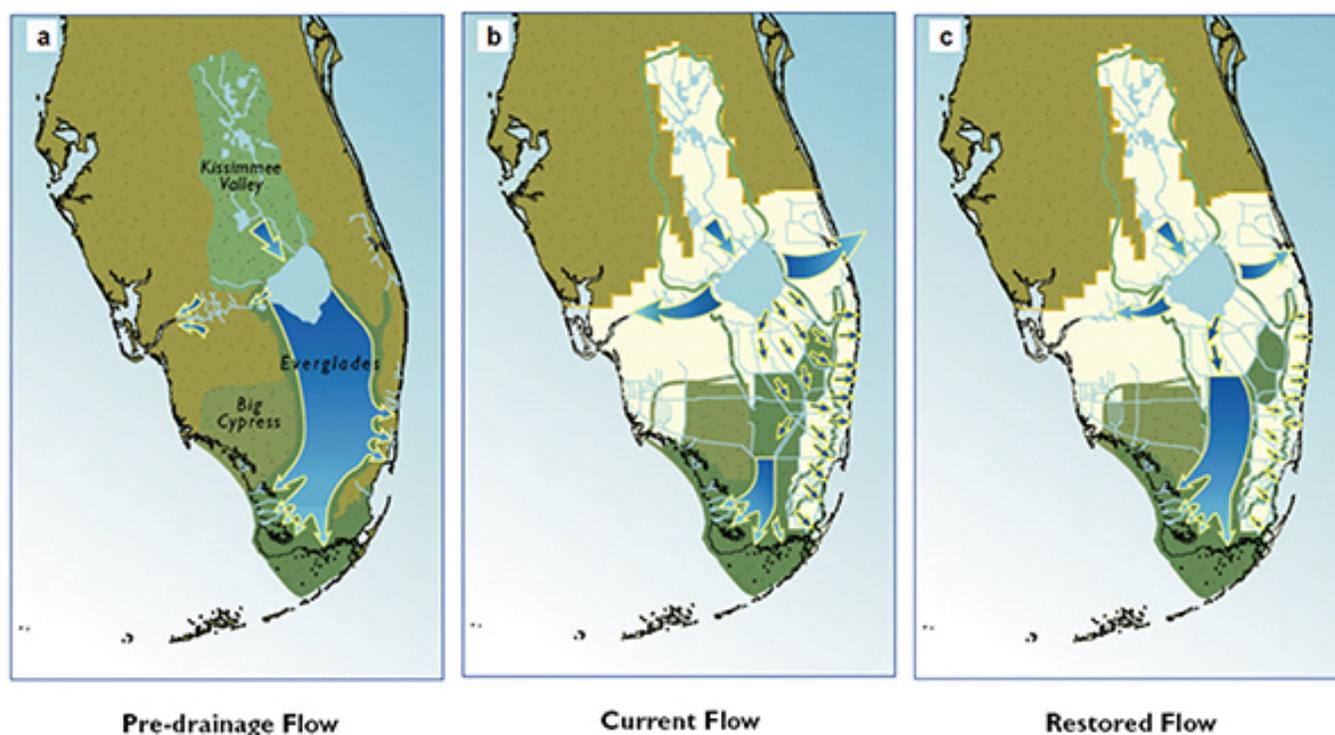
I asked Mr. Reed if he believes people are still apathetic about the Everglades, to which he replied "absolutely. The Everglades is not like Yellowstone where you drive inside of it and immediately understand its beauty. The Everglades must be learned, and one only understands

¹⁶ Kevin Kotun, Interviewed by Federico Jimenez, March 9th, 2017. 16 minutes : 20 seconds

¹⁷ *Ibid.*, 44 minutes : 20 seconds

¹⁸ Nathaniel Reed, Interviewed by Federico Jimenez, March 23rd, 2017. 16 minutes : 11 seconds

it when you look at it from above.”¹⁹ Since he believes most people still do not care about the Everglades’ importance, I asked him what would be the definitive reason that they should care about it. He explained that it is a necessity, as it recharges the Biscayne Aquifer. “The Biscayne Aquifer has only receiving rainfall and drainage from the Everglades Agricultural Area for the last 15 years, and with now 3.3 million residents in Miami depending on the aquifer, along with 1.5 million visitors who all have a straw in the Aquifer, The Biscayne cannot supply that much water for such demands without having a properly functioning Everglades water system, the way god intended it to be.”²⁰

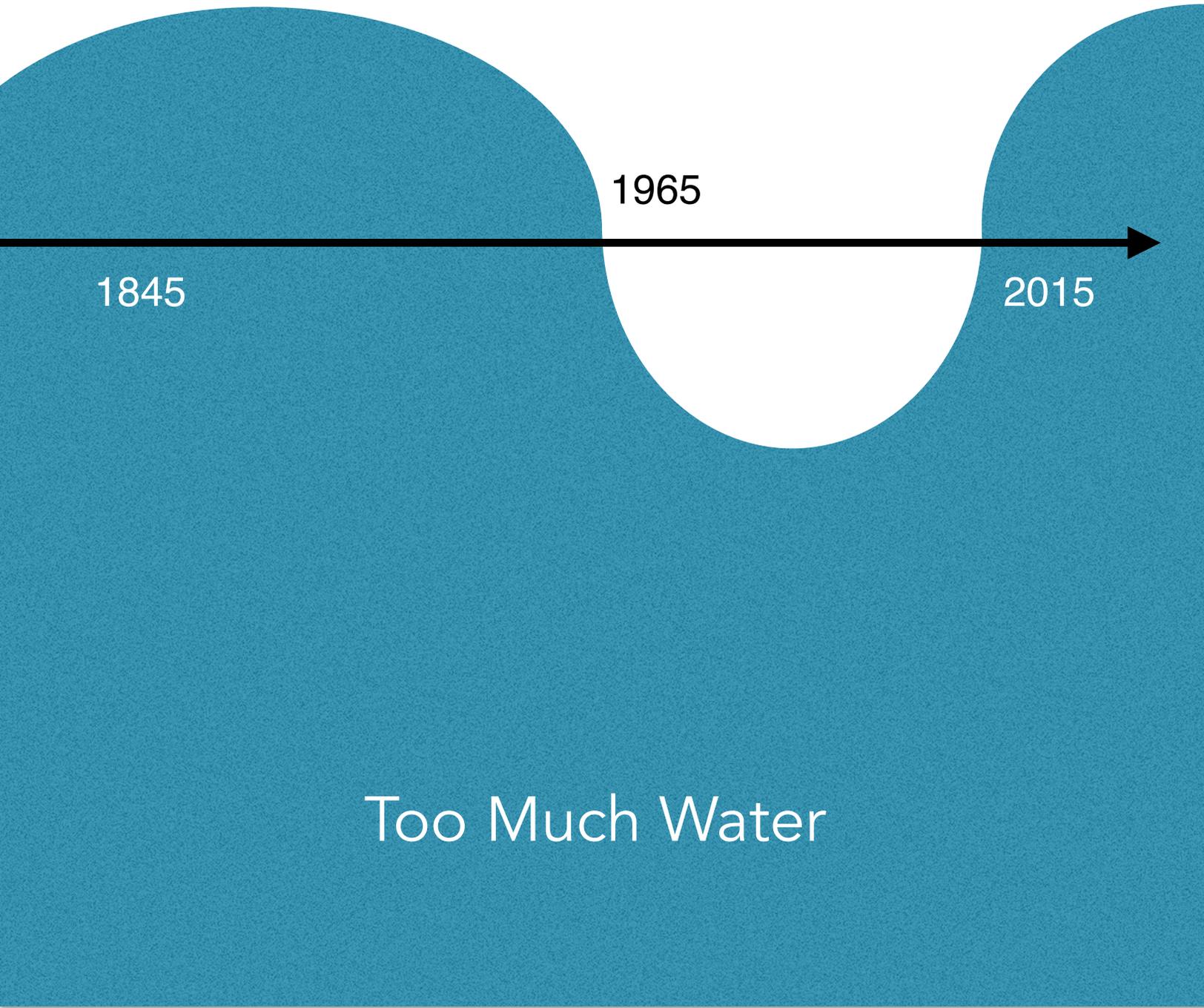


Comprehensive Everglades Restoration Plan proposed changes to water flow

¹⁹ Nathaniel Reed, Interviewed by Federico Jimenez, March 23rd, 2017. 39 minutes : 41 seconds

²⁰ *Ibid.*, 43 minutes : 28 seconds

Not Enough Water



1845

1965

2015

Too Much Water



Royal Martin
Philip LEVINE
www.levineforlloyd.com

Alton Rd

Epilogue: A New Challenge

Previous chapters have examined South Florida's long and difficult history with water. At first, Floridians were trying to get the water out of the land. Then, they needed the water back in the land. The Everglades is currently undergoing a restoration that will bring back its waters and keep South Florida's water cycle going. While residents are trying to balance not having too much or too little water, South Florida faces a new danger: Rising sea levels.

Climate change has been showing its effects in some places more than others. Miami Beach is unfortunately one of the first ones to have effects due to its low altitude. It is not uncommon to tune in to a television channel in Miami and hear "tidal flooding in Miami beach" or "rising tides are leading to flood streets once again."¹ Florida has more major cities at risk from rising sea levels than any other state in the country, and some scientists are predicting that Miami Beach may be permanently flooded by the end of the 21st century.²

In 1947, Florida had severe flooding from Lake Okeechobee, which drove the necessity to create a comprehensive flood control program to prevent it from happening again. Today, in 2017, Miami Beach is suffering from severe flooding from a different source — high tides. Since it is a city with one of the highest number of

¹ Philip Levine, "Is Miami Beach Doomed?", *The Atlantic*, 2016. <https://www.theatlantic.com/video/index/460332/is-miami-beach-doomed/>

² Leonardo Di Caprio, "Before the Flood", *National Geographic*, 2016.

tourists in the world, and contains some of the most expensive real estate in the country,³ Miami Beach must work to prevent continuous flooding. Over the last ten years, the amount of “sunny day floodings”⁴ (days where the city would flood without rain) per year has increased. Streets flood when water starts coming out of the sewage system, worrying residents and tourists alike.

The reason why the sewage system is filling up and flooding the streets is due to the design of the sewage system. The system is connected throughout the city, having outflow drains in the city’s sea walls. As the sea levels rise, the outflow drains submerge into the water, causing water to reverse into the system and escaping through the streets. In order to fix this, Mayor Philip Levine ordered the installation of one-way valves in the sewage system; valves that only allow the water to leave but not enter. In order to actually push the water into the ocean and prevent back flow, pumps had to be installed. Lastly, roads in Miami Beach are being built higher, usually on top of an existing road.⁵ The thinking behind that is simple: if the road is higher, it won’t flood.

Miami Beach has its share of city and state roads. Roads that are considered state roads are specifically handled by the state, but the state refuses to fix the street as Governor Rick Scott’s present administration does not believe in climate change, going

³ Justine Gillis, “Flooding of Coast, Caused by Global Warming, Has Already Begun”, *The New York Times*, September 3rd, 2016. Print.

⁴ Albert C. Hine, Don P. Chambers, Tonya D. Clayton, Mark R. Hafen, and Gary T. Mitchum, *Sea Level Rise in Florida*, University Press of Florida, 2016, p. 136

⁵ Philip Levine, “Is Miami Beach Doomed?”, *The Atlantic*, 2016. <https://www.theatlantic.com/video/index/460332/is-miami-beach-doomed/>

as far as banning state officials from using the term.⁶ Despite the city's attempt to show evidence (including showing fish on the street) the state still refuses to fix it, forcing the city to close down the state road when it floods. The city has also been raising its sea walls, something that does not solve the sewage system but does prepare the city for the possibility of the tide going over the sea walls and into the land.

Currently, the city is developing a set of solutions city wide. It has an estimated cost of \$400 million, and is solely being paid for by the city.⁷ Mayor Levine has expressed frustration with the state's refusal to help, but Governor Scott's administration remains uncooperative with climate change matters.

The bigger issue is that the solutions carried out by the city are engineered solutions to solve current problems. They are solutions that will only work for the next thirty or forty years. In order to plan for the next century, the city has to consider everything from what kind of landscaping can withstand salt, to how can residents begin to raise their homes. Mayor Levin said in an interview "We do not have a lot of answers. We have a lot of questions."⁸ This is an issue for which there is no instruction manual; combating rising sea levels is a new issue for a new generation of Floridians. Mayor Levine once said, "I want to be the Mayor of Miami Beach, not the Mayor of

⁶ Tristram Korten, "In Florida, officials ban the term 'climate change'", *Miami Herald*, March 8, 2015. Print.

⁷ Philip Levine, "Is Miami Beach Doomed?", *The Atlantic*, 2016. <https://www.theatlantic.com/video/index/460332/is-miami-beach-doomed/>

⁸ *Ibid.*

Venice,”⁹ a quote that is now famous amongst residents of the city. If anything, that quote serves to validate the ideas expressed in this thesis: Florida has gone from having too much water, to having too little, and now is heading back to having too much. To compensate, the city of Miami Beach has acted proactively on the necessity to keep the streets dry and is becoming a pioneer in tackling the next chapter in Florida’s flood control.

⁹ Philip Levine, “Is Miami Beach Doomed?”, *The Atlantic*, 2016. <https://www.theatlantic.com/video/index/460332/is-miami-beach-doomed/>



"Sunny Day Flooding"



Example of a raised road

Sewage system in the city ->

Note the outflow drain goes into the ocean. When tides rise, the outflow drain is under the water, and water enters the sewage system.



Conclusion:

This thesis explored the history of flood control in South Florida and its effects on South Florida. Within that larger framework, it also examined the role of necessity and the negotiations between the different interests through the history of the Central and Southern Florida Flood Control Project. The project itself was a necessity to protect the lives of the residents of southeast Florida. As it was being built, the agricultural industry and the municipalities tried to persuade the U.S. Army Corps of Engineers to meet most of their respective needs. One particular interest, the Everglades itself, was not taken as a serious necessity. In this thesis, I interpreted these necessities as the agent for change, shaping critical moments in the history of South Florida. Without the Central and Southern Florida project, South Florida would not be the place it is today.

The Central and Southern Florida project did in fact solve the general issue of flooding, fulfilling early governors' and entrepreneur's dreams of draining the Everglades. The project also led to a population boom and a huge increase in agricultural production boom that was larger in scale than anyone foresaw. As these events occurred, the water demand grew and different interests fought on their behalf for what they considered necessary. Throughout the years since construction of the project began, Florida has gone from having too much water, to having too little, and now is heading back to having too much.

The channeling of water in South Florida regulated when and where the water went, creating challenges for an environment that needed protection but also posed problems for an ever-growing region. It was a battle that incorporated multiple different activists, industries, and residents. The mission of building “paradise” in South Florida proved to be a challenging one, and by examining the key moments, one realizes that building this paradise is the story of managing its waters. This story still goes on today with new challenges arising. More than ever, a careful balance of water for the Everglades (and therefore the Biscayne Aquifer), the municipalities, and the agriculture industry is needed. By learning about the necessities of each, proper choices can be made. But Florida will also need to start paying attention to a new water problem: Rising sea levels. If mastered carefully and promptly, Florida may become the pioneer in flood control in the twenty-first century. If not, Florida will face the need for a new comprehensive water control plan that will tackle sea levels and will only get costlier as time goes on.

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