

April 2019

BUILDING A BETTER BATTURE: A REGIONAL RECREATIONAL ENHANCEMENT AROUND THE MORGANZA TO THE GULF LEVEE

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BUILDING A BETTER BATTURE:
A REGIONAL RECREATIONAL ENHANCEMENT AROUND THE MORGANZA TO THE
GULF LEVEE

A Thesis

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Master of Landscape Architecture

in

The School of Landscape Architecture

by
Taylor Nicole Fehmel
B.S., University of Delaware, 2014
May 2019

ACKNOWLEDGMENTS

I want to express my sincere gratitude to my parents, Anne and Tim Fehmel, and my brother Jeffrey for their love and support. I am especially thankful for the encouragement they extended me during my graduate studies in landscape architecture. They taught me what it means to work hard to accomplish my goals.

During my years at the Robert Reich School of Landscape Architecture, I have had the pleasure of meeting so many excellent educators and classmates, and I am forever grateful for their support and knowledge. I am especially thankful to my thesis committee – Kevin Benham, Dr. Brendan Harmon, and Dr. Robert Twilley. Their guidance, feedback, and positivity have helped keep me on track throughout this project. I am honored to have worked with them on this thesis.

A special thanks to Louisiana Sea Grant and Dr. Robert Twilley for allowing me to work on this amazing project and for providing the funding to make this project possible. I am honored that this thesis has the potential to be a valuable asset in future discussions on Coastal Louisiana.

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ABSTRACT

Twenty-five years ago, the existing flood protection levees along the Louisiana coastline were removed and construction was started by Terrebonne Levee and Conservation District on a new project called 'Morganza to the Gulf' or MTG. This project was undertaken to construct a new flood protection levee system around Louisiana in the communities in Terrebonne and Lafourche Parish. The MTG Levee is one of the first coastal projects in Louisiana to incorporate a risk-based analysis for a double levee system containing both local parish drainage levees and future storm surge levees of MTG. It was designed to protect approximately 250,000 people in the coastal parishes the levee encompasses and the remaining fragile marsh from hurricane storm surges. The hurricane protection system, that was initially proposed by the U.S. Army Corps of Engineers but executed by the local parish levee districts, consists of approximately 98 miles of earthen levee (the eastern extent of the authorized levee alignment ties into Larose to Golden Meadow levee south of the Gulf Intracoastal Waterway); 22 floodgates on navigable waterways; 23 environmental water control structures; and a lock complex consisting of a lock in the Houma Navigation Canal measuring 110 feet wide by 800 feet long, and an adjoining floodgate measuring 250 feet wide, and a dam closure¹. The ongoing construction of this levee system has created a barrier for the residents of these parishes against storm surges, but has also greatly reduced human access to the Gulf of Mexico. When a community is cut off from one of its predominant natural resources by physical infrastructure there are threats to the cultural, social, and interpersonal capital of the coastal community. Recently there have been additional sources of funding for Gulf of Mexico Restoration and Recovery funding, earmarked for the building of the Morganza to the Gulf Levee protection systems and the surrounding areas, some of which has been allocated for "Enhancing Recreational Value" to the coastal communities of the State of Louisiana.² I plan to examine landscape architecture opportunities and possibilities for recreation in the Morganza to the Gulf Levee region of coastal Louisiana.

¹ Coastal Protection and Restoration Authority of Louisiana, (2017). *Louisiana's Comprehensive Master Plan for a Sustainable Coast: effective June 2, 2017*. Baton Rouge, LA. Retrieved from <http://coastal.la.gov/our-plan/2017-coastal-master-plan/>

² Environmental Law Institute Ocean Program. (January 2018). BP Oil Disaster: Restoration & Recovery Natural Resource Restoration in Louisiana. Washington, D.C. Retrieved from <http://eli-ocean.org/wp-content/blogs.dir/2/files/ELI-NRDA-in-LA-Jan.-2018.pdf>

CHAPTER 1. THE LEVEE, A TIMELINE

*"To control the Mississippi River- not simply to find a modus vivendi with it, but to control it, to dictate to it to make it conform is a mighty task. It requires more than confidence; it requires hubris. It was the perfect task for the nineteenth century. This was the century of iron and steel, certainty and progress, and the belief that physical laws as solid and rigid as iron and steel governed nature, possibly even man's nature, and that man had only to discover these laws to truly rule the world. It was the century of Euclidean geometry, linear logic, magnificent accomplishments, and brilliant mechanics. It was the century of the engineer."*³

Levees, a natural or artificial embankment to prevent overflow of a river, first originated in New Orleans and the word is derived from the French word, levée', to rise or lift.⁴ The man-made, artificial levees have become the immediate response to natural catastrophes in Louisiana since the first man-made levee was completed in the year 1727 along the left bank of the Mississippi.⁵ The purpose of this chapter is to understand the history of coastal Louisiana, its relationship to the water in the Gulf of Mexico and the factors that led to the start of construction of Morganza to the Gulf Levee in 2008. The chapter also examines the lengthy process that was required to mobilize a project of this size and scope and the parties involved in the process and execution. The chapter also explores how outdoor recreation could have been more fully integrated in the design in response to the social and cultural changes that were destined to occur as a result of the construction.

1.1 Hurricanes, Flooding and the U.S. Army Corps of Engineers

In 1927, the Great Mississippi Flood occurred which was the most destructive river flood in the history of the United States, with 27,000 square miles inundated up to a depth of 30 feet. It was a flood that took many human lives, destroyed large amounts of property, and caused an economic downturn in New Orleans Parish. It is not unusual after disaster events for shifts in government policy and, in the aftermath of the flood of

³ Barry, J. M. (1997). *Rising Tide : The Great Mississippi Flood of 1927 and How it Changed America*. New York : Simon & Schuster, 1997.

⁴ FEMA, Department of Homeland Security. (2016, May 18). *History of Levees [PDF File]* . Reterived from <https://www.fema.gov/media-library/assets/documents/22863>

⁵ Rogers, D. J. (2005). History of the New Orleans flood protection system. *Investigation of the performance of the New Orleans flood protection systems in Hurricane Katrina on August 29*.

1927, there were policy changes with respect to the U.S. Army Corps of Engineers, or The Corps, and its role and responsibilities.



Figure 1. B&W photo taken 1927, Provided by the Library of Congress. Sandbags used to hold back the rising water during the Louisiana Great Flood of 1927.

Prior to the great flood of 1927, the Corps' main job was navigation on the river. Immediately following the flood, the Corps, was suddenly tasked with flooding and riverine protection. The Corps of Engineers Mississippi River & Tributaries (MR&T) Project was authorized by Congress in the Flood Control Act of 1928 which put the Corps in charge of both navigation and flood control protection.⁶

In September of 1965, Hurricane Betsy hit the southeastern Louisiana coast as a category 4 hurricane and wind meters at Grand Isle, Louisiana a recorded gusts of up to 160 mph and a storm surge of 15.7 feet overwhelmed the entire island. It was the most destructive economic natural catastrophe in America thus far and the first to exceed \$1 billion in damages.⁷ During Betsy, the Mississippi River rose more than 10 feet in New Orleans and crested at 15.5 feet in Baton Rouge. Following the storm, the existing levee was elevated to 12 feet by the USACE. Betsy was coined a "double disaster," the occurrence of, a hurricane, followed shortly by, a flood.⁸

The Larose to Golden Meadow Hurricane Protection Project began, by the South Louisiana Tidal Water Control Levee District, one month after the economically

⁶ Rogers, D. J. (2005). History of the New Orleans flood protection system. *Investigation of the Performance of the New Orleans Flood Protection Systems in Hurricane Katrina on August 29.*

⁷ Several Studies (Rogers, 2005; Blake, Rappaport & Landsea, 2007)

⁸ Forrest, T. R. (1979). Hurricane, Betsy, 1965; A Selective Analysis Of Organizational Response In The New Orleans Area.

devastating Hurricane Betsy hit land. The South Louisiana Tidal Water Control Levee District would preside over the project that provides protection for the southern reaches of Lafourche and Terrebonne Parishes.

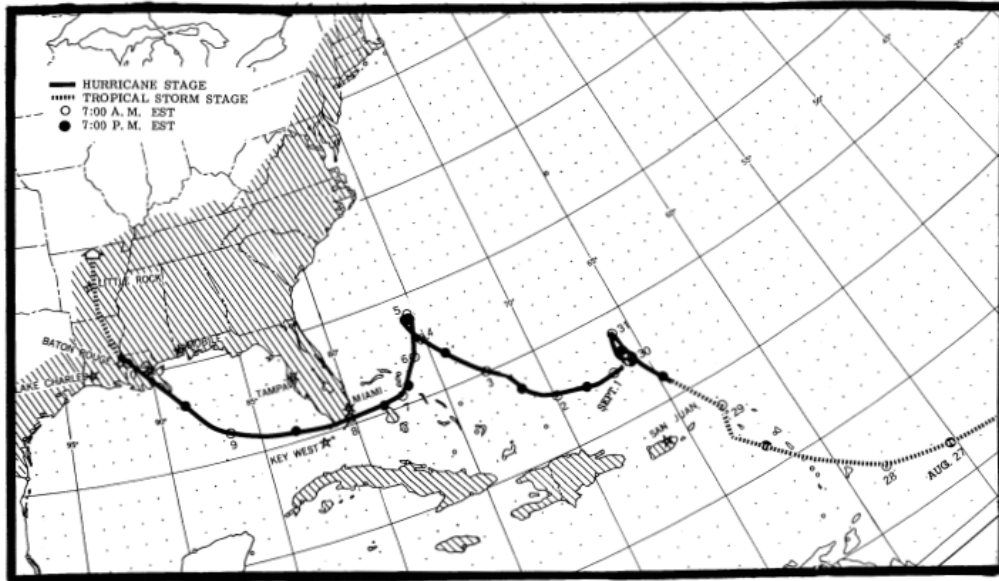


Figure 2. Hurricane Betsy's Track from U.S. Department of Commerce, Preliminary Report. August 27 to September 12, 1965.

Unfortunately, construction of this protection levee did not begin until eight years later, in 1976 and during that period hurricanes continued to hit the coast.

In the aftermath of Hurricane Betsy, two agencies once again responded with policy shifts. The Army Corps of Engineers was brought to the forefront and charged with implementing annual hurricane protection plans. Secondly, 1965 brought to light that no flood insurance was available and the victims of Hurricane Betsy had to rely on friends and family, charities, or Federal relief in the aftermath of the storm. After that catastrophe, the U.S. government established a new program in 1968—the National Flood Insurance Program, or NFIP.⁹

The National Flood Insurance Program manages the Community Rating System which evaluates the risk reduction efforts made by local communities. An example of the Community Rating System, is that building a levee system provides benefits to the community in the form of reductions on their flood insurance premiums.

⁹ Michel-Kerjan, E. O. (2010). Catastrophe Economics: The National Flood Insurance Program. *Journal of Economic Perspectives*, 24(4), 165-86.

In October of 1985, Hurricane Juan, produced a storm surge of 8 feet in Cocodrie, Louisiana where it overtopped all parish forced drainage levees and caused \$35,000,000 worth of damage.¹⁰ The storm hovered in southeastern Louisiana and kept pumping water that reached almost 20 inches of flood water in Galliano, Louisiana. Although none of the Lafourche Levee Districts larger storm surge levees allowed water to top over the levee, the secondary parish drainage levees failed. It became clear that larger more comprehensive levee plan was needed around both parishes. In 1986, following Hurricane Juan, the South Terrebonne Tidewater and Management District, now known as the Terrebonne Levee and Conservation District was created. In April 1990, Congress enacted the Coastal Wetlands Planning, Protection and Restoration Act, CWPPRA, often referred to as simply "the Breaux Act." CWPPRA was the first Federally mandated restoration effort to take place along Louisiana's coast and the first program to provide a stable source of Federal funds dedicated specifically to coastal restoration.

1.2 The Inception of Morganza to the Gulf

In April 1992, the U.S. Army Corps of Engineers was authorized to conduct a reconnaissance study for the Morganza project. The area of study spanned from Morganza in the north, east to the Atchafalaya River, west to Bayou Lafourche and south to the Louisiana Gulf of Mexico. The proposed action consisted of upgrading the existing parish drainage levees in southern Terrebonne and Lafourche Parishes, constructing some new levees and water control structures, and operating the water control structures and floodgates in a coordinated manner during a tropical storm or hurricane tidal surges.¹¹ The reconnaissance study took three years and determined that there may be Federal need for action. This kickstarted a feasibility study by the Corps. The Energy and Water Development Appropriation Act of 1995, authorized the Mississippi River & Tributaries- Morganza, Louisiana to the Gulf of Mexico Hurricane Protection feasibility study. As the study progressed, the magnitude and complexity of the undertaking became evident. No "open" hurricane protection system of such size had been undertaken before.¹² After clearing many governmental and policy hurdles, the feasibility study was completed in March 2002 by the Corps and consisted of an environmental impact statement, technical appendices to support the environmental impact statement, and design plans describing the project. The study completed by the Corps determined that there is indeed Federal interest, in providing protection from hurricane surge flooding for Terrebonne and Lafourche Parishes.

¹⁰ Roth, D. (2010). *Louisiana Hurricane History* (p. 70). Camp Springs, MD: National Weather Service.

¹¹ USACE, (2001). *Draft Feasibility Report, Mississippi River and Tributaries Morganza, Louisiana to the Gulf of Mexico Hurricane Protection*. New Orleans: U.S. Army Corps of Engineers, October 30, 2001.

¹² USACE, (2004). *Final Programmatic Environmental Impact Statement Mississippi River & Tributaries- Morganza , Louisiana to the Gulf of Mexico Hurricane Protection*. New Orleans: U.S. Army Corps of Engineers, December 4, 2004.

While the feasibility study was being conducted, the residents of Terrebonne Parish became impatient because the study was protracted. Storm surge protection is “a parish-wide need that will take parish-wide resources” stated Reggie, Dupree, the Director of the Terrebonne Levee and Conservation District.¹³ On November 17, 2001, the voters of Terrebonne Parish supported a quarter-cent sales tax to fund the hurricane protection project, Morganza to the Gulf Levee.¹⁴ This was the first local tax dedicated to hurricane protection and was expected to generate an estimated \$3.6 million a year in revenue for hurricane protection.

On August 29th, 2005, 40 years after Hurricane Betsy struck the Louisiana coast, Hurricane Katrina made landfall as a category 5 storm and the resulting economic damages far exceeded those from the 1965 hurricane. Katrina will likely be recorded as the most catastrophic natural disaster along the Gulf Coast. As of August 10, 2006, damages totaled \$81 billion within the United States.¹⁵ The most significant result in Louisiana in the aftermath of Hurricane Katrina was Louisiana Legislature approving Act 8 in 2005, creating the Louisiana Coastal Protection and Restoration Authority, or CPRA. The CPRA integrated several state agencies and became accountable oversight agency of all activities and funds, and it proposed to develop a coordinated plan of action among coastal Louisiana with clear goals and achievable objectives. As a result, the CPRA produced a master plan with the core objective to “promote a sustainable coastal ecosystem by harnessing the processes of the natural system.” The organization takes advantage of both Federal and State funding of around \$1 billion annually.¹⁶ From 2005 to 2008 the residents of south Louisiana believed that the Federal government was going to help with funding Morganza to the Gulf Levee Project.

As previously mentioned, Congress authorized a Feasibility Study of the Morganza project in the Energy and Water Development Appropriations Act of 1995, which was completed by the USACE in March 2002. Despite the completion of the study there was no water bill between 2001 and 2007 under President George W. Bush and the project stalled. By 2007, based on the findings of the feasibility study and a subsequent Programmatic Environmental Impact Statement (PEIS), the Water Bill was back on the table and Congress provided construction authorization to the Morganza project through the Water Resources Development Act of 2007. This authorization was based on the study completed in 2002, which was prepared prior to development and implementation of post-Katrina design criteria. This design criteria required the USACE

¹³ Interview, 19 January, 2019

¹⁴ Terrebonne Parish Consolidated Government (2013). Comprehensive Annual Financial Report, 2012-2013, Annual Report. Houma, LA: Finance Department, Division of Accounting. Retrieved from http://www.tpcg.org/files/accounting/2012_CAFR.pdf

¹⁵ Roth, D. (2010). *Louisiana Hurricane History* (p. 70). Camp Springs, MD: National Weather Service.

¹⁶ Khalil, S. M., Raynie, R. C., Muhammad, Z., & Killebrew, C. (2011). Overview of Coastal Restoration in Louisiana. *Shore and Beach*, 79(3), 4-11.

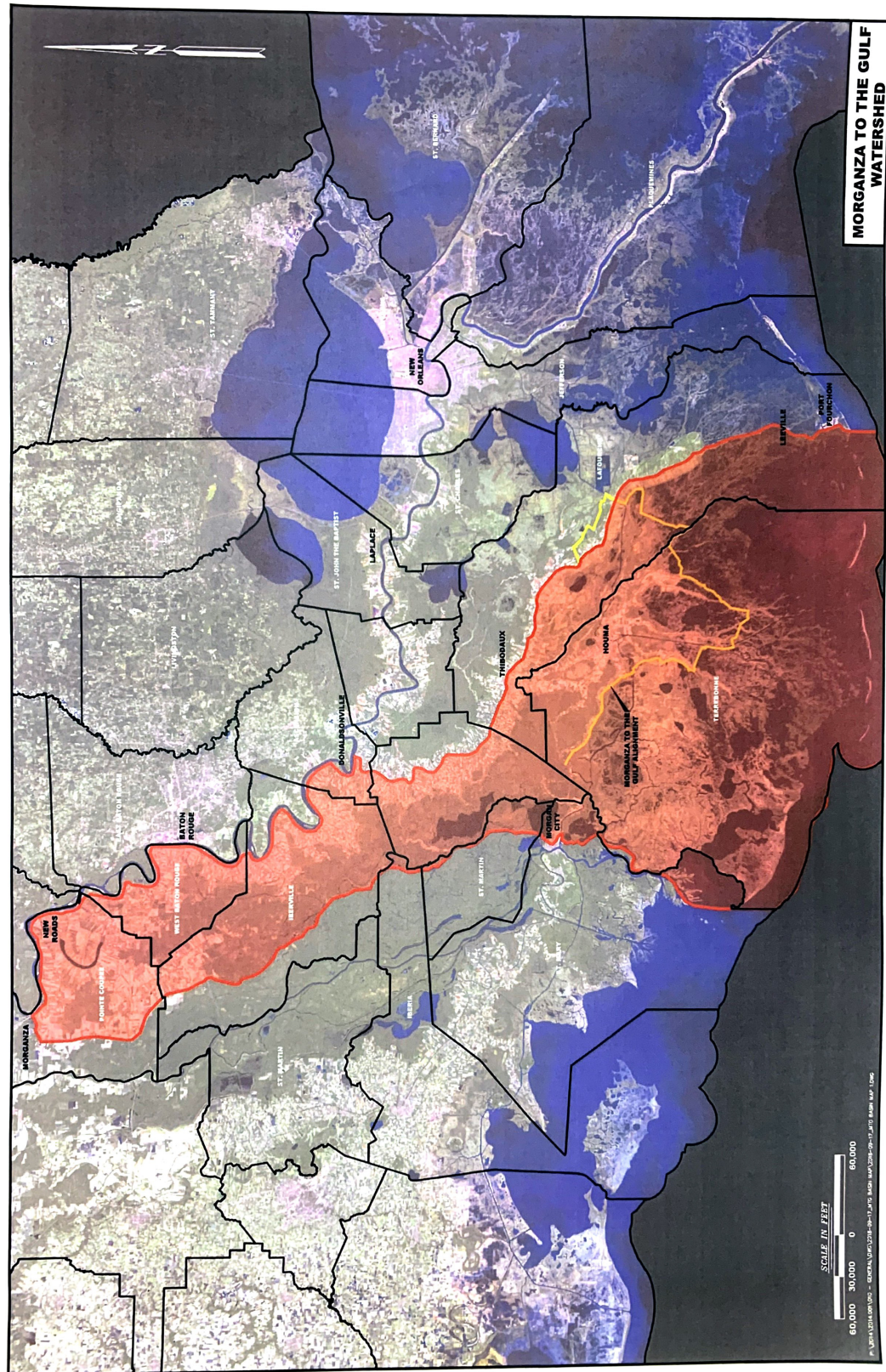


Figure 3. U.S. Army Corps of Engineers Reconnaissance Study Region. Provided by Terrebonne Levee and Conservation District.

to incorporate lessons learned from hurricanes Katrina and Rita into the designs for the Morganza to the Gulf project.¹⁷

By 2007 the design criteria project cost estimate prepared in 2002 exceeded the amount allocated by the Federal government and, as a result, the Corps New Orleans District was asked to prepare a Post Authorization Change Report or a PAC, to present a new project cost for reauthorization. For the first time, the Corps' feasibility study - a critical component of the process - declared that the project's benefits outweigh cost to construct the levee. This 2008 PAC report found that the cost would exceed original estimates by 20% and, despite the support of the Corps, the project was removed from Federal funding sources. In September of 2008, hurricanes Ike and Gustav hit the coast and by December of that year, Terrebonne and Lafourche Parishes applied for permits to break ground on Morganza to the Gulf without Federal funding support.

Since 2001 the Terrebonne Levee and Conservation District had been collecting a quarter-cent sales tax to help fund the storm surge protection project and no longer believed that the that the Federal Government was going help to fund Morganza to the Gulf. After hurricanes Gustav and Ike in 2008, the Levee District opted to build a scaled-down version of the levee system along the Corps approved path with more than \$220 million in state and local money. In 2012 the voters of Terrebonne parish approved a half-cent sales tax aimed at raising as much as \$150 million to finish the Morganza to the Gulf levee system and build additional hurricane protection in Falgout Canal, Bayou Black and Gibson. The half-cent sales tax, was expected to raise about \$11.2 million a year in Terrebonne. Local officials said a bigger, Federally financed, U.S. Army Corps of Engineers-built levee system seemed increasingly unlikely. The Terrebonne Levee District sold parish bonds to raise \$150 million to pay for the levee. Terrebonne Levee Director Reggie Dupre suggested, the parish would use the tax revenue to repay the debt over 28 years.¹⁸

With \$34 million in infrastructure matching money from the state, the tax money would cover the cost of finishing the Morganza to the Gulf project, but would also pay for a \$38 million project to build levees in Bayou Black and a \$22 million project to build a floodgate in Falgout Canal in Dularge, and additionally put \$500,000 toward a permanent floodgate in Bayou Chene to protect against Atchafalaya River flooding. This approach taken by Terrebonne Parish leaders illustrates how local parishes have played a critical role in assisting the state with the construction and maintenance of the earthen levee and operation of flood gates for the Morganza to the Gulf.

Parishes have also partnered with the State on construction costs toward lifting levee increments. Such local efforts have provided crucial funds for construction of the Bubba

¹⁷ Assistant Secretary of the Army, Civil Works, the Department of Defense, (2013). *Morganza to the Gulf of Mexico, LA: Final Post Authorization Change Report and Revised Programmatic Environmental Impact Statement [Transmitting Report]*. Washington : U.S.

¹⁸ Interview, 19 January, 2019

Dove Barge Floodgate, the Bayou Petite Caillou Floodgate, and other projects, providing flood risk reduction to communities along the bayou and the Houma Navigation Canal. With continued local support for Morganza to the Gulf and other hurricane risk reduction projects, coordinated efforts will ensure projects are consistently maintained while reducing flood risk to our communities.¹⁹

In 2015, the settlement for the Deepwater Horizon disaster provided the State of Louisiana with 8.78 billion dollars in restitution. This created a new funding stream that could be used to support NRDA, NFWF, and RESTORE- all of which help support coastal protection and restoration.²⁰

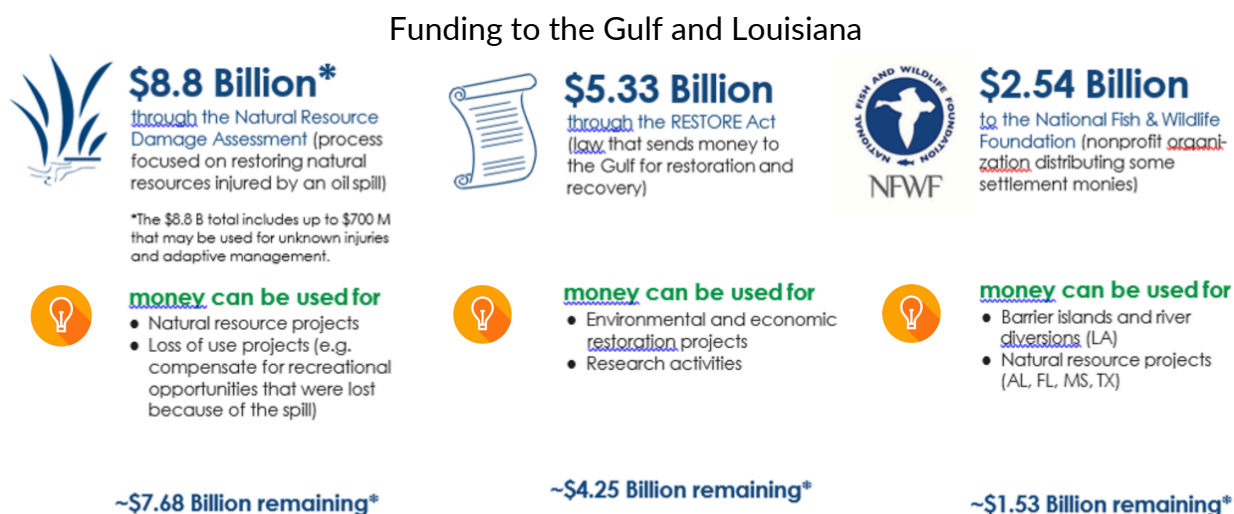
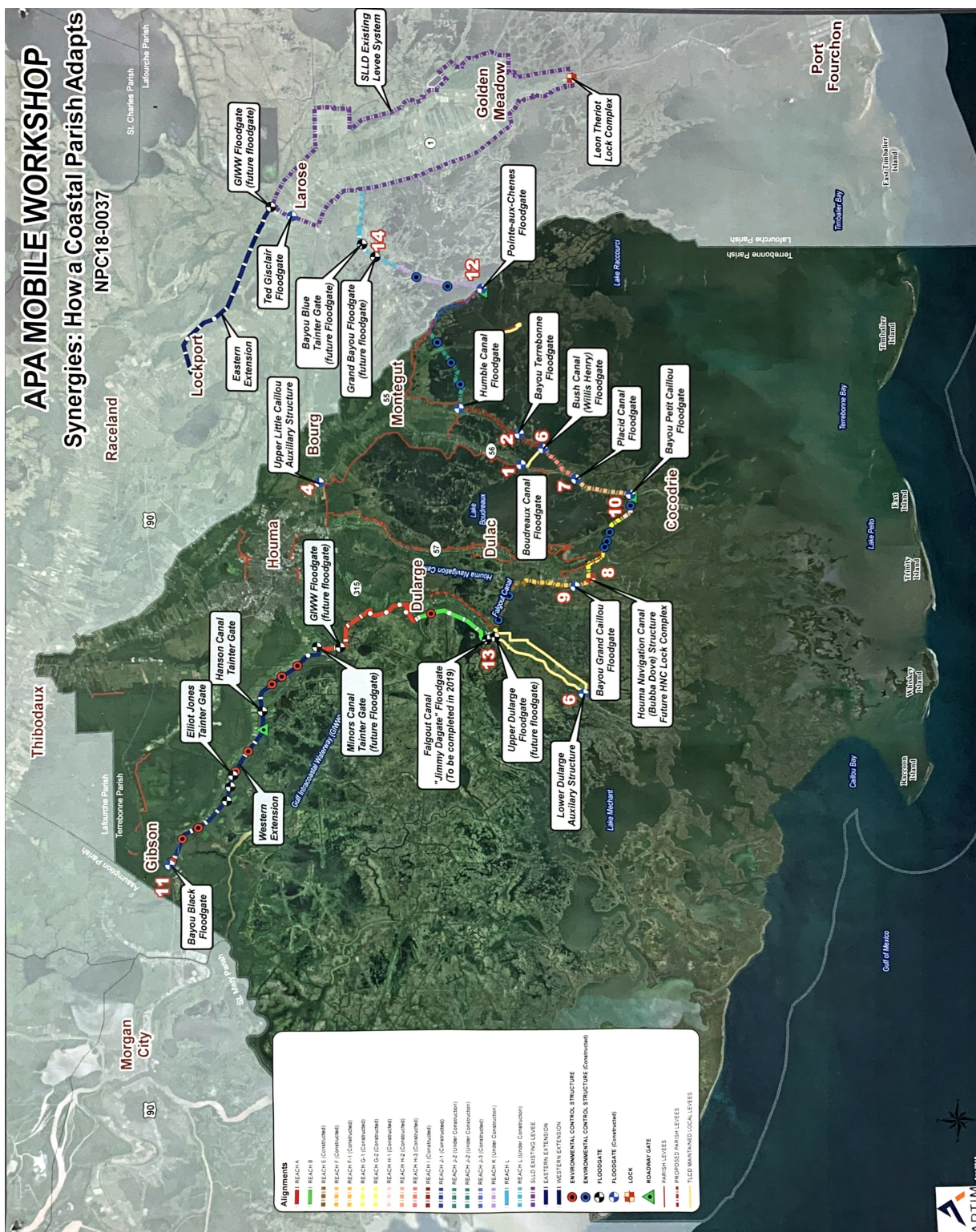


Figure 4. Amounts of Funding Sources for Gulf of Mexico Restoration and Recovery that may be designated for projects, programs or planning by Environmental Law Institute Ocean Program

Today, the Morganza to the Gulf Levee project is still under construction along the 98 miles of coast in Terrebonne and Lafourche parishes.

¹⁹ Coastal Protection and Restoration Authority of Louisiana, (2017). *Louisiana's Comprehensive Master Plan for a Sustainable Coast: effective June 2, 2017*. Baton Rouge, LA. Retrieved from <http://coastal.la.gov/our-plan/2017-coastal-master-plan/>

²⁰ Coastal Protection and Restoration Authority of Louisiana, (2017). *Louisiana's Comprehensive Master Plan for a Sustainable Coast: effective June 2, 2017*. Baton Rouge, LA. Retrieved from <http://coastal.la.gov/our-plan/2017-coastal-master-plan/>



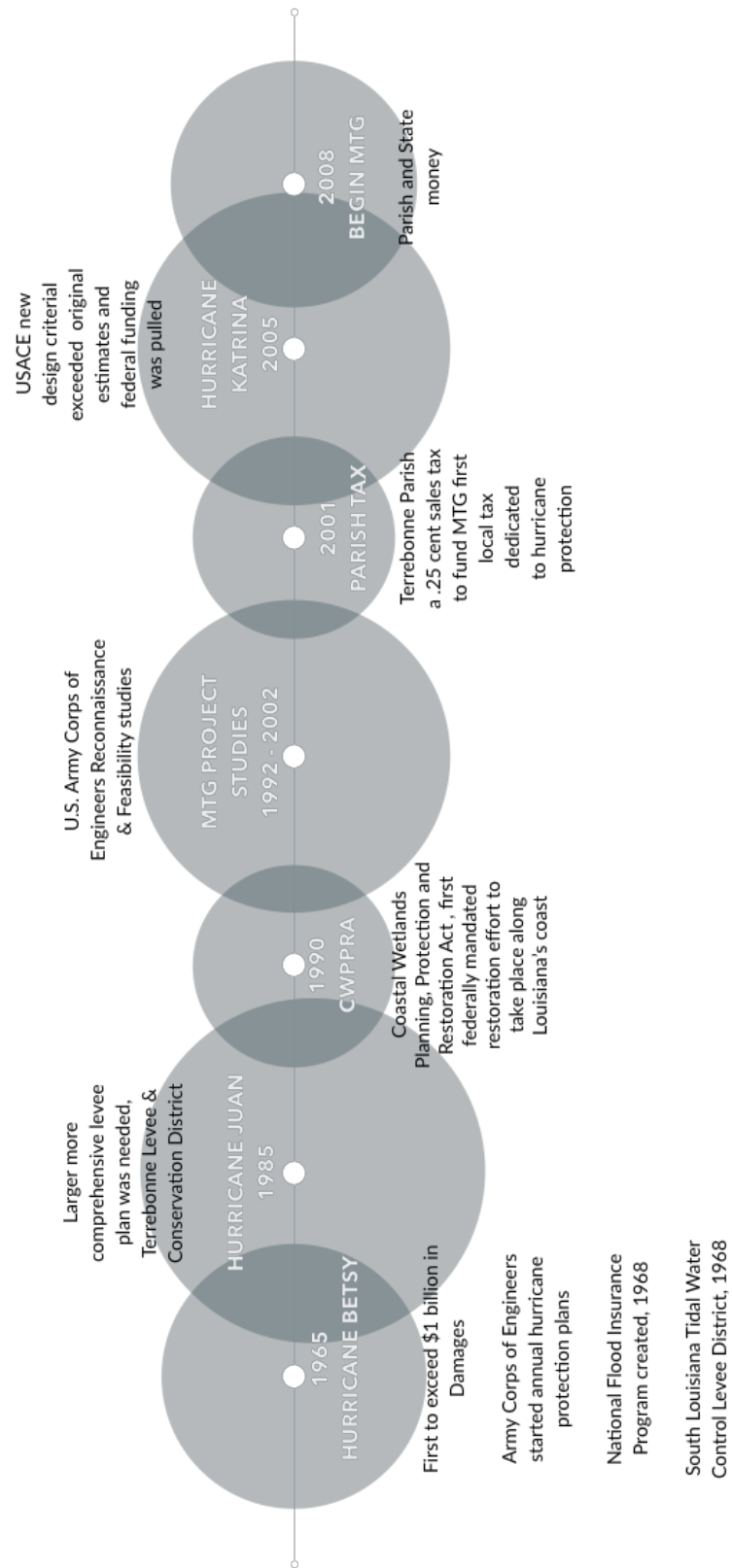


Figure 6. Timeline of Major Events, Morganza to the Gulf

CHAPTER 2. CLIMATE CHANGE AND STORM PROTECTION IN THE GULF, WHAT THIS MEANS FOR RECREATION

The term “climate change” is often used by scientists, environmentalists, and politicians, but in Louisiana the term has very specific meanings. Perhaps no other place on earth, and certainly no other place in the United States has experienced the impact of climate change more dramatically than the state of Louisiana. Around the world sea levels are rising. Storms are becoming more frequent and the severity of storms has also been increasing. In Louisiana, these things, coupled with the man-made damage that has been done to the natural processes that protect the coast, have resulted in marsh loss and degradation, subsidence, and saltwater intrusion along the coast. These negative effects contribute to more intense and damaging storm effects along the coast, a cycle that is very difficult to reverse through natural means. One of these unfavorable conditions evident in Terrebonne and Lafourche parishes, the two parishes that transect Morganza to the Gulf, is rising sea level, further amplified by subsidence, that has resulted in a loss of over 1.2 million acres of land since 1930.²¹ Coastal erosion has increased flooding, altered inundation patterns, and increased saltwater leaching into freshwater marshes. Some of the other long-term effects that the state is just now coming to terms with are salt intrusions into groundwater, marsh migration and large shifts to open water. Hurricanes have become stronger and storm surges have become larger, often approaching 10 feet in size. They have also become more frequent and are intensifying due to sea level rise and the loss of protective marshes. Terrebonne and Lafourche parishes have become increasingly vulnerable to flooding from rainfall, overflowing rivers, and hurricane-induced storm surges.²²

The severity of these conditions has created a situation where by man-made protection systems, like levees, must be built to mitigate the effects of both climate change and the man-made disruptions to the natural processes that, in the past, provided coastal protection. Since the first implementation of a levee in 1927, humans have become increasingly dependent on engineering to protect infrastructure and habitats as the Mississippi River Delta evolves.²³ Many of the problems along the Louisiana coast can be traced to human activity that has resulted in a severe reduction in natural barriers. In a recent interview, “We now have to fight back the water with man-made structures”-observed Reggie Dupree, Director of the Terrebonne Levee district.²⁴ Large scale changes are affecting the Mississippi River Coastal Delta and low lying coastal environments, each have become increasingly vulnerable to the negative impacts of climate change. The consequence of mitigating these risks, include the loss of culture,

²¹ Batker, D., Torre, I.D., Costanza R., Swedeen P., Day J.W., Boumans R., & Bagstad K. (2010). *Gaining Ground. Wetlands, Hurricanes and the Economy: The Value of Restoring the Mississippi River Delta*. Tacoma, WA: *Earth Economics*. Tacoma, WA.

²² Syvitski, J. P., Kettner, A. J., Overeem, I., Hutton, E. W., Hannon, M. T., Brakenridge, G. R., Day, J., Vorosmarty, C., Saito, Y., Giosan, L., & Nicholls, R. J. (2009). Sinking Deltas Due to Human Activities. *Nature Geoscience*, 2(10), 681.

²³ Syvitski, J. P., & Saito, Y. (2007). Morphodynamics of Deltas Under the Influence of Humans. *Global and Planetary Change*, 57(3-4), 261-282.

²⁴ Interview, 19 January, 2019

interpersonal capital and entire communities; the responses to mitigate the impact involve great financial costs to local, state and Federal governments.²⁵ Morganza to the Gulf Levee has been designed to provide 100-year, Category 3 storm protection to 250,000 residents in Terrebonne and Lafourche parishes and 1,700 square miles of wetlands and fragile marsh.²⁶ The earthen levee, along with the floodgates and a lock complex will continue to be implemented to reduce hurricane risk and flood damages and provide coastal protection, restoration, and sustainability in conjunction with the CPRA master plan.



Figure 7. Aerial Image of a Morganza to the Gulf Levee Section and Floodgate. Provided by Terrebonne Levee and Conservation District.

It is it clear that climate change has caused damage to our natural environment and increased risks of storm damage along the coast. In response, levees like Morganza to the Gulf have been implemented with the sole focus of protection from these risks, but this protection has come at a cost. The construction of the levee has separated large numbers of people from the water and altered their lifestyles and a cultural heritage

²⁵ Twilley, R., Allison, M., Capozzoli, L., Laska, S., Reed, D., and Ryan, T. (2008). Morganza-to-the-Gulf Technical Panel Review [Final Report]. Retrieved from https://www.academia.edu/18829196/MORGANZA-TO-THE-GULF_TECHNICAL_PANEL_REVIEW

²⁶ Morganza Action Coalition.(2018). *Advocating for the Hurricane Protection that Our Community Needs and Deserves: Fact Sheet*. Retrieved from <http://www.morganza.org/wp17/wp-content/uploads/2018/05/MAC-fact-sheet-May-2018.pdf>

which is so closely tied to the coastal environments. The MTG levee, while necessary, has restricted access to the water and diminished recreational opportunities for many communities along its path. Entire communities that depend upon access to the water for their livelihood and recreation have been negatively affected. The levee, while admittedly need, because of the protection it provides. These protection aspects of the barrier have been at the forefront of discussions while culture, lifestyle, and recreation have been forgotten. Locals have historically vocalized their accounts of the changing land they grew up with and how their use has changed since the construction of the levee but their voices have been overcome by concerns for protection from hurricanes and flooding.

Direct and Indirect Effects of Climate Change on Recreation

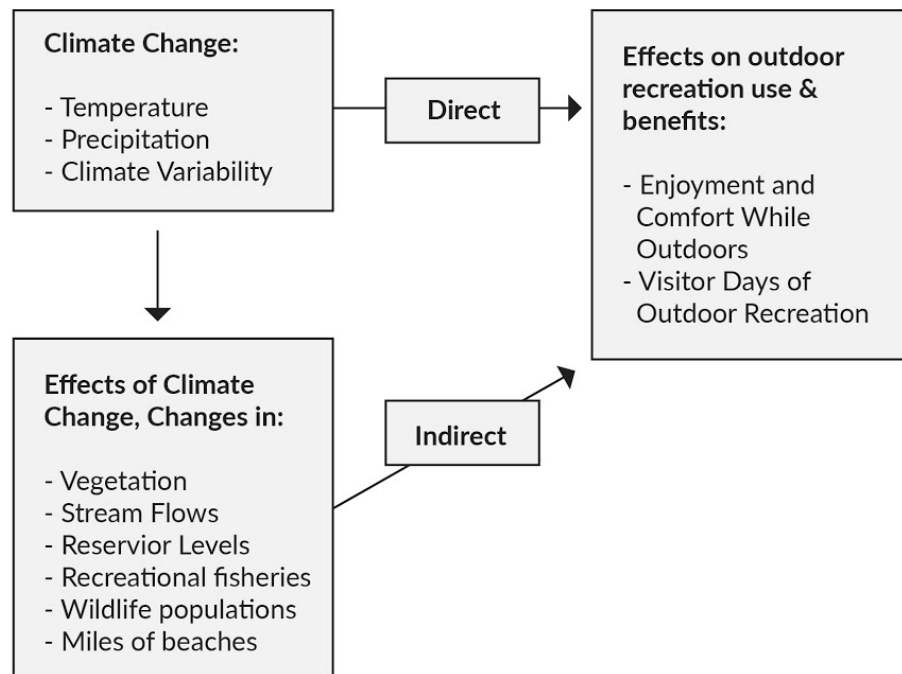


Figure 8. Adapted from Frameworks for analyzing the economic effects of climate change on outdoor recreation by Shaw & Loomis, 2008.

Despite negative impacts, there have also been positive changes to the environment as a result of the levee. Since sections of the levee have been constructed, local residents have commented on some of the direct positive impacts to the natural systems that they have seen. Environmental habitats have been restored and created through wetland mitigation and marsh creation. Fresh water has returned to marsh areas previously spoiled by saltwater intrusion, which has led to the return of many fish and bird species that had been driven out by the damage to their habitats. "A healthy environment is the cornerstone of our tourism industry," said Carrie Stansbury, executive director of the Cajun Coast Visitors and Convention Bureau. "Whether visitors come to our area for

wildlife and scenery, for outdoor recreation or to eat our seafood, their experiences are directly connected to productive and thriving wetlands.”²⁷ Louisiana’s coast has always been a landscape of constant change. Restoration projects aiming to maintain diverse marsh habitats assist in preserving the richness and abundance of Louisiana’s fisheries. Without such efforts, Louisiana’s right to the moniker “Sportsman’s Paradise” will erode and vanish along with its fish and its wetlands.²⁸



100+ Years of Land Change for Southeast Coastal Louisiana

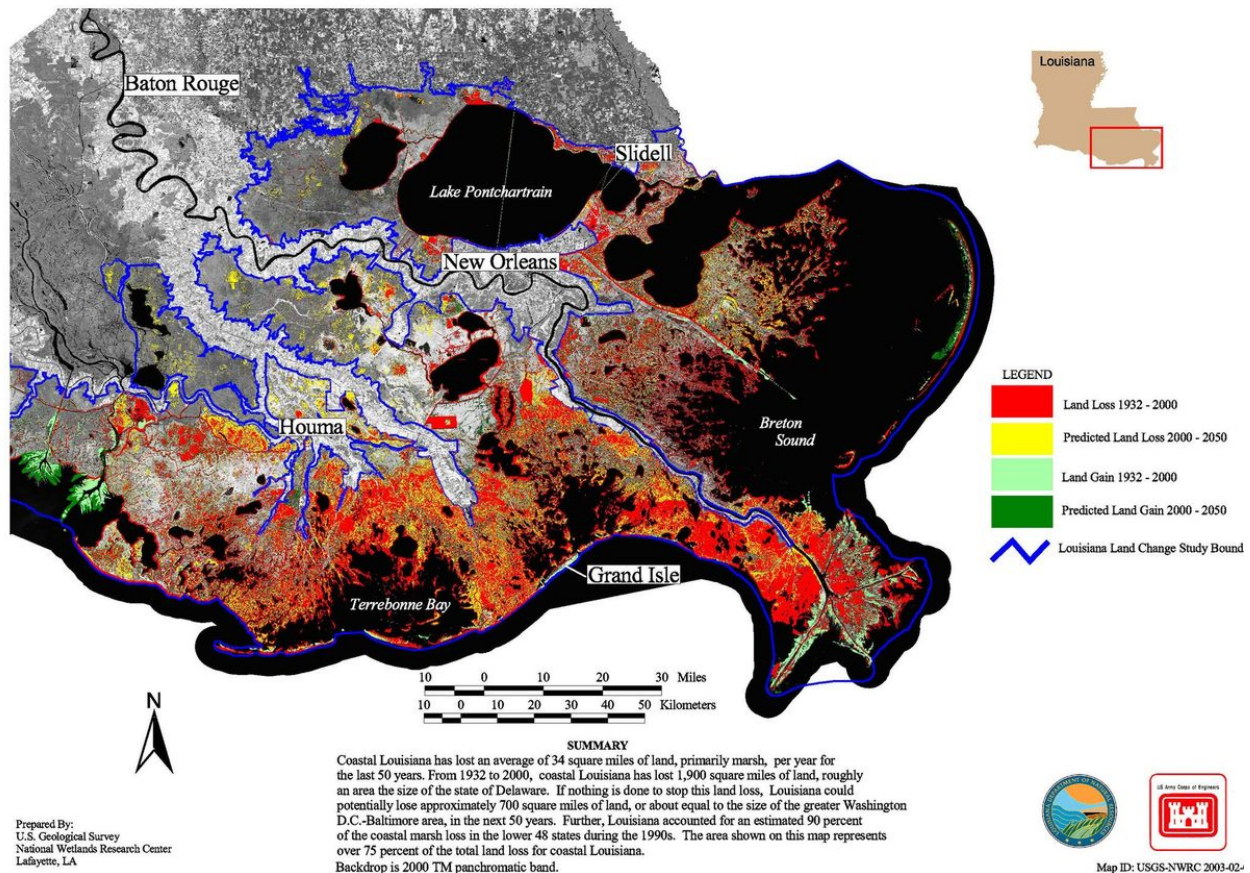


Figure 9. Land Lost, Projected Land Loss, Land Gain and Projected Land Gain from 1932 -2050s.
Provided by United States Geological Survey.

As the Morganza to the Gulf project progresses, it seems clear that there is an opportunity that can be capitalized upon. In order to keep the communities along the

²⁷ Louisiana Coastal Wetlands Planning, Protection and Restoration. (October 2012). *Watermarks Newsletter, Number 46*. Retrieved from <https://lacoast.gov/new/Pubs/WaterMarks.aspx>

²⁸ Louisiana Coastal Wetlands Planning, Protection and Restoration. (July 2017). *Watermarks Newsletter, Number 55*. Retrieved from <https://lacoast.gov/new/Pubs/WaterMarks.aspx>

levee connected to their coastal culture, efforts must be made to support the activities that earned Louisiana the reputation as a sportsman's paradise. Recreational enhancement and development will help restore and preserve some of the the aspects of the Louisiana coastal culture that has been negatively impacted by the levee. Increased accessibility to the water will provide increased recreational opportunities and help restore some sense of cultural normalcy to the communities and increase opportunities for tourism along the Louisiana coast.

²⁹ National Recreation and Parks Association. (2018). 2018 NRPA Annual Report. Retrieved from <https://www.nrpa.org/siteassets/annual-report-nrpa-2018.pdf>

CHAPTER 3. RECREATION IN THE PARISHES, PAST, PRESENT AND FUTURE

3.1 Defining Recreation

Recreation includes a wide array of activities, however, the U.S. National Survey of Fishing, Hunting, and Wildlife-Associated Recreation defines recreation as:

*“Wildlife-related recreation is fishing, hunting, and wildlife-watching activities. These categories are not mutually exclusive because many individuals participate in more than one activity. Wildlife-related recreation is reported in two major categories: (1) fishing and hunting, and (2) wildlife watching, which includes observing, photographing, and feeding fish or wildlife.”*³⁰

Louisiana has a rich history as a “Sportsman’s Paradise” and that nomiker having that slogan imprinted on the automobile license plates issued by the state. For many years, the communities along the coast of Louisiana enjoyed a close relationship with the land and the water. Animals, fish and birds were plentiful and the natural processes of the ecosystem protected, maintained, and replenished the resources. Access to the open water was easy and resources found in open water defined culture and provided livelihood for many.



Figure 10. Photograph, Mailbox sign capturing coastal culture, captured January 23rd, 2019 in Theriot, Louisiana.

³⁰ U.S. Fish, & Wildlife Service. (2016). 2016 National Survey of Fishing, Hunting and Wildlife-Associated Recreation. Retrieved from <https://www.census.gov/library/publications/2018/demo/fhw-16-nat.html>



Figure 11. B&W photo, 1970s. Blessing of the Shrimp Fleet at Chauvin, alongside a bayou known as Petite Caillou. Image from State Library of Louisiana

For generations hunting, fishing and viewing of wildlife on Louisiana's coastline has been viewed as a right of passage and could even be argued that these recreational amenities should not be optional but are actually an inalienable right in the state.



Figure 12. B&W photo, circa 1939. Fishermen. Terrebonne Parish, LA. Image from State Library of Louisiana.



Figure 13. B&W photo, 1952 Redfish Caught in Terrebonne Parish, Image from Terrebonne Parish Development Board, Resources and Facilities

While it is imperative to build the levee, it has greatly restricted human access to the Gulf of Mexico. When a coastal community is cut off from one of its primary natural resources by physical infrastructure there is a threat to cultural, social and interpersonal capital of the coastal driven community. Before levees were constructed there was total access to the water without the fear of disturbing restorative processes and ecosystems.



Figure 14. Photograph, Fence Across the Levee, captured January 23, 2019 in Theriot, Louisiana.



Figure 15. Photograph, Fence to Prohibit crossing over the Levee, captured January 23, 2019 in Cocodrie, Louisiana.



Figure 16. Photograph, No Trespassing on the Levee, captured January 23, 2019 in Dularge, Louisiana.

Sportsmen likely see more than promise in the structural levees and restorative wetland projects. Restoration efforts may look simple or insignificant on maps or in aerial photography yet hunters see these projects as possibilities of flourishing expanses of waterfowl habitat, and fishermen perceive them as stabilized stretches of marshes protecting the bays and bayous that nurture big fish. Having watched their paradise erode, these outdoorsmen and women recognize that the survival of recreation is in the hands of these coastal projects.

As sea level rises we are likely to see these large scale development projects increasingly in coastal communities and since these projects are still relatively new it is imperative to start by making Morganza to the Gulf levee a model that other communities adopt as best practices. For this reason, the Morganza to the Gulf needs to become integrated with the history, culture and the landscape.

3.2 Levee Themes

We can accomplish this by thinking of the levee as a part of the history and fabric of southern Louisiana. By cataloging and identifying the history, and culture of the state, and by understanding landscape architecture processes, themes began to emerge:

1) Levee as a Batture; A place for the people.

In 1807 the Mississippi River Banks were bare when the river water was low and the people of New Orleans valued this space for public gatherings.³¹ According to Ari Kelman, “The waterfront was the border where the human and nonhuman worlds mingled, the center of New Orleans’ surban-riparian environment. Every day, people interacted with one another and with the Mississippi at the riverbanks. In many ways the waterfront defined the city.” By mimicking the historical culture of the Mississippi, Morganza to the Gulf has this unique opportunity with right of ways on either side of the levee that encourages interaction. While keeping in mind that the structural integrity is of utmost importance.

2) Levee as a Datum: Form of connection.

To some people Morganza to the Gulf levee looks like an uphill wall of grass, but it has the ability to cross parishes and boundary lines without discrimination. James P. Kemper, an New Orleans engineer observed, “floodwaters will not respect political boundaries.” Like flood water, which crosses boundaries indiscriminately, the levee can also spread across multiple communities and help bridge a greater regional connection.

³¹ Kelman, A. (2003). *A River and Its City: The Nature of Landscape in New Orleans*. Univ of California Press.

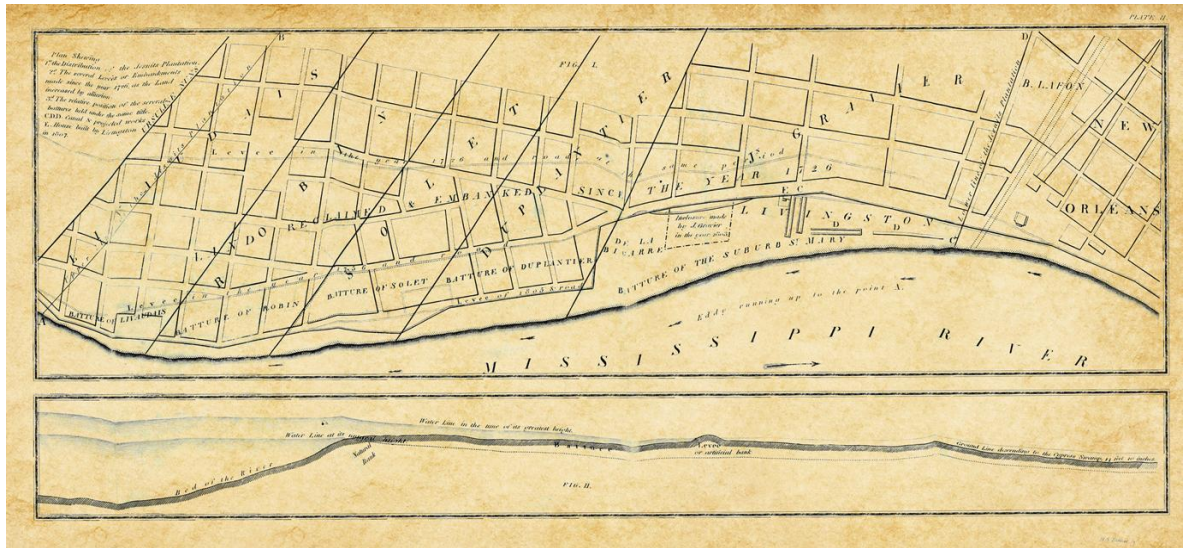


Figure 17. Map Section of Mississippi River, batture and the levee protection New Orleans, LA, 1813 by Edward Livingston

3) Levee as Navigation: Reference for guidance.

The Levee was built to hold the stormwater back, but most of the time the floodgates are open allowing boats to pass freely from the fresher water to the north of the levee into the more brackish water of the Gulf of Mexico. This levee, and its system of passageways can be viewed as the new regional compass for boaters guiding them to the fish or birds they are seeking.



Figure 18. Photograph boat leaving the Gulf of Mexico, captured January 23, 2019 in Dularge, Louisiana.

3.3 Placement of Recreation

Not many states can say they have the opportunity for the site specific recreational enhancement that Louisiana does. It is important to consider both the demand that people have for activities and the supply of resources, and the historical uses to facilitate process and design.³²

Features of Leisure and Recreation Types Affected by Climate Change.

Activity:	Feature:
General leisure	
Urban Outdoor Activities	<ul style="list-style-type: none"> - Daily Temperature - Precipitation / Humidity - Sunshine - Extreme Events (hurricanes, tornadoes)
Site Specific Outdoor Recreation	
Hiking, Biking	<ul style="list-style-type: none"> - Forest Composition, Vegetation Cover, Density
Fishing, Boating	<ul style="list-style-type: none"> - Water Quality, Quantity, Fish Habitat and Catchability
Hunting	<ul style="list-style-type: none"> - Animal Habitat, Availability
Bird/ Animal Watching	<ul style="list-style-type: none"> - Animal, Species Availability
Beach - Going	<ul style="list-style-type: none"> - Sea Level, Loss of Beach & Coastal Areas

Figure 19. Adapted from Frameworks for analyzing the economic effects of climate change on outdoor recreation by Shaw & Loomis, 2008.

Since these recreational spaces will be proposed on coastal sites that are always being altered due to the changing environment it would make sense to follow some of the same principles outlined in the Louisiana 2017 Coastal Master Plan. The plan recommends following design criteria when choosing project sites and designing these spaces. Three of the principals from the Master Plan that I find applicable to landscape architecture are a systems approach, accounting for uncertainties, and adapting to the changing circumstances.³³ Adaptive management is a relatively recent science and encourages the integrated and flexible approach to land and water management that

³² Shaw, W. D., & Loomis, J. B. (2008). Frameworks for Analyzing the Economic Effects of Climate Change on Outdoor Recreation. *Climate Research*, 36(3), 259-269.

³³ Coastal Protection and Restoration Authority of Louisiana, (2017). *Louisiana's Comprehensive Master Plan for a Sustainable Coast: effective June 2, 2017*. Baton Rouge, LA. Retrieved from <http://coastal.la.gov/our-plan/2017-coastal-master-plan/>

considers risk and uncertainty. It promotes solutions that are sustainable, even if conditions change, by providing a mechanism for robust decision making. Connecting short-term investments with long-term challenges and the selection of action pathways that allow for maximum flexibility of future decisions are two of the key concepts of adaptive management.³⁴

Future plans to incorporate recreation in conjunction with the levee will need to consider many factors. Understanding the trends and opportunities based on visual analysis, in-person interviews, and public data is important for determining the wants and needs of the surrounding communities. Part of the long term success of landscape architecture installations along the levee is the selection of appropriate sites and the adherence to the design principles proposed in the Master Plan.

Relevant Questions I considered to help guide recreational design decision making:

- *What does a person currently do for recreation?*
- *What would a person like to do for outdoor recreation?*
- *What location is the community currently using for recreation?*
- *Where are the appropriate landscape resources?*
- *Where is the current access considering the levee?*
- *Who will use the space?*
- *Who will manage the space?*
- *How will someone get to the space?*

In a national survey, nature-based outdoor recreation trends are identified; Participation in walking for pleasure and family gatherings outdoors were the two most popular activities for the U.S. population as a whole.³⁵ These outdoor activities were followed closely in popularity by viewing or photographing wildlife, boating, fishing, and swimming. This national study aligns with state data indicating growing momentum in participation in sightseeing, birding and wildlife watching in recent years.³⁶

A second report, The Outdoor Recreation Topline Report 2013, includes nationwide trends for various outdoor activities, including the following water recreation activities: boardsailing, canoeing, fishing, kayaking, sailing and stand-up paddling. Among water recreation activities, stand-up paddling had the highest number of new participants in

³⁴ Coastal Protection and Restoration Authority of Louisiana, (2017). *Louisiana's Comprehensive Master Plan for a Sustainable Coast: effective June 2, 2017*. Baton Rouge, LA. Retrieved from <http://coastal.la.gov/our-plan/2017-coastal-master-plan/>

³⁵ Council on Environmental Quality, Department of Agriculture, Department of the Interior, & Environmental Protection Agency, (February 2011). *America's Great Outdoors: A Promise to Future Generations*. Retrieved from www.doi.gov/AmericasGreatOutdoors.

³⁶ Louisiana State Parks. (2014-2019). *Statewide Comprehensive Outdoor Recreation Plan (SCORP)*. Retrieved from <https://www.crt.state.la.us/louisiana-state-parks/grant-opportunities-for-outdoor-recreation/louisiana-outdoor-recreation/2014-2019-scorp/index>

2012. Fishing is the second most popular outdoor activity nationwide with 16 percent participation after running/jogging which has 19 percent participation.³⁷

A survey released by U.S. Fish and Wildlife Service in September of 2012, showed that Louisiana outdoor recreation increased by 40% from 2006-2011, second only to Alaska. Carrie Stansbury cites bird watching as one of tourism's fastest growing niche markets, and Louisiana's coastal zone is legendary for the number and variety of its resident, seasonal and migratory birds. The America's Wetland Birding Trail designates twelve loops that take birders into avian habitats throughout Louisiana's Gulf Coast region. Whatever the technique, wherever the location, CWPPRA projects help Louisiana and Louisianans survive and thrive, suggested Carrie Stansbury. "We depend on healthy habitat to attract the birds that birdwatchers come to see. By building marsh and improving wetland conditions, coastal restoration protects and promotes our communities and their resource-based economies."³⁸

Ten Most Popular Outdoor Recreation Activities Reported from 2014 - 2019

Top Ten Activities: Random Survey	Top Ten Activities: Open Link Survey
1. Fishing (62%)	1. Walking (80%)
2. Walking (61%)	2. Visiting Natural Areas (70%)
3. Picnicking (55%)	3. Fishing (61%)
4. Swimming Outdoors (52%)	4. Picnicking (61%)
5. Visiting Playgrounds (51%)	5. Hiking/ Backpacking (53%)
6. Spectator Activities (44%)	6. Nature Programs/ Self- Guided Tours (52%)
7. Visiting Natural Areas (44%)	7. Swimming Outdoors (49%)
8. Hunting (42%)	8. Paddling (48%)
9. Playing Outdoor Athletic Team Sports (40%)	9. Primitive Tent Camping (47%)
10. Non- Team Outdoor Sports (37%)	10. Botanical Gardens (47%)

Figure 20. Adapted from Statewide Comprehensive Outdoor Recreation Plan, SCORP, by Louisiana State Parks.

³⁷ Louisiana State Parks. (2014-2019). Statewide Comprehensive Outdoor Recreation Plan (SCORP). Retrieved from <https://www.crt.state.la.us/louisiana-state-parks/grant-opportunities-for-outdoor-recreation/louisiana-outdoor-recreation/2014-2019-scorp/index>

³⁸ Louisiana Coastal Wetlands Planning, Protection and Restoration. (October 2012). *Watermarks Newsletter, Number 46*. Retrieved from <https://lacoast.gov/new/Pubs/WaterMarks.aspx>

In addition to understanding the recreational demands of the community the production of high-quality outdoor recreation opportunities is dependent upon relatively stable and predictable climatic and environmental conditions. Environmental systems are adapting, often in nonlinear and unforeseen ways, and as they adapt and react to change, recreation should also be able to be modified with the changing conditions.³⁹ When studying Morganza to the Gulf, I began to notice very clear trends in recreation that could drive landscape architecture projects. Many of these trends parallel those identified in the nation and state recreational reports and will be a focus of proposed recreational enhancements along the MTG levee.

3.4 Current MTG Opportunities and Missing Links

From my site surveys of the areas along the levee and from information gathered during personal interviews with residents of Terrebonne and Lafourche parishes I recognized that there were recreational opportunities along the levee. From my research I learned that there were many problems with the current recreational infrastructure along the levee. There were many boardwalks that were ostensibly for observation that seemed to go nowhere and provided little opportunity for observing nature. In addition to appearing out of place they were poorly marked and lacked a connection to any other recreational infrastructure in the area. Another observation that I made was that many of the existing boat launches were minimally accessible and those that were accessible charged fees for their use.



Figure 21. Photograph, Boat Launch Fees, captured January 23, 2019 in Dulac, Louisiana.

³⁹ Smith, J. W., Brownlee, M. T., & Seekamp, E. (2018). Introduction to the Special Issue on Climate Change and Outdoor Recreation: Shifting Supply and Demand. *Journal of Park and Recreation Administration*, 36(2).

There were also many fishing piers that were in a state of disrepair and appeared unsafe and therefore were minimally used. All of these things contribute to the fact that the percent of adults who report no leisure time physical activity in Terrebonne Parish is 32.7%⁴⁰



Figure 22. Photograph, Boat Launch Fees, captured January 23, 2019 in Dulac, Louisiana.

Understanding that there are financial resources earmarked for recreational enhancements along the levee many landscape architecture opportunities present themselves. Today we know that people are more environmentally conscious that they have ever been and often strive to have a no/low carbon footprint in their daily activities.⁴¹ Along the MTG levee there are opportunities to produce recreational sites that attempt to address this modern desire for environmentally friendly recreation. Opportunities also begin to present themselves when considering the prior landscape architecture theories, levee as a batture, levee as a datum, and levee as navigation of the Morganza to the Gulf Levee.

⁴⁰ www.towncharts.com, 2016 American Community Survey; HUD

⁴¹ Louisiana State Parks. (2014-2019). Statewide Comprehensive Outdoor Recreation Plan (SCORP). Retrieved from <https://www.crt.state.la.us/louisiana-state-parks/grant-opportunities-for-outdoor-recreation/louisiana-outdoor-recreation/2014-2019-scorp/index>

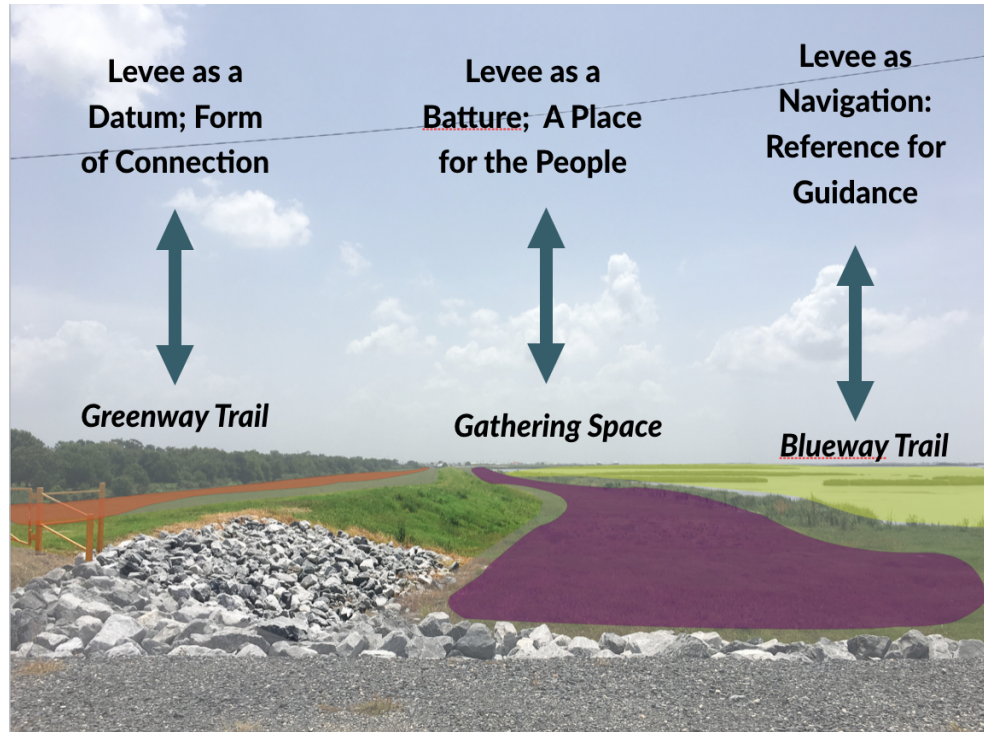


Figure 23. Diagrammatic programming example showing MTG design opportunities near the levee, derived from recreational research and landscape architecture theories.

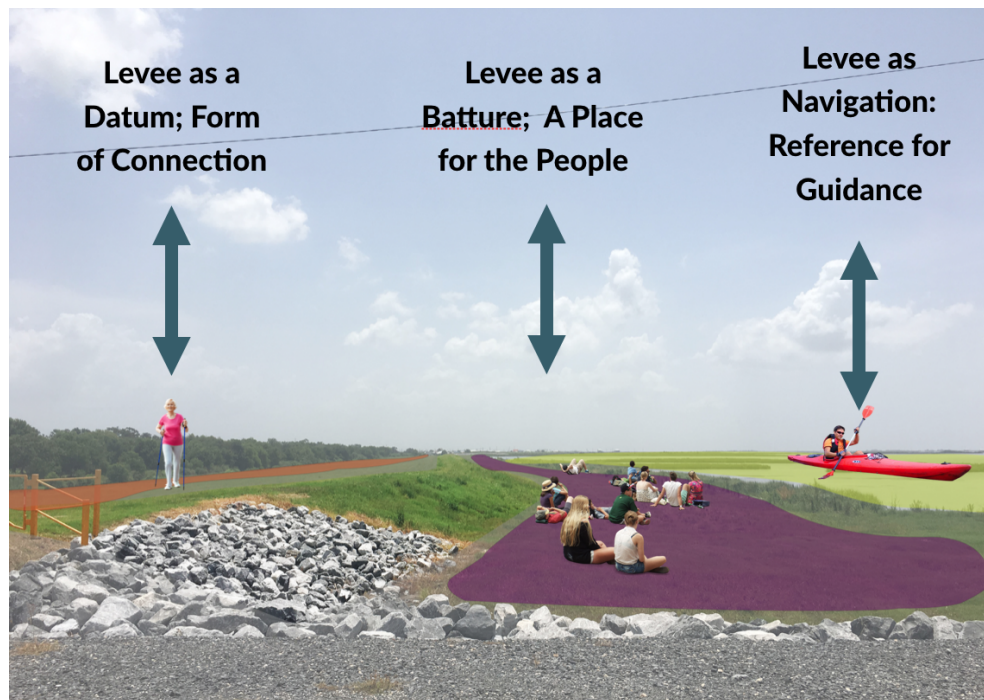


Figure 24. Diagrammatic example showing MTG design activities near the levee, derived from recreational research and landscape architecture theories.

There are opportunities to design parks, trails, blueways, and greenways in Terrebonne and Lafourche Parishes on or near the land in close proximity to the levee. Improved wayfinding and signage at existing sites and at any newly developed sites will increase usage and provide an educational opportunity as well. Further recreational development could include rest facilities along the waterways for kayakers and daytrippers and perhaps even overnight campsites for weekenders. Design efforts should also be made to interconnect as many of these recreational locales along the levee as possible providing a system of recreational enhancement.

Priorities for Future Investment

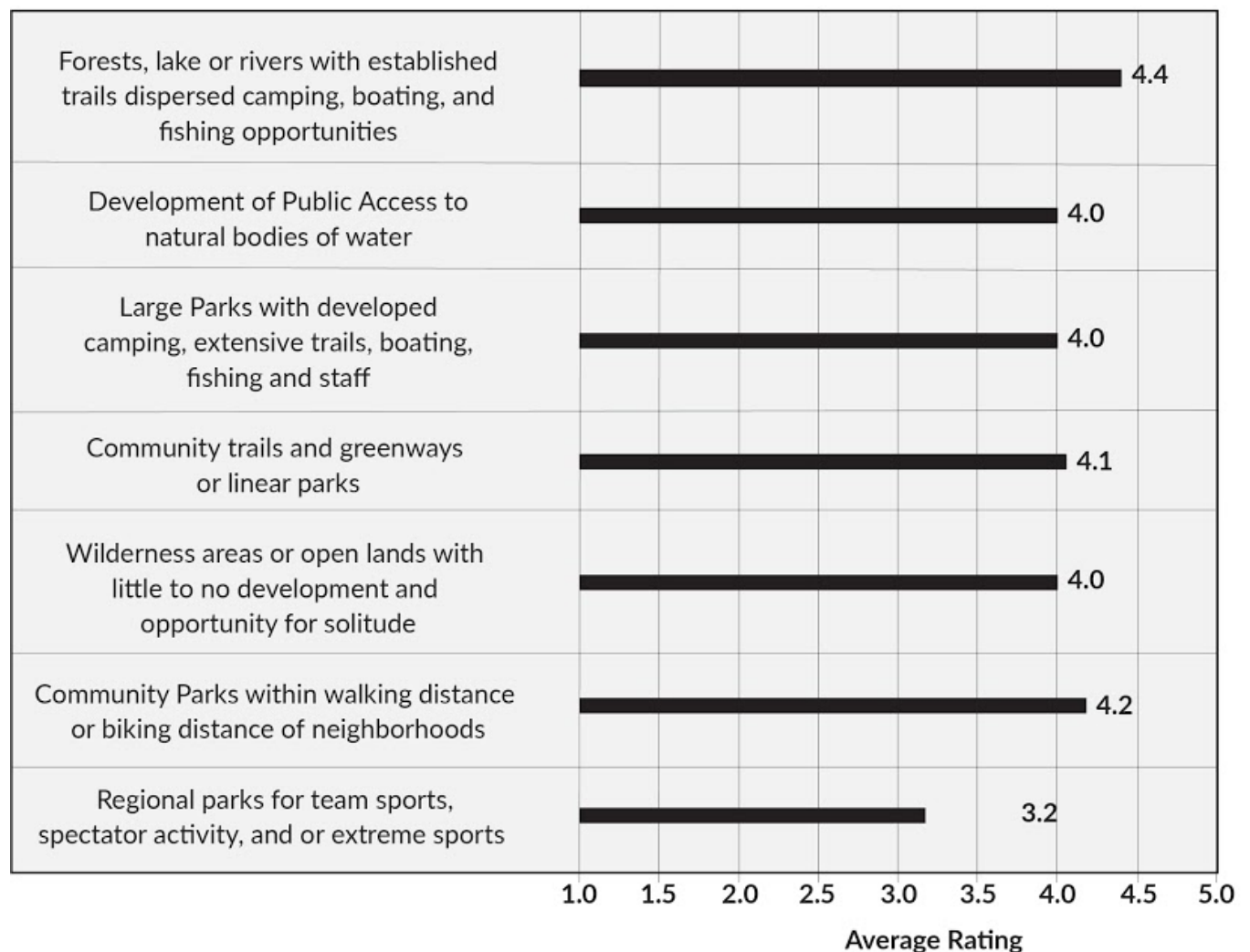


Figure 25. Adapted from Statewide Comprehensive Outdoor Recreation Plan, SCORP, by Louisiana State Parks. Survey Results from an Open Web Link.

3.5 Site Specific Opportunities

All of the research thus far has lead me to identify key sites for for possible landscape architecture intervention and opportunities to create recreational enhancements along the levee.



Figure 26. Site Context indicating MTG design opportunities near the levee, derived from recreational research and landscape architecture theories.

1) Wetland Terracing

Wetland Terracing is a form of mitigation performed by levee districts to replenish the land that was destroyed during the construction of the MTG Levee. These terraces are 10 to 15 feet wide and about 750 feet long with sloping sides and these terraces are often incorporated into marsh creation projects. Terracing increases marsh edge and is assumed to slow erosion, decrease pond depth, and encourage vegetation production. Over time a marsh community does develop on

the slopes and increases wetland habitat acreage.”⁴² These unique structures are drawing wildlife with each passing moment and would be ideal structures to incorporate into a blue way trail because they provide navigational references and opportunities to observe wildlife.



Figure 27. Aerial Photograph Provided by Mr. Reggie Dupree, Wetland Terracing Reach J-3, captured January 10th, 2019 in Theriot

2) Lake Boudreaux

Lake Boudreaux bounds the southernmost tip of Morganza to the Gulf and was once open brackish water that has slowly been reverting back to marsh land. Currently there is access to the lake via a perimeter road and would be an excellent location for a series of connected boardwalks through the open space. Marguerite Moffett Audubon Sanctuary Boardwalk is located on Lake Boudreaux

⁴² Several Sources (O'Connell, J. L., & Nyman, J. A., (2010); Louisiana Coastal Wetlands Planning, Protection and Restoration, (2016)

Using the open spaces of

1. *What is the purpose of this study?*

experiences for nature observers. By identifying the wildlife opportunities found in an area, trailheads located near gathering spaces will be able to be accurately marked as to the experiences that observers are likely to have in those areas. Visitors will be able to choose the nature experience they want based on clearly marked trailheads which connect to gathering spaces in the batture.



Figure 29. Photograph, Wildlife on the Floodgate, captured January 23, 2019 in Dulac, Louisiana.

Determining Access Points & Trail Heads



Figure 30. Map highlighting different salinity gradients and associated wildlife in the region of Morganza to the Gulf Levee

CHAPTER 4. ANTICIPATED BENEFITS AND RATIONALE OF RECREATIONAL ENHANCEMENT

4.1 The Benefits and Rationale

Recreational opportunities and designs should be integrated in any future levee construction project. Funds for recreational amenities should be included in the overall construction budget of these projects because of all the positive benefits that the sites bring to the local community, the state, or even the nation. These benefits include but are not limited to increased health and wellness, ecotourism, increased funding to local economy and job creation. Levees are placed in locations where flooding or storm surges have occurred, it follows that on one side is open water and on the other is human habitation. When one thinks of the benefits of recreation many ideas come to mind, but there are also unintended consequences of land construction potentially diminishing the health, quality of life, tourism, jobs, and the economic revenue that comes with them.

While the economic, social and cultural values of recreation may not have been the first thought, among the residents of Louisiana they are some of the most critical aspects of recreation. Recreation provides economic, social and cultural value to existing or proposed infrastructure. When recreation is not considered a priority in the design of an infrastructure project, it can be difficult for recreation to compete for financial resources against other, more obvious amenities, such as protection. While I do not think anyone would argue against the utmost importance of these multi-parish protection systems, I do think one could argue that they could be built with more cohesion across disciplines. When recreation is only viewed as an amenity to be added on rather than an essential ecosystem service, it is hard for it to compete against the primary function of storm protection, yet both are categorized under the same structural components of an ecosystem.⁴³ Unfortunately, in the case of the Morganza to the Gulf project, which is parish and state-financed, the importance of recreation will be placed behind storm protection and coastal restoration.⁴⁴ This situation is illustrated by the comments from the The Morganza to the Gulf Technical Review Panel.

The present approach includes only an assessment of the structural (levee) measures and how those measures may be challenges or benefits to economic and environmental conditions of the region. Rather, an integrated package of risk-reducing methods and their interaction with the

⁴³ Batker, D., Torre, I.D., Costanza R., Swedeen P., Day J.W., Boumans R., & Bagstad K. (2010). Gaining Ground. Wetlands, Hurricanes and the Economy: The Value of Restoring the Mississippi River Delta. Tacoma, WA: *Earth Economics*. Tacoma, WA.

⁴⁴ Loomis, J. (2016). The Role of Economic Benefit Measures in Recreation Planning and Management. *Journal of Park and Recreation Administration*, 34(4).

*economic, environmental, and social attributes of the project area should be used. The current studies fail to incorporate some important “Other Social Effects” and insufficient attention has been given to integrating the social impacts associated with both the current lack of hurricane protection and the manner in which it will be provided in the future.*⁴⁵

- Findings from Morganza to the Gulf Technical Panel Review

Protecting and restoring Louisiana's coast makes sense on its own merits, but if recreation enhancements are planned and integrated in the levee structure, such recreation projects will do more than defend our culture and heritage. By rebuilding wetlands and protecting communities from flooding while also connecting and delineating recreational uses, the state can create new jobs, spur sectors of innovation, and strengthen its economy.⁴⁶ How can the value the recreation around Morganza to the Gulf be measured? One of the ways researchers assign the value to natural systems is by considering what are known as ecosystem services, the benefits that conditions and processes of natural ecosystems have on the species and the environment.⁴⁷ In Louisiana, these benefits include flood reduction, health, improved quality of life, jobs creation, and nature-based tourism.

4.2 Health in Louisiana

Natural environments provide highly inspirational and educational experiences for all. Recreation contributes to the needs of human health by providing opportunities in nature for reflection, spiritual enrichment, cognitive development, and aesthetic experience through exposure to life processes and natural systems.⁴⁸ Outdoor recreation has been linked to healthy people and communities and therefore the quality of life. The purpose of recreation is to seek the highest possible quality of life for individuals and is a vital component to every community.⁴⁹ The United Health Foundation, UHF, releases a report called America's Health Rankings: A Call to Action for Individuals and Their Communities each year. The purpose of the report is to educate and encourage Americans and to take steps toward a healthier future. In its 2013 report the state of

⁴⁵ Twilley, R., Allison, M., Capozzoli, L., Laska, S., Reed, D., and Ryan, T. (2008). Morganza-to-the-Gulf Technical Panel Review [Final Report]. Retrieved from https://www.academia.edu/18829196/MORGANZA-TO-THE-GULF_TECHNICAL_PANEL_REVIEW

⁴⁶ Coastal Protection and Restoration Authority of Louisiana, (2017). *Louisiana's Comprehensive Master Plan for a Sustainable Coast: effective June 2, 2017*. Baton Rouge, LA. Retrieved from <http://coastal.la.gov/our-plan/2017-coastal-master-plan/>

⁴⁷ Several Studies (Coastal Protection and Restoration Authority of Louisiana, 2017; Batker,, Torre, Costanza, Swedeen, Day, Boumans, & Bagstad, 2010)

⁴⁸ Several Studies (Forster, 1973; De Groot, Wilson, & Boumans, 2002)

⁴⁹ Several Studies (Bricker, Hendricks, Greenwood, & Aschenbrenner, 2016; Librett, Henderson, Godbey, & Morrow, 2007)

Ecosystem System Services that include Information and Cultural Functions

Information and Cultural Functions: Providing Opportunities for Cognitive and Spiritual Development		
Aesthetic Information	Attractive Landscape Features	Enjoyment of Scenery
Recreation	Variety in Landscapes with Potential Recreational Uses	Travel to Natural Ecosystems for Eco-Tourism, Outdoor Sports ect
Cultural and Artistic Information	Variety in Natural Features with Cultural and Artistic Value	Use of Nature as Motive in books, film, painting, folklore, national symbols, architecture, advertising, ect.
Spiritual and Historic Information	Variety in Natural Features with Spiritual and Historic Value	Use of Nature for Religious or Historical Purposes (i.e. heritage value of natural ecosystems and features)
Science and Education	Variety in Nature with Scientific and Educational Value	Use of Natural Systems for School Excursions, etc. Use of Nature for Scientific Research.

Figure 31. Adapted from A typology for the classification, description and valuation of ecosystem functions, goods and services. By DeGroot, Wilson and Boumans, 2002.⁵⁰

Louisiana was ranked 48th in the country.⁵¹ In the report Louisiana's biggest weakness was recorded as a high prevalence of physical inactivity which supports the dire need for more accessible outdoor recreation. Research from the Statewide Comprehensive Outdoor Recreation Plan, SCORP, by Louisiana State Parks from 2014 to 2019 indicated that the lack of accessible facilities is the number one barrier to recreation. A variety of studies have been completed proving the array of benefits that recreation provides related to the quality of life: improved physical and mental health, spiritual development, personal growth, a community of cohesion, and a healthy economy.⁵²

⁵⁰ Louisiana State Parks. (2014-2019). Statewide Comprehensive Outdoor Recreation Plan (SCORP). Retrieved from <https://www.crt.state.la.us/louisiana-state-parks/grant-opportunities-for-outdoor-recreation/louisiana-outdoor-recreation/2014-2019-scorp/index>

⁵¹ Louisiana State Parks. (2014-2019). Statewide Comprehensive Outdoor Recreation Plan (SCORP). Retrieved from <https://www.crt.state.la.us/louisiana-state-parks/grant-opportunities-for-outdoor-recreation/louisiana-outdoor-recreation/2014-2019-scorp/index>

⁵² Several Studies (Hammit, & Schneider, 2000; Chang, Hammitt, Chen, Machnik, & Su, 2008)

Barriers to Recreation

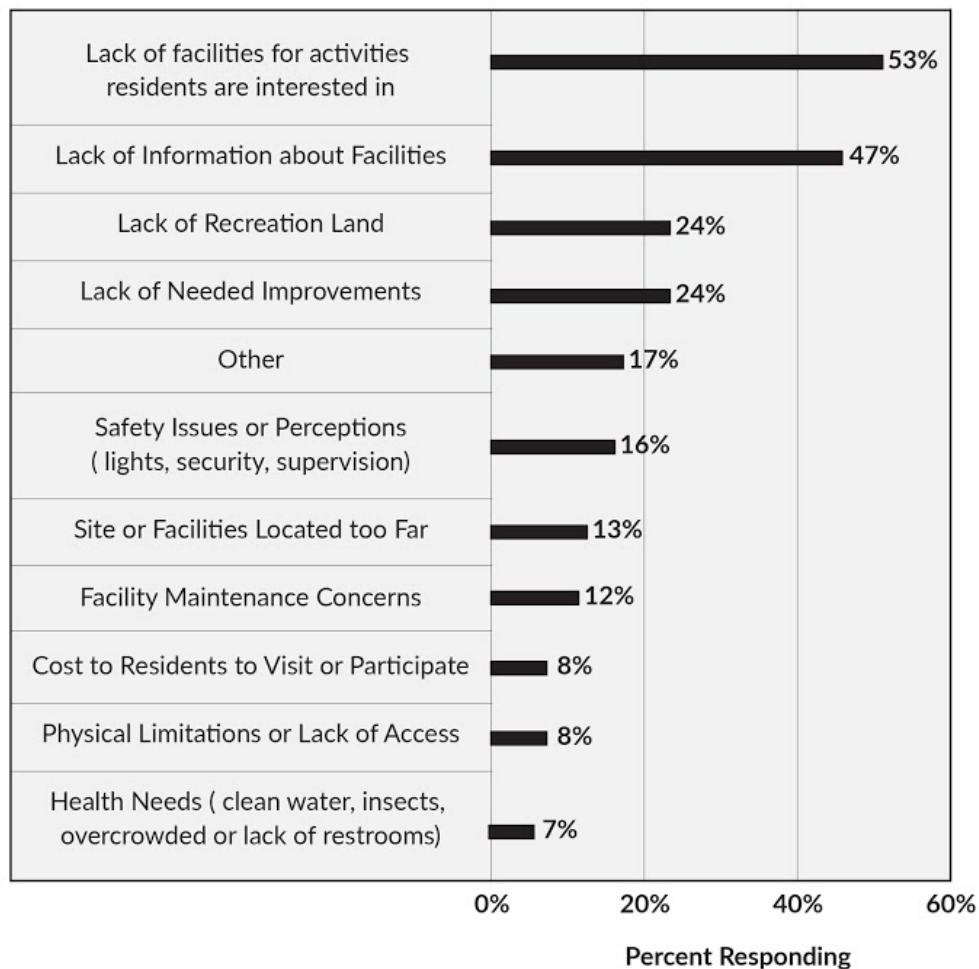


Figure 32. Adapted from Statewide Comprehensive Outdoor Recreation Plan, SCORP, by Louisiana State Parks. Survey Results from an Open Web Link .

4.3 Eco-Tourism for the State

The effects of climate change and other impending natural disasters are difficult to predict because of the complexity of the systems involved. The impact of storms on outdoor recreation is minor in comparison to the impact they have on other economic sectors, such as infrastructure. Outdoor recreation is a significant element of the tourism industry, and tourism represents 10% of the nation's gross domestic product and has value.⁵³ Across the United States outdoor sportspeople, anglers and hunters, and

⁵³ Berrittella, M., Bigano, A., Roson, R., & Tol, R. S. (2006). A General Equilibrium Analysis of Climate Change Impacts on Tourism. *Tourism Management*, 27(5), 913-924.

wildlife observers spend \$144.7 billion annually which is 1.0% of the Nation's gross domestic product. In Louisiana, a coastal, warm weather state, the amount of money spent on these activities is certainly a larger, more relevant amount of the state's revenue. In the southeastern region of the country, 16% of the population identify themselves as anglers, 7.0% as hunters, and 26% of the population took part in wildlife viewing activities.⁵⁴ National data also shows that for the year 2011, 1.7 million people participated in fishing, hunting, and wildlife-watching activities. These three outdoor recreation activities resulted in roughly \$2.2 billion in expenditures including the money spent on equipment and trip related expenses.⁵⁵ Many outdoor enthusiasts visit Louisiana as a destination for hunting, fishing, and wildlife watching as well as other forms of outdoor recreation, which significantly impacts the state's economy year to year. Since ecotourism involves a resource-based asset, it can be assumed that it has been directly affected before, during and after the completion of the Morganza to the Gulf Levee.⁵⁶

4.4 Local Economy and Job Creation

People around the country travel to Louisiana to share the unique experience that the state's coastline has to offer. Louisiana is the nation's top recreational fishing destination and it supports 34,000 local jobs, \$4.6 billion in wages and salaries and \$1.1 billion to state and local revenue.⁵⁷ Local landowners have the opportunity to become business owners by providing venues for bird watching; becoming experts on boating, and working as guides for swamp tours. Agritourism Limited Liability Law passed in 2008 allows landowners to form business associated with camping, fishing and hunting, and for target skeet shooting.⁵⁸ Many of these year round enthusiasts have invested in second homes or stay multiple nights to pursue their outdoor activities. They own or lease land at a rate of \$9K per season for one square mile of land for hunting. The visitors to the region buy groceries, purchase recreational licenses, shop, and eat in the local venues contributing significantly to the local economy.

4.5 Shovel-Ready Projects

The 2017 Louisiana Coastal Master plan stressed that it will be putting a more direct focus on coastal communities, while still maintaining the goals of coastal restoration and risk reduction to ultimately support the people who live and work in coastal Louisiana.

⁵⁴ Several Studies (Holcomb, Bass, Reid, Seymour, Lorenz, Gregory, Javed, & Balkum, 2015; US Fish and Wildlife Service, 2011)

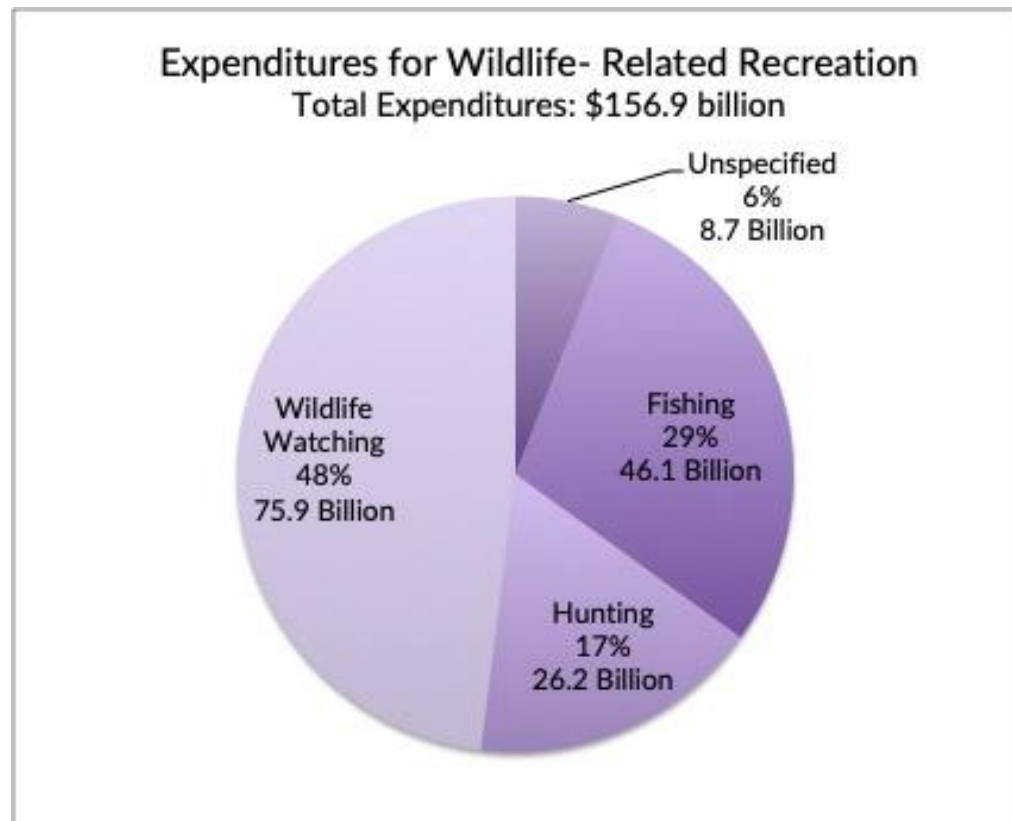
⁵⁵ Holcomb, S. R., A. Bass, C. Reid, M. Seymour, N. Lorenz, B. Gregory, S. Javed, and K. Balkum. (2015). Louisiana Wildlife Action Plan. Louisiana Department of Wildlife and Fisheries. Baton Rouge, LA.

⁵⁶ Several Studies (Richardson, & Loomis, 2004; Louisiana State Parks, 2014-2019)

⁵⁷ Several Studies (Coastal Protection and Restoration Authority of Louisiana, 2017; U.S. Fish, & Wildlife Service, 2016)

⁵⁸ Hatch, D. (2014, January 28). Outdoor Recreation in Today's Economy. LSU AGCenter. Retrieved from https://www.lsuagcenter.com/portals/our_offices/parishes/lincoln/news/outdoor-recreation-in-todays-economy

CPRA's Flood Risk and Resilience Program was developed with the intent to have a list of shovel-ready non-structural projects that are recommended for implementation in some of our most vulnerable coastal communities. These projects were also designed to consider future flood depths and environmental conditions so that our communities are able to plan for changing levels of risk in the future. I think this focus should apply to recreational sites as well.⁵⁹

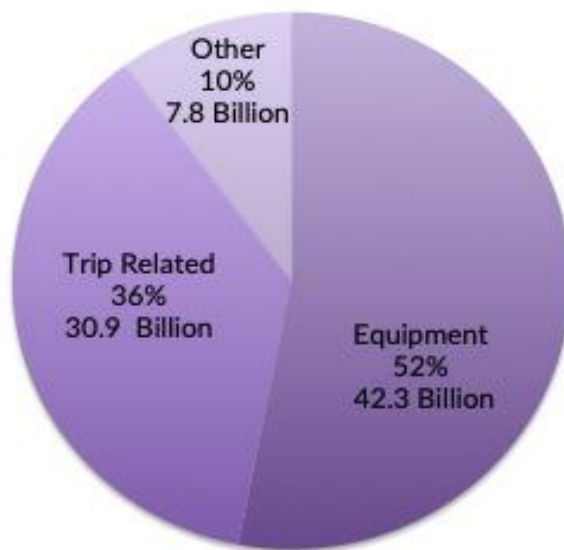


Figures 33. National Survey of Fishing, Hunting and Wildlife-Associated Recreation. By U.S. Fish & Wildlife Service, 2016

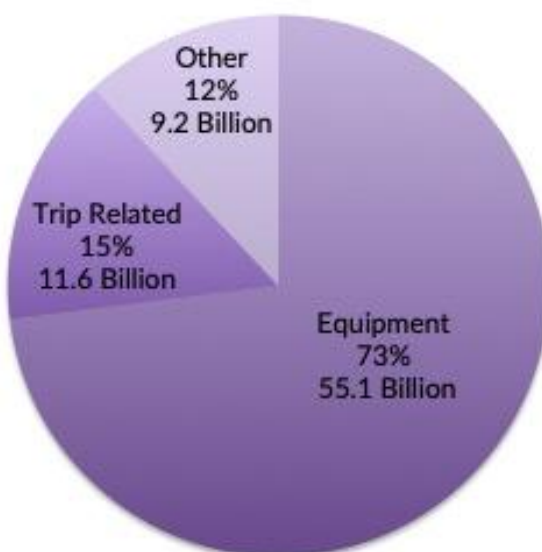
Fig, cont'd

⁵⁹ Coastal Protection and Restoration Authority of Louisiana, (2017). *Louisiana's Comprehensive Master Plan for a Sustainable Coast: effective June 2, 2017*. Baton Rouge, LA. Retrieved from <http://coastal.la.gov/our-plan/2017-coastal-master-plan/>

Expenditures by Sportsperson
Total Expenditures: \$81.0 billion



Expenditures for Wildlife-Watching Participants
Total Expenditures: \$75.9 billion



The Morganza to the Gulf levee project was designed to protect approximately 250,000 people in the coastal parishes of Louisiana from hurricanes and the effects of storm surges. While this protection is absolutely necessary and embraced by the residents of these areas, this protection comes at a cost. The ongoing construction of this levee system has created a barrier between the residents of these parishes and the wetlands and Gulf of Mexico which play such an important role in the culture and economy of the region. One way of dampening the negative effects of this barrier is to design and implement “recreational enhancements” along the levee that will serve to promote the identity of Louisiana as a “Sportsman’s Paradise” and create help preserve and protect the coastal culture of the state.

In the next phase of my research I hope to be able to further develop site placements along the levee based on the landscape architecture theories discussed. I hope that my research will continue to evolve into actual site designs based on the varying typologies along the 98 mile levee. Ideally, this research will lead to site specific designs for potential shovel ready installation projects at select locations along the MTG levee.

As landscape architects this project presents an opportunity to set a precedent that illustrates how recreational enhancements and installations which help to integrate the culture and community with a project should be included in the initial design and budgeting phase of other levee projects that are planned for other Gulf States. By demonstrating the benefits of including a plan for recreation in the MTG project, policy makers will be encouraged to engage the Landscape Architecture community early in the planning and design process of all types of public works projects which affect the communities in which they are being undertaken. This is the century of the Landscape Architect.

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VITA

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