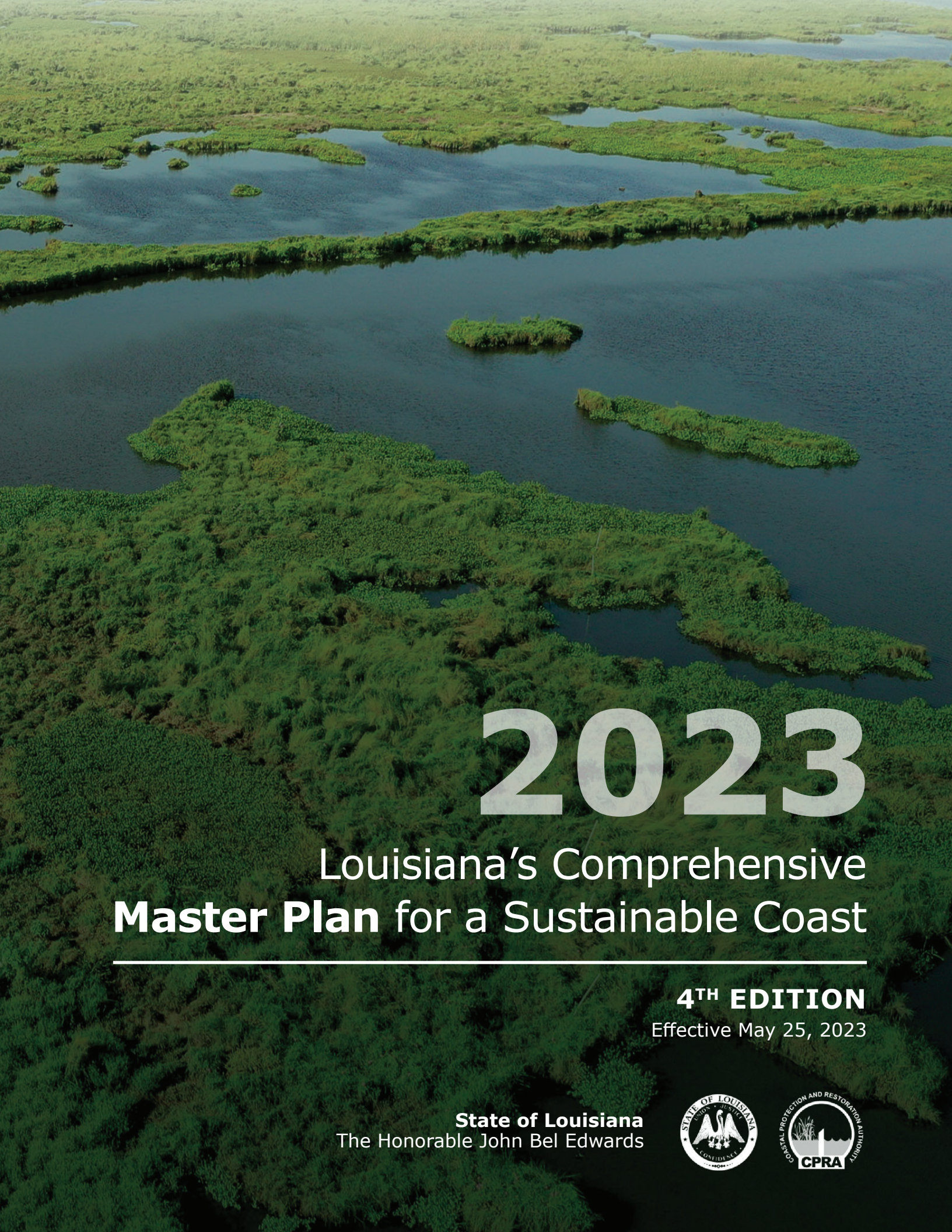

2023

Louisiana's Comprehensive **Master Plan** for a Sustainable Coast

4TH EDITION

Effective May 25, 2023

State of Louisiana
The Honorable John Bel Edwards

STATE OF LOUISIANA · UNION · JUSTICE · CONFIDENCE

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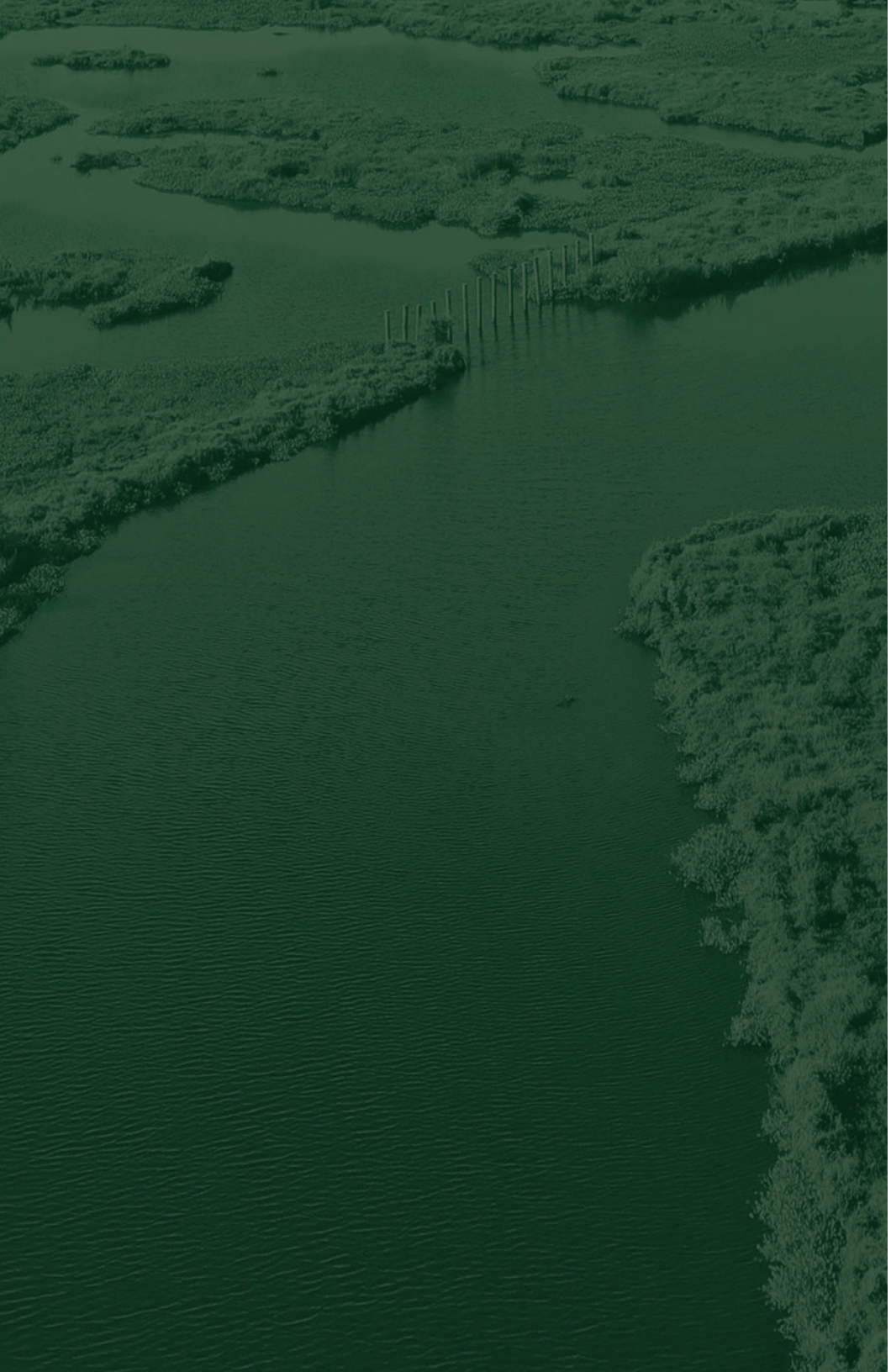

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dministration

Casey Tingle
Director, Governor's Office of Homeland Security and Emergency Preparedness

James "Jim" Donelon, III
Commissioner, Louisiana Department of Insurance
Billy Broussard, Designee

Scott Burke
Representative of Barataria Basin

Dwayne Bourgeois
Representative of Terrebonne Basin

Guy McInnis
Representative of Breton Sound Basin

Bill Bubrig
Representative of Mississippi Delta Basin

Monica Gorman
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Designee of Speaker of the House

Stephen Sagrera

APRIL 2023

Dear Members of the Louisiana Legislature,

I am proud to submit for your consideration and approval, Louisiana's fourth comprehensive Coastal Master Plan. This plan represents both the evolution of a process that began eighteen years ago in the aftermath of Hurricanes Katrina and Rita, and something that, thanks to its ability to incorporate new data and new analyses, is entirely remarkable and new.

In 2005, the danger a degrading coast posed for our communities was all too real, yet our ability to respond to the enormity of the challenge was very much an aspiration. Today, we can celebrate the fact that the projects in this 2023 Coastal Master Plan are explicitly designed to build on the successes we have realized in the intervening years. Successes that include 358 miles of levee improvement, 60 miles of barrier island and headland restoration, the benefits of projects covering 82 square miles of our coastal habitats—a level of progress that would have been almost unthinkable when the coastal program first began.

Of course, not all of the changes along our coast have been positive. Persistent natural processes and the accumulating impacts of human actions are still working against us; the oiling that once spread across at least 450 miles of our shore took its toll; and too many of our communities are trying to rebuild after a new generation of destructive milestones brought by Hurricanes Laura, Delta, and Ida.

Despite these changes and challenges, Louisiana's approach to the land loss crisis remains constant. The Coastal Master Plan is still built on the most scientific and up-to-date understanding of the problem and a

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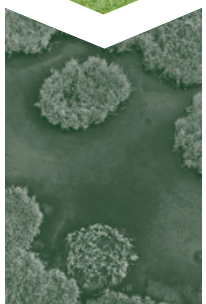

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projects to address those challenges. Taken together, the many parts of the master plan provide ideas for a better future and offer ways to enhance the connection between our coast and all who depend on it.

The 2023 Coastal Master Plan is the fourth such plan developed by the State of Louisiana to articulate a clear statement of priorities to achieve comprehensive coastal restoration and risk reduction goals. The Louisiana Coastal Protection and Restoration Authority (CPRA) is tasked with updating the master plan every six years. Once approved by the Louisiana Legislature, this plan becomes the guiding document for the state's coastal activities and provides a path forward for billions of dollars of investment in the design, implementation, and operation of large-scale restoration and risk reduction solutions.

CPRA was formed following the devastating hurricanes of 2005. The first Louisiana Coastal Master Plan was released in 2007. It has since been updated in 2012, 2017, and now 2023. The 2012 plan represented a significant advancement in the plan framework, utilizing predictive models to prioritize investments, which was built upon in the 2017 plan. The 2023 plan has again built on that framework while improving evaluation tools, incorporating the best available science, and adapting the process to better utilize local knowledge.

Much has changed over the last 18 years since CPRA was formed. Additional hurricanes have ravaged our coast. We experienced the Deepwater Horizon Oil Spill – one of the worst environmental disasters in the history of our country. New funding sources became available, and CPRA and its partners developed, designed, and constructed the state's largest and

Image: White Lake Wetlands Conservation Area, 2021 (Louisiana Sea Grant College Program)

There is uncertainty in what the future holds, but work to date demonstrates that the state is invested in the future of our coast. This plan is the blueprint for where we go from here: the goal is a sustainable coast where people can continue to live, work, and enjoy the things that make coastal Louisiana economically, ecologically, and culturally unique and valuable.

Building this resilient coast is a much larger endeavor than the projects CPRA implements. It is dependent on the decisions of individual citizens, communities, local governments, and businesses, as well as fellow state and federal agencies. In addition to prioritizing restoration and risk reduction projects, the 2023 Coastal Master Plan illustrates how the coast will change in terms of landscape, natural resources, and future hurricane risk. It also illustrates how people and communities may experience that change so they can make informed decisions.

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stakeholders across coastal Louisiana is a major component of the plan development process. Goals are identified, timelines are determined, tasks are outlined, and appropriate technical partners are engaged to undertake the work of updating the plan. We work with experts to translate up-to-date data and scientific information into a modeling framework that addresses the physical and ecological dynamics of the coastal landscape and changes in predicted damages from storm surge-based flooding.

In parallel, advisory groups are established and a broad network of coastal experts, landowners, scientists, community leaders, local officials and stakeholders are asked to provide insight and guidance during the development process. By doing this, we identify challenges, understand what Louisianans value, and develop projects that address the coastal crisis. Advisory group members provide input on topics ranging from technical updates and scientific understanding to regional and local priorities and effective communication strategies.

An extensive model improvement effort was one of the first steps in the development process of the 2023 Coastal Master Plan, the results of which are detailed in the following section. These models were used to predict changes in the landscape and storm surge damages over a 50-year period and identify future challenges across the coast.

PROJECT SELECTION PROCESS

Louisiana residents are facing enormous changes. Because people are making decisions about their families, their jobs, and their futures, they need the

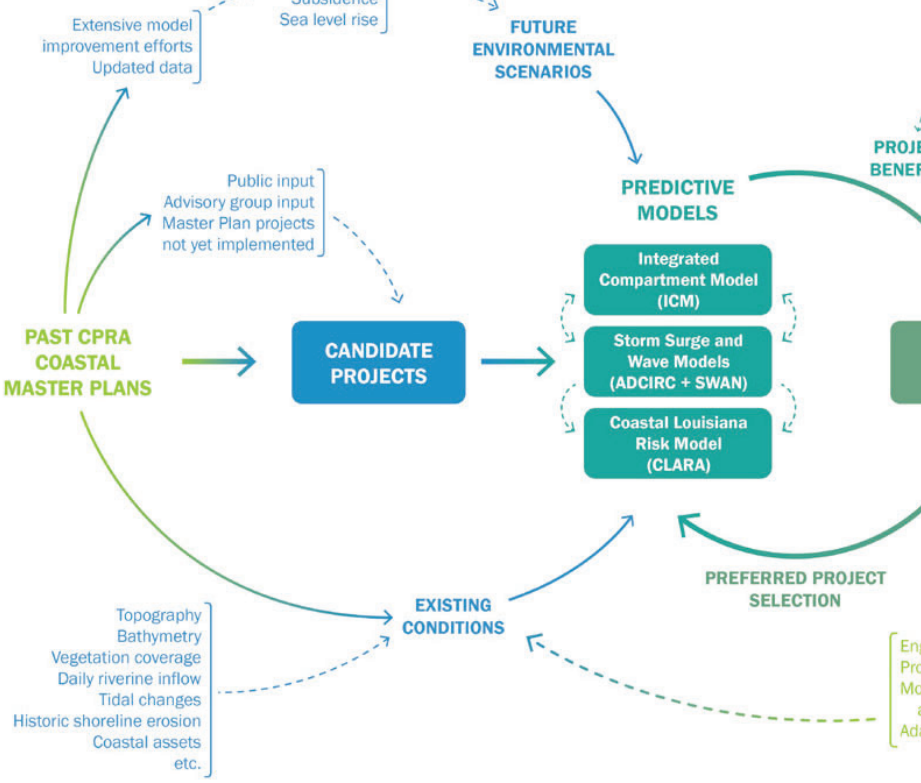

Figure 1.1: The 2023 Coastal Master Plan Development Process.

was developed to address future land loss and storm surge-based flood damages. Project concepts were solicited from the public and members of advisory groups to address key coastal concerns. Projects included in previous master plans that have not yet been implemented were also added to the list. All of these candidate projects were then modeled, and model outputs were used to evaluate project performance in reducing land loss, reducing storm surge-based flood risk, and other impacts on important coastal metrics (such as navigation, habitats, and support of resource-based industries and workers).

We modeled 50 years of a future with each project and compared that to the predictions without the project in place to understand the project's impacts (positive or negative). Then, a computer-based decision support software system, called the Planning Tool, was used to identify groups of robust projects that are predicted to have beneficial impacts under a

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the master plan refines the vision of our future coast by identifying objectives and principles. Here, we present objectives and principles which have been identified to help support the master plan's goals and provide clarity about what Louisianans value. Together, these goals, objectives, and principles reflect years of coastal planning experience and serve as guidelines for developing and implementing a comprehensive 2023 Coastal Master Plan.

PLAN OBJECTIVES

FLOOD PROTECTION

Reduce economic losses from storm surge-based flooding to residential, public, industrial, and commercial infrastructure.

NATURAL PROCESSES

Promote a sustainable coastal ecosystem by harnessing the natural processes of the system.

COASTAL HABITATS

Provide habitats suitable to support an array of commercial and recreational activities coastwide.

CULTURAL HERITAGE

Sustain the unique cultural heritage of coastal Louisiana by protecting historic properties and traditional living cultures and their ties and relationships to the natural environment.

WORKING COAST

Promote a viable working coast to support regionally and nationally important businesses and industries.

Urgent Need to Take Action. In order to have the best future outcomes, we must plan, design, and implement projects now to address increasing land loss and storm surge-based flood risk in the future.

A Systems Approach. The master plan was developed using a systems approach to risk reduction and restoration, whereby projects that are effective under a range of future conditions were selected.

Planning for the Future. The master plan is charged with providing a sustainable long-term solution for coastal protection and restoration. Projects were evaluated and prioritized based on their effects over the next 50 years. Beyond 50 years, uncertainties about environmental conditions such as sea level rise, project costs, and other factors become too great for the evaluation results to be reliable.

Clear Expectations. We cannot recreate the coast of the 20th century or even retain the coast of today. Instead, we must plan to help shape a new landscape that will continue to support viable natural and human communities into the future.

Acknowledging Residual Risk. Risk reduction measures and restored coastal habitats cannot eliminate all storm surge-based flooding risks. Some degree of residual risk is inevitable.

Collective Responsibility. The state, through the master plan and with its partners, develops the common vision for our coast. Achieving a sustainable coast, however, is a collective endeavor that requires stakeholder input and feedback, and coordinated action from our state, federal, and local government partners, and various other stakeholders including non-governmental organizations (NGOs), business, industry, and academic and research institutions.

Providing for Transitions. Louisiana's coastal crisis has and is displacing people, infrastructure, businesses, and entire communities. Sensitivity and

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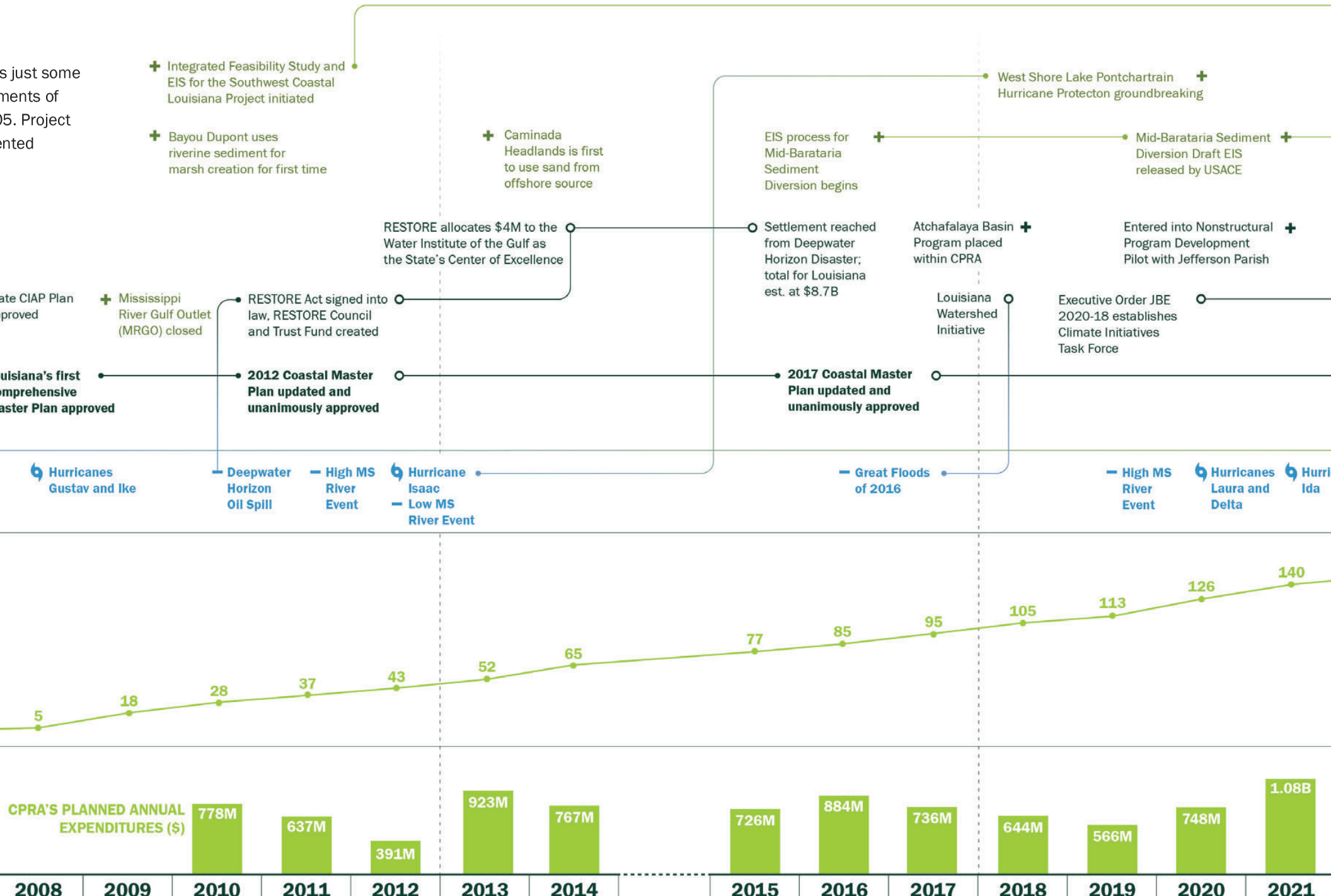

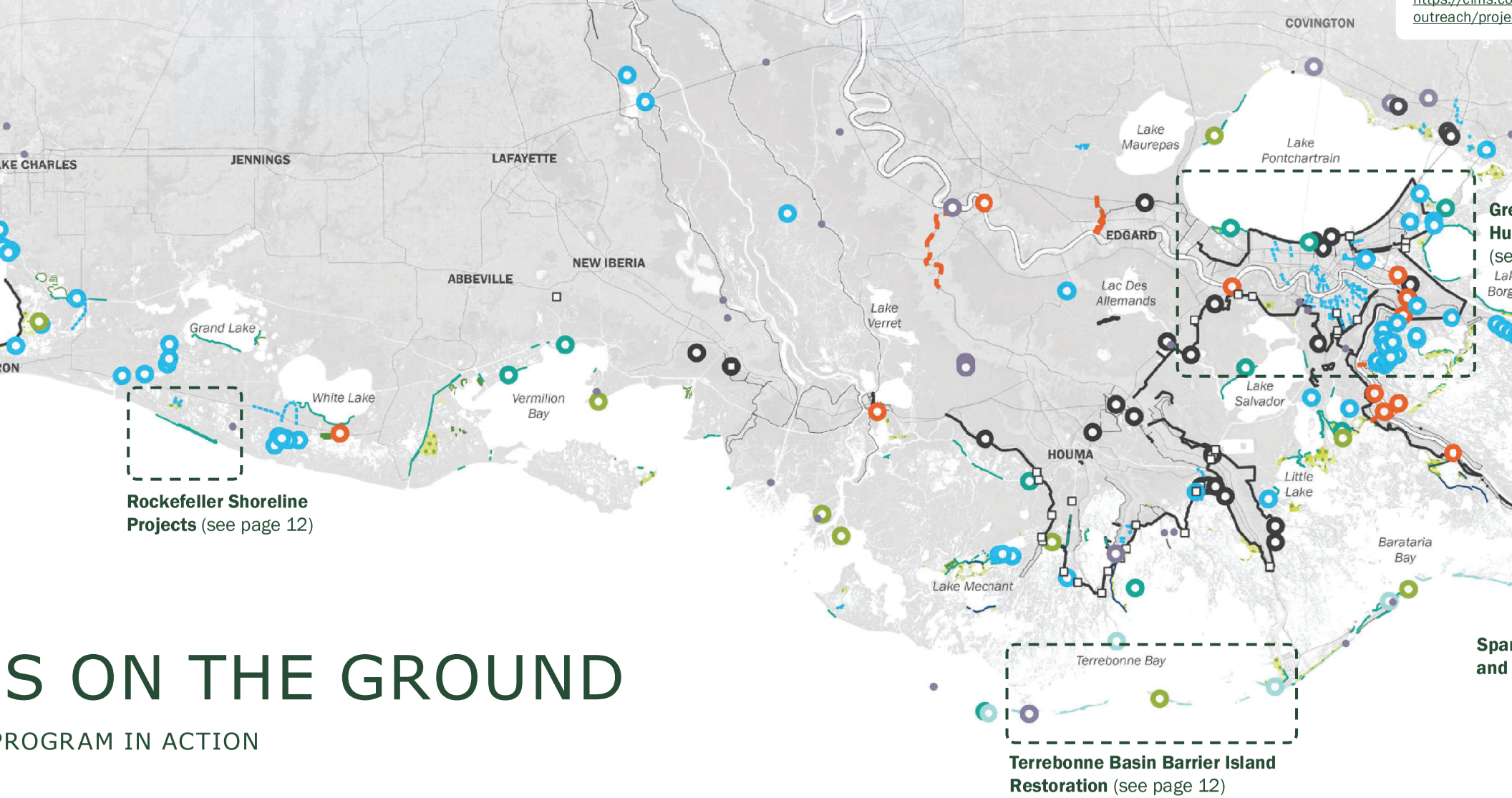

Rockefeller Shoreline Projects (see page 12)

Terrebonne Basin Barrier Island Restoration (see page 12)

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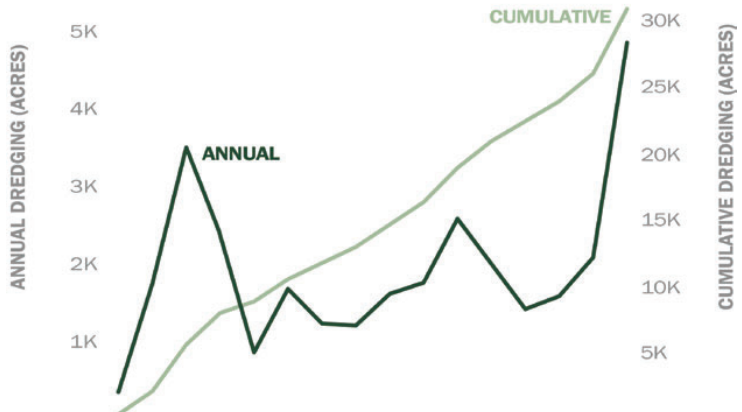
Louisiana is committed to mobilizing dollars quickly and efficiently through the master plan process and to leveraging advanced science and technology and the dedication of people working to implement the master plan.

The following spread provides more details on some example projects highlighted in the coastwide map shown above.



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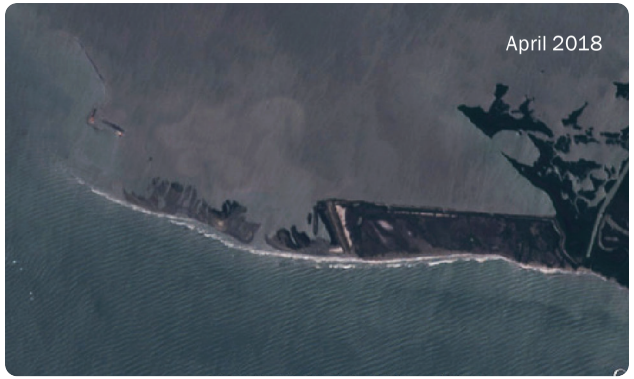
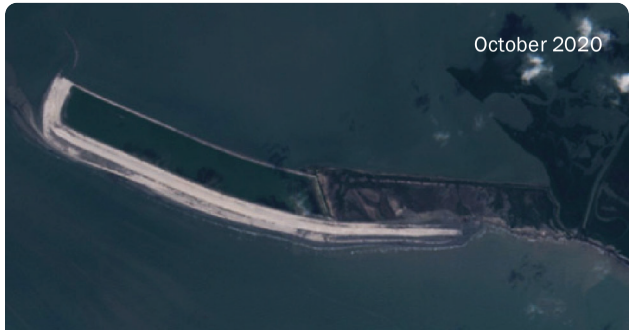


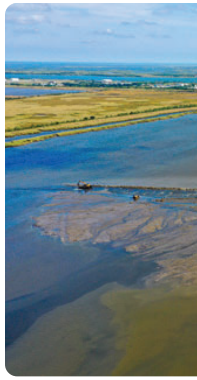


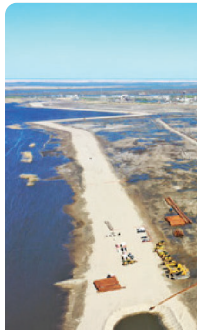
GREATER NEW ORLEANS HURRICANE RISK REDUCTION

The Hurricane and Storm Risk Reduction System (HSDRRS) project includes the construction and improvement of 133 mi of perimeter risk reduction features, such as levees, floodwalls, floodgates, and pump stations to reduce risk for an event with a 1% annual exceedance probability. It also includes about 70 mi of interior risk reduction features such as large-scale pump stations. It is among the most advanced storm surge risk reduction systems in the world.

SPANISH PASS RIDGE AND MARSH CREATION

The Barataria Basin Ridge and Marsh Creation Project, Spanish Pass Increment project involves dredging sediment from the Mississippi River to restore 132 acres of earthen ridge and 1,538 acres of marsh along Spanish Pass in Plaquemines Parish, a natural historic river distributary west of Venice, Louisiana.





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appointed Louisiana's first Chief Resilience Officer and encourages state agencies to incorporate long-term coastal change projections into their planning and operations. Governor Edwards also established the Climate Initiatives Task Force, which released a plan to guide the state's pursuit of carbon neutrality by 2050. In 2018, in response to the statewide flood events of 2016, the state launched the Louisiana Watershed Initiative, a watershed-based approach to reducing flood risk in Louisiana. It is designed to coordinate and align various state and federal programs, and coordinate policies and decision-making among local jurisdictions within a watershed.

WHAT'S NEW IN 2023

Building on the capabilities and advancements of previous plans, the 2023 Coastal Master Plan includes efforts to improve project development and evaluation; incorporate the best available science to refine tools and analyses; collaborate with federal, state, and local governments, academia, and NGO partners; and effectively engage stakeholders.

Following two public solicitations for new project ideas, CPRA worked with Regional Workgroups (RWs) to refine project concepts and identify areas of need that were not represented among the initial proposals. Ultimately, 131 candidate projects were evaluated. Projects were developed with a focus on addressing regional-scale challenges and integrating restoration techniques to amplify benefits. A new robust project selection process was used to identify projects that perform well under a range of possible future conditions to address climate and other uncertainties in the decision-making process. Improvements to predictive models include updates to inputs and

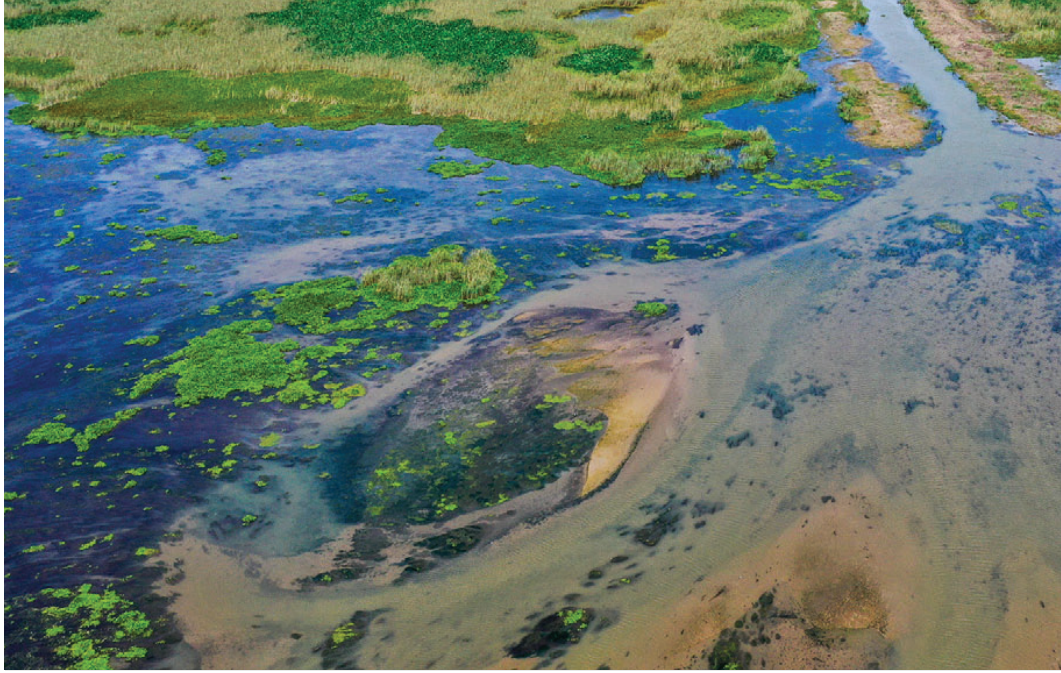

Image: Pass A Loutre, 2020 (CPRA)

stressors and ensuring environmental scenario values vary consistently with potential climate change pathways and sea level rise. Risk modeling now incorporates updated and higher resolution coastal assets data, population change, and community demographics information. The development of new risk metrics allows us to better understand and illustrate who is currently most vulnerable to flood risk and how different communities may experience future flood risk. Nonstructural risk reduction strategies are considered coastwide to better support funding and implementation opportunities provided by multiple agencies and programs.

To facilitate effective communication of the results, the 2023 Coastal Master Plan makes more results from the analyses accessible through the Master Plan Data Viewer.

These improvements work together to create a plan that is both realistic and practical, links risk reduction and restoration projects, and focuses on a message of transition and adaptation for coastal Louisiana residents.

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From there, projects can move forward to engineering and design.

The next stage, once funds and permits are in hand, is construction. Depending on the project type and size, this can take several years, and hundreds of local jobs may be created during the construction phase.

Following construction, CPRA or its partners are responsible for project operation, maintenance, and monitoring. This improves project outcomes and provides data and information necessary to inform future planning efforts and adaptively manage the state's coast with respect to ongoing challenges.

CPRA is both a planning and an implementation agency, which ensures consistency between the master plan and CPRA's other charges.

EXPANDED COORDINATION

In addition to the work of CPRA, the State of Louisiana leverages local government initiatives, the efforts of other state agencies, federal studies and funding, and the work of NGO and community-based organizations to expand the reach of our coastal program.

Through state and local partnerships, large-scale risk reduction projects, such as the Morganza to the Gulf project, have been pursued incrementally.

The Governor's Adaptive Governance Initiative (AGI) has promoted information sharing among

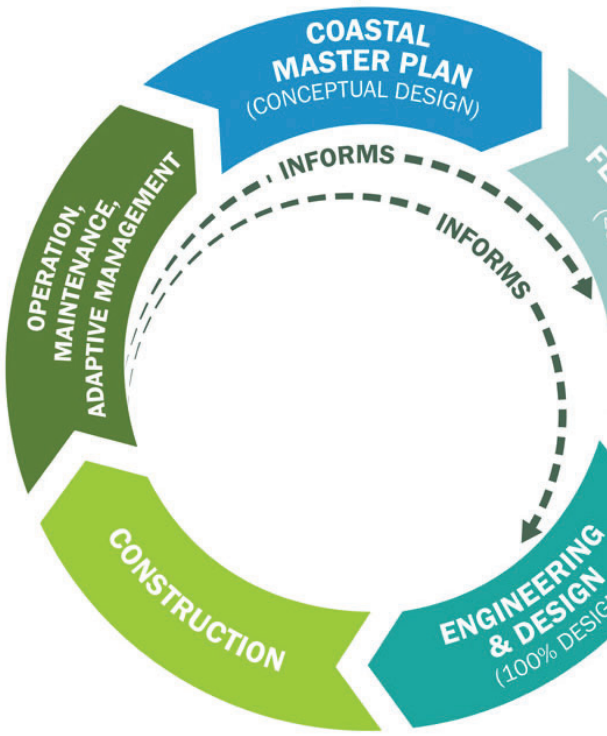

Figure 2.1: Six-Year Cycle to Update the Master Plan.

vulnerabilities, identification of adaptation actions, and pursuit of measures to make our coastal communities more resilient. CPRA supports the agencies in their efforts to consider environmental change projections from the master plan in their long-term planning and decision-making.

In addition to state and local partners, CPRA also works directly with USACE to monitor and maintain levees and coordinates with the Federal Emergency Management Agency (FEMA) and other federal partners during and in the aftermath of damaging storms.

The state's pursuit of these endeavors is anchored in a commitment to the people and places that make up coastal Louisiana. While restoration and risk reduction planning is essential for managing the coast and providing consistent, long-term investment in our communities and

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Image: Atchafalaya Basin, 2018 (Louisiana Sea Grant College Program)

Image: Fort Pike, 2021 (CPRA)

Image: Pier Fishing at Pointe-aux-Chênes, 2015
(Louisiana Department of Wildlife and Fisheries [LDWF])

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These experiences, skills, and enjoyments have been passed down for generations. Implementing the 2023 Coastal Master Plan is critical to a vibrant future coast for generations to come.

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Image: Map of the Alluvial Region of the Louisiana Coastal Plain, 1861 (Library of Congress)

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British, chose to settle in Louisiana. Descendants of these groups, including the geographically unique Creole population, have continued to make their home in Louisiana alongside more recently arrived residents, including members of Louisiana's large Vietnamese and Latin American communities.

During and after World War II, Louisiana's significant economic development was associated with the petrochemical industry and increased drilling for oil and natural gas, both inshore and in the Gulf of Mexico. This energy development completely transformed the state's economy and its landscape. As the oil and gas industry expanded, thousands of miles of canals were cut through Louisiana's coastal wetlands, unintentionally contributing to and exacerbating land loss. Chemical production, leveraging the state's readily available hydrocarbons, sulfur, salt, and water resources, boomed between 1947 and 1957 when the first big move to offshore petroleum production was made. After the war, the rise of global economic markets led to rapid industrialization in Louisiana including oil refineries, petrochemical plants, foundries, food production, fishing, timber, transportation equipment, and electronic equipment. Today, chemical, petroleum, and coal products remain Louisiana's leading industrial sectors, providing approximately 30% of all industrial activity in the state. These industries are located predominantly along the Mississippi River between Baton Rouge and New Orleans, and near Lake Charles, where they are served by deep water navigation channels.

While petrochemical production is still important, the agricultural foundation of rural Louisiana remains strong. Louisiana farmers produce a variety of commodities

cotton, strawberries, hay, and pecans. Louisiana is also the nation's second largest seafood supplier and the seafood industry is a major employer across the coast. From shrimp to oysters and crabs to crawfish, Louisiana seafood remains an iconic product for the state.

Many of these coastal industries and businesses rely on workers living in coastal communities that have been increasingly impacted by damage from hurricanes in recent decades. Repeated flooding, frequent and unpredictable evacuations, and challenges with obtaining affordable insurance are all factors that have contributed to many residents' decisions to move. The residents of south Louisiana have always moved with the changing coast and will continue to do so as they weather these challenges. However, moving away from the coast today is a different proposition than it was 100 or even 50 years ago. The way we currently live and work in coastal Louisiana means most of us move houses or jobs relatively infrequently and have strong ties to our local communities. Long-term, gradual changes to the coastal landscape and increased flooding risks, along with the more acute impacts of hurricanes such as Katrina, Rita, Ike, Gustav, Laura, Delta, and Ida have led some coastal residents to move north. People are moving to areas that might not be ready for them. Increases in traffic, needs for road improvements, and a lack of affordable housing are all problems that expanding communities and their new arrivals face

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Image: Elevated Camps along Bayou Decade, 2021 (CPRA)

Image: Bridge Repair Post Hurricane Ida, Lafitte, 2021 (CPRA)

Implementing projects to restore wetlands and reduce flood risk are part of how we prepare for the future, but they cannot fully address the impacts that a changing coast will have on residents and communities. Through the state's Adaptive Governance Initiative, CPRA will continue to coordinate with fellow state agencies to help them consider coastal change as they manage programs that support coastal communities and resources—ranging from access to key services to supporting cultural preservation.

For more information on the state's Adaptive Governance Initiative, see **Chapter 7: Beyond the Master Plan**.

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21 Coastal Advisory Team meetings

7 Community Engagement Workgroup meetings

28 Regional Workgroup meetings

19 Predictive Models Technical Advisory Committee meetings

23 Conferences

9 CPRA Board meetings

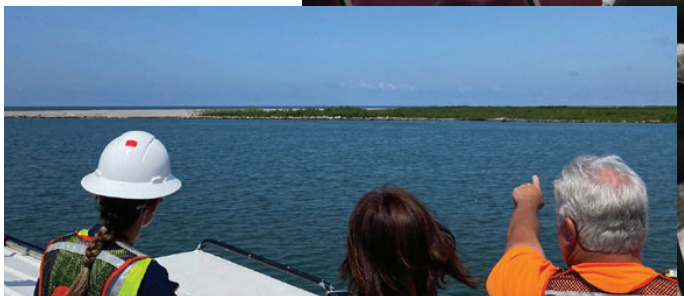
4 Workshops

15 Informal public meetings

2 Governor's Advisory Commission on Coastal Protection, Restoration and Conservation

12 Master Plan Data Viewer demonstrations

4 Official Public Master Plan Hearings



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THE LANDSCAPE MODEL (ICM)

The landscape of coastal Louisiana is represented using the ICM which predicts coastal hydrology, wetland morphology, vegetation dynamics, and the suitability of habitats to support an array of fish and wildlife. The ICM builds on the version used for the 2017 Coastal Master Plan, but recent improvements include refined resolution in key areas and the incorporation of additional processes.

The State of Louisiana's Coastwide Reference Monitoring System (CRMS) is a large network of more than 300 wetland-based observation stations that, since 2006, have collected data about wetland elevation, water levels, salinity, vegetation, and land change. In the 2023 Coastal Master Plan, data from CRMS stations has been used to refine how wetland vegetation in the ICM responds to changes in salinity and inundation stress. CRMS data, along with data and information from other CPRA-funded studies, were also used to improve the evaluation of subsidence (i.e., sinking of the ground) across the coast.

Future environmental change is an important driver of the predictive models used to inform master plan development and decision-making. During plan development, the most recent available global climate model outputs were leveraged to develop environmental scenarios that use climate-related variables, such as sea level rise rates and temperature changes, to represent plausible future conditions.

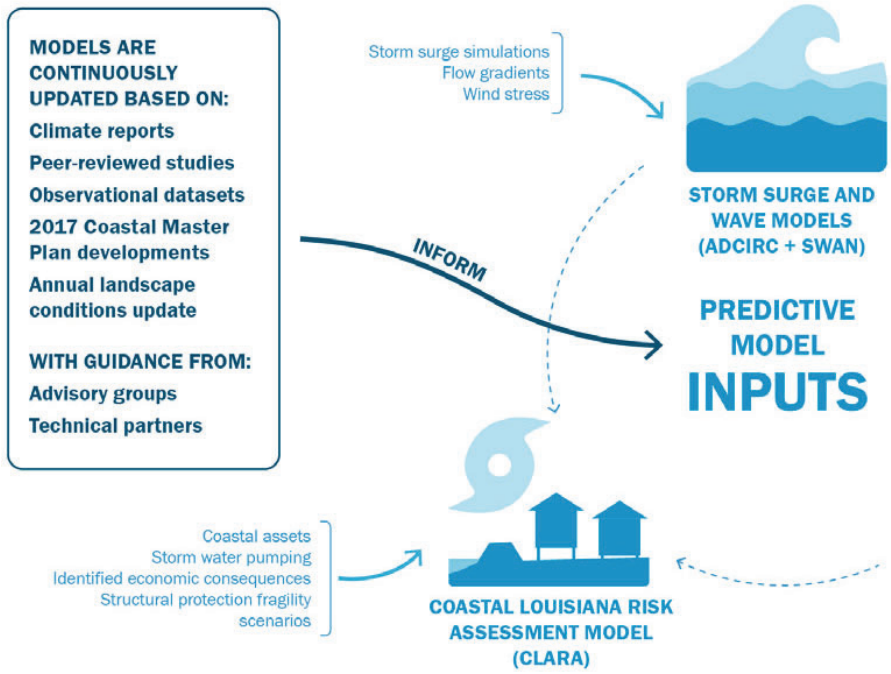

Figure 2.2: Predictive Model Inputs.

STORM SURGE AND WAVE MODELS (ADCIRC+SWAN)

Risk to coastal communities from hurricanes and other tropical events will continue into the future. Storm surge and wave models (ADCIRC+SWAN) are used to model storms and provide water level inputs to the risk assessment model.

Synthetic storms with varying characteristics, such as wind speed and central pressure, are used to test the impacts of a range of plausible events.

Working with the USACE Engineer Research and Development Center, an updated set of storms was used to model hurricanes and tropical storms, including more extreme and less intense events than were previously available, to predict associated storm surge and wave heights across the coast.

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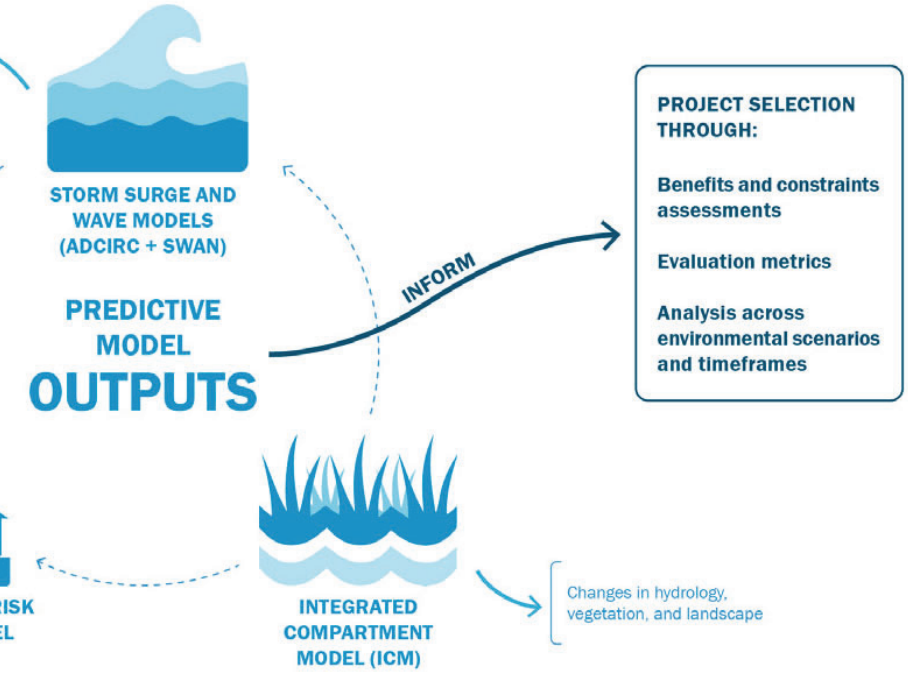

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>>> WANT TO KNOW MORE?

The following appendices provide additional information on model improvements, inputs, and other aspects of the predictive models used in developing the 2023 Coastal Master Plan.

- **Appendix C: Use of Predictive Models in the 2023 Coastal Master Plan** provides an overview of all the predictive models and their uses in the 2023 Coastal Master Plan development process.
- **Appendix D: Overview of Improvements to Landscape Modeling (ICM) for 2023** provides an overview of the ICM landscape model and how it functions, as well as details on improvements to individual model components.
- **Appendix E: Overview of Improvements to Risk Modeling (ADCIRC+SWAN, CLARA) for 2023** provides an overview of two risk-related models focused on storm surge and waves

FREQUENTLY ASKED QUESTIONS

Why is the master plan important to Louisianans? The master plan provides a way for Louisiana leaders, residents, and businesses to understand what may happen in the future to their neighborhood, their favorite fishing areas, and how much flooding may occur in future storms. This allows them to prepare for, rather than react to, the changing coast. By knowing which projects are planned and how they can improve future conditions, individuals and communities can support these efforts, inform others, and work with local, state, and federal officials to expedite project implementation.

How can I get involved in the master plan process? By reading the plan you are already engaged! The CPRA Board meets monthly to share updates on progress and allow individuals time for public comments. You can also sign up for master plan updates (email us at masterplan@la.gov) and follow our social media to stay informed of recent advancements and upcoming events. Providing your thoughts and comments about coastal change and how it impacts you, gives the state important context for when and where action is needed.

If new data is incorporated into the master plan models and it changes the results from the last plan, does that mean that the previous models were wrong? How do we know this plan is right? The master plan models are neither right nor wrong. Their job is to tell us how our current understanding of how the coast works will play out in the future as conditions change. The regular updates to the state's coastal master plan allow us to ensure that the plan is based on what we

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wind speeds. They are based on historical conditions or predictions of future conditions. Data about elevation, water levels, vegetation, and other aspects of the landscape serve as a starting point, or initial conditions, for the 50-year predictions of landscape change in the ICM. The storm surge and risk assessment models are also informed by the boundary conditions imposed on the ICM as well as information about existing structures and infrastructure across the coast.

The future is uncertain with regard to climate-related environmental conditions and, therefore, assumptions about how climate will change must be made to make landscape- and storm damage-related predictions. We know that sea level rise and subsidence, along with precipitation, temperature, tributary flows, and hurricane intensity are key environmental drivers that influence our coastal landscape. We also know that there is uncertainty in how these variables may change over time. To make informed decisions, the master plan employs a scenario approach to define a range of plausible future environmental conditions.

SCENARIOS AND DRIVERS

For the 2023 Coastal Master Plan, we defined two scenarios, referred to as the "lower" and "higher" scenarios, to drive change within the ICM and ADCIRC+SWAN for use in project selection. Analyses from the 2017 Coastal Master Plan showed that two variables, subsidence and sea level rise, had the greatest impact on model outputs; therefore, development of scenarios for this plan began with choosing values for these two model inputs. Sea level rise rates were selected based on climate change modeling from external sources such as the National Oceanic and Atmospheric Administration (NOAA)

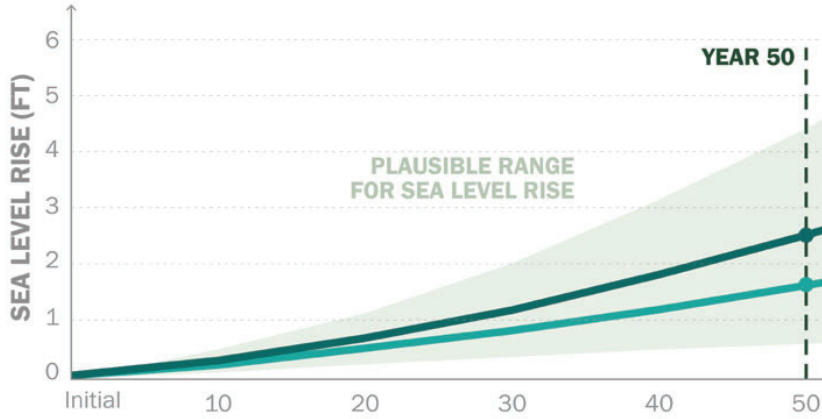

Figure 3.1: Sea Level Rise Curves for Project Selection and Range of Plausible Curves.

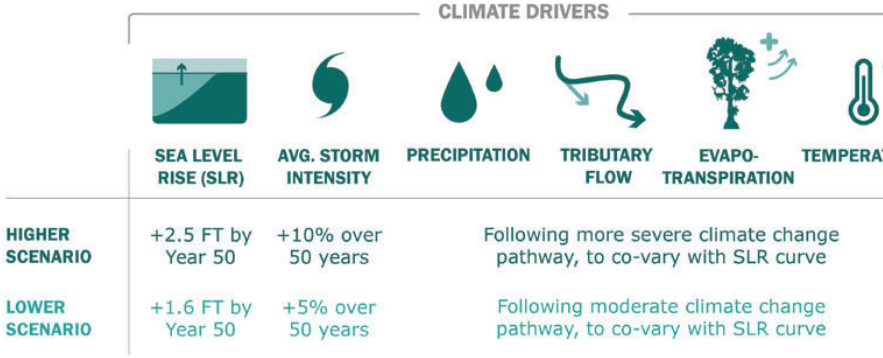

Figure 3.2: Environmental Drivers for the Higher and Lower Scenarios.

derived from CRMS and global positioning system (GPS) elevation data, with a greater rate of shallow subsidence applied in the higher scenario than in the lower. Overall, the lower scenario represents more moderate future conditions, while the higher scenario represents more severe conditions with greater sea level rise and shallow subsidence, leading to increased land loss and flood depths compared to the lower scenario.

Once sea level rates were selected for the two scenarios, values for the other scenario variables were derived from related global climate model outputs. When considered together, the model outputs of the two scenarios delineate a range of possible future landscapes and damage profiles that can be used to inform decision-making. While the use of this scenario approach does not make the future more certain, it does provide a

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These model runs serve to demonstrate the possible future of coastal Louisiana if all future planned restoration and risk reduction efforts were halted and the coastal program only continued to operate existing projects. Given that funding for future projects is not guaranteed and that unforeseen circumstances could complicate the process of implementing projects that are already funded, comparing these model runs to those with projects that have funding but are not yet constructed can provide insight into the long-term effects of ongoing investments in the coastal program.

The 2023 Coastal Master Plan, however, does not assume this FWOCFP landscape to be the starting point. The next section provides additional detail about what is included in the master plan's starting landscape or "Future Without Action (FWOA)."

FUTURE WITHOUT ACTION (FWOA)

The FWOA condition in the 2023 Coastal Master Plan serves as the baseline for predicting changes to the landscape and storm surge-based risk into the future. The initial landscape represented in the ICM and passed to the ADCIRC+SWAN and CLARA models reflects a snapshot in time while the coastal program continues its activities. Thus, a decision must be made about how to include the effects of ongoing work in the modeling.

Image: Operations at West Belle Headland after Hurricane Ida, 2021 (CPRA)

Then, additional projects and features are included based upon expectations around progress in implementing those projects. This includes projects that have undergone significant advancements in engineering and design, those that have availability of funding for construction, and those for which construction permits are currently being obtained.

Some of the projects included in FWOA are very large and are expected to have significant impacts on the future landscape following implementation. Of particular note are several projects that were included in the 2017 Coastal Master Plan and have been successful in advancing toward construction since that time.

For the first time, two large-scale sediment diversions off of the Mississippi River — the Mid-Barataria and Mid-Breton Sediment Diversions — are included in FWOA. These projects, when implemented, will

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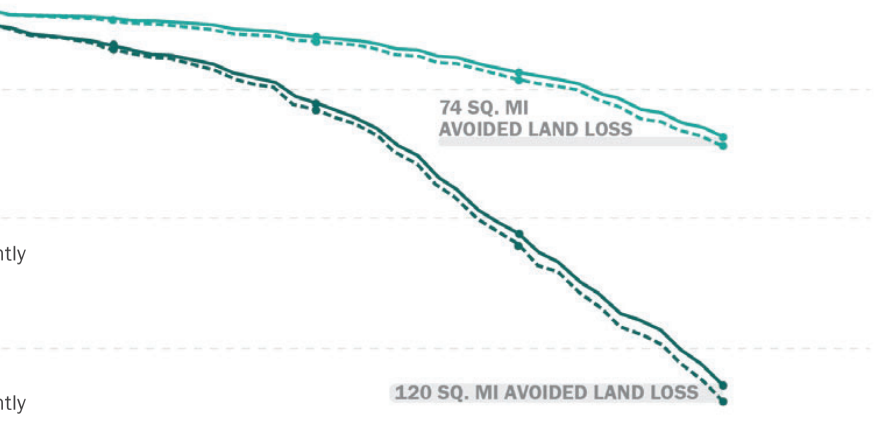
from these two projects marks an important step forward in recognizing the value in mitigating wetland impacts directly adjacent to projects; this will increase the resiliency of the West Shore Lake Pontchartrain Risk Reduction project and is an on-the-ground example of the master plan's emphasis on both reducing coastal flood risk and restoring coastal habitats.

The impact of these projects can be seen in output maps for FWOA model runs (see maps 3.1-3.4) showing land creation that helps to strengthen wetlands in both basins. It is important to note that because these projects are in FWOA their benefits are not attributed to the 2023 Coastal Master Plan. Those benefits, however, are an important part of Louisiana's coastal program and are the result of targeted, significant investment in large-scale restoration projects.



FUTURE WITHOUT ACTION OUTCOMES

Even with these projects assumed to be on the ground, the FWOA landscape realizes significant land loss and increases to storm surge-based flood depths over the 50-year model prediction. Under the lower scenario, 1,100 sq mi of land are lost at Year 50; an equivalent amount of loss occurs by Year 34 under the higher scenario, with up to 3,000 sq mi lost at Year 50 under those more severe environmental conditions.

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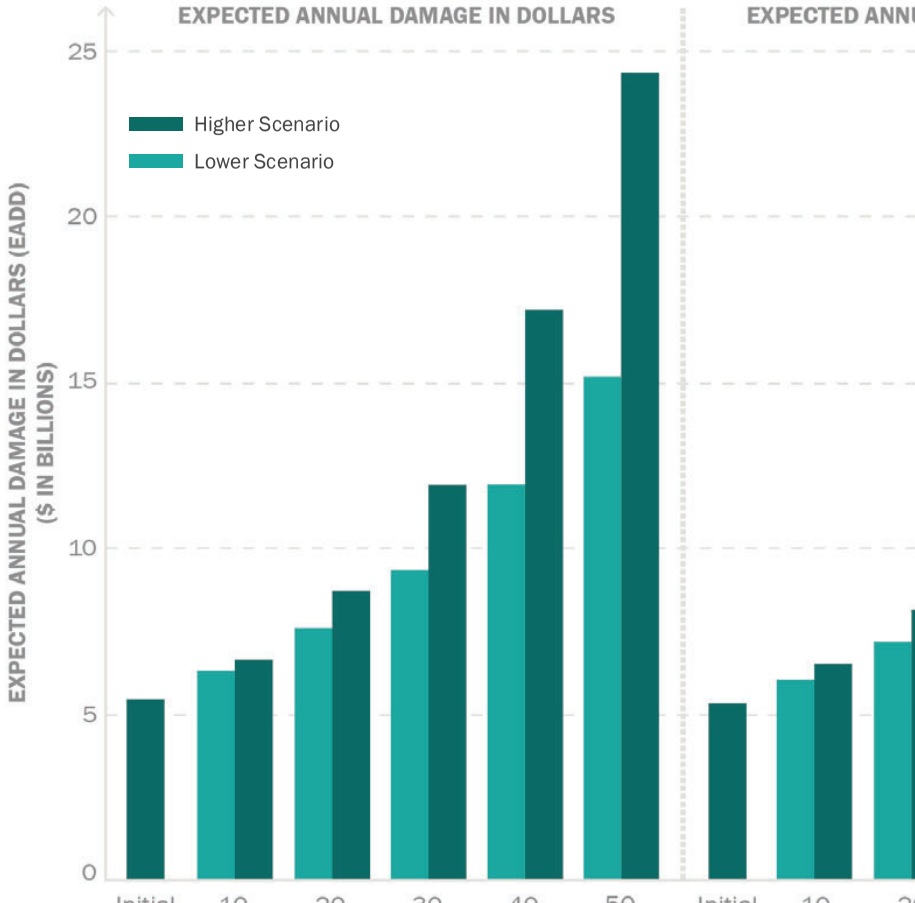

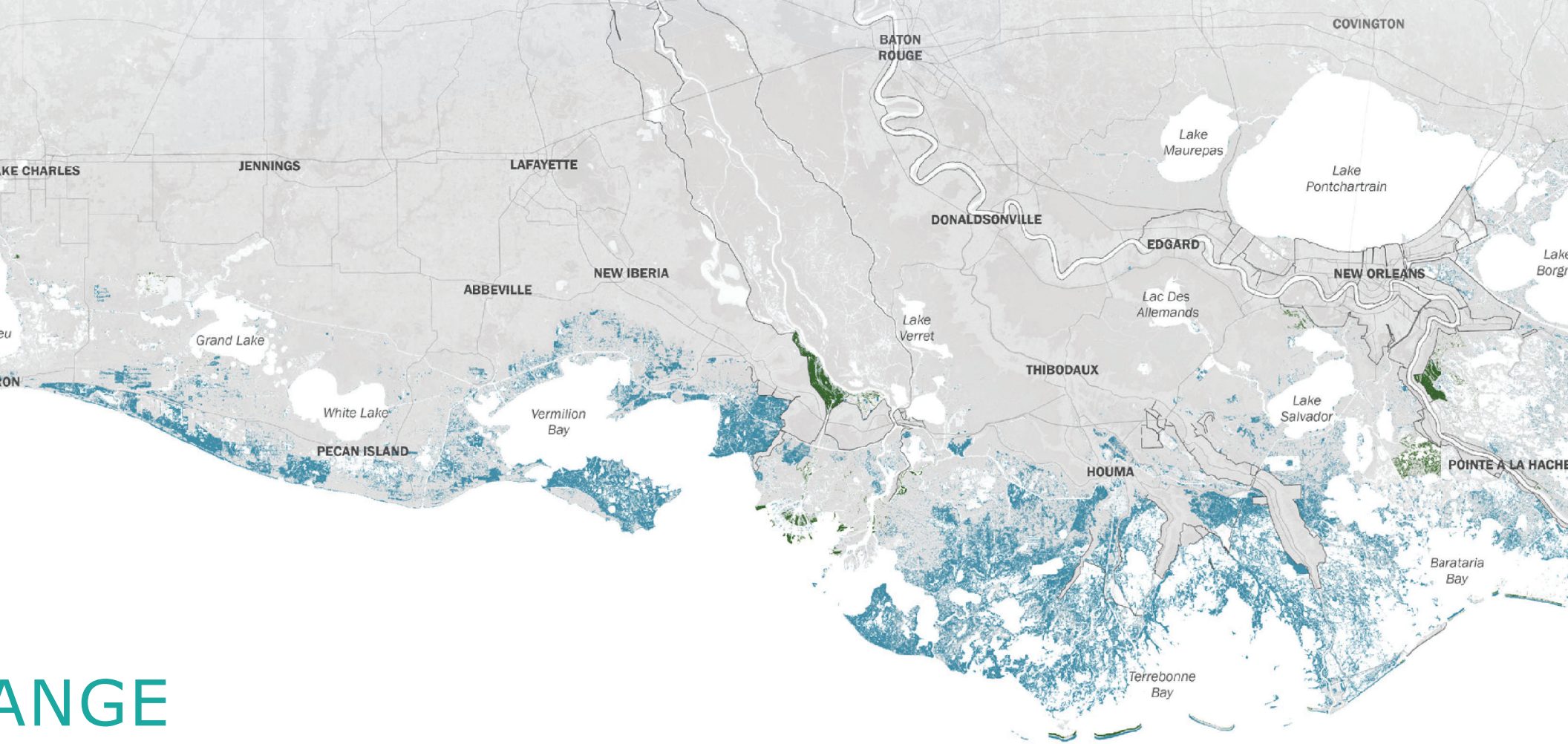

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climate change impacts, including sea level rise of 1.6 ft over 50 years. Without the 2023 Coastal Master Plan projects, the lower scenario ICM outputs predict 1,100 sq mi of land lost in that same time period. Much of the projected loss is concentrated in lower basins and on marsh edges.

>>> Go to **Chapter 5: Take Action** to read about how CPRA addresses these anticipated challenges through protection and restoration projects

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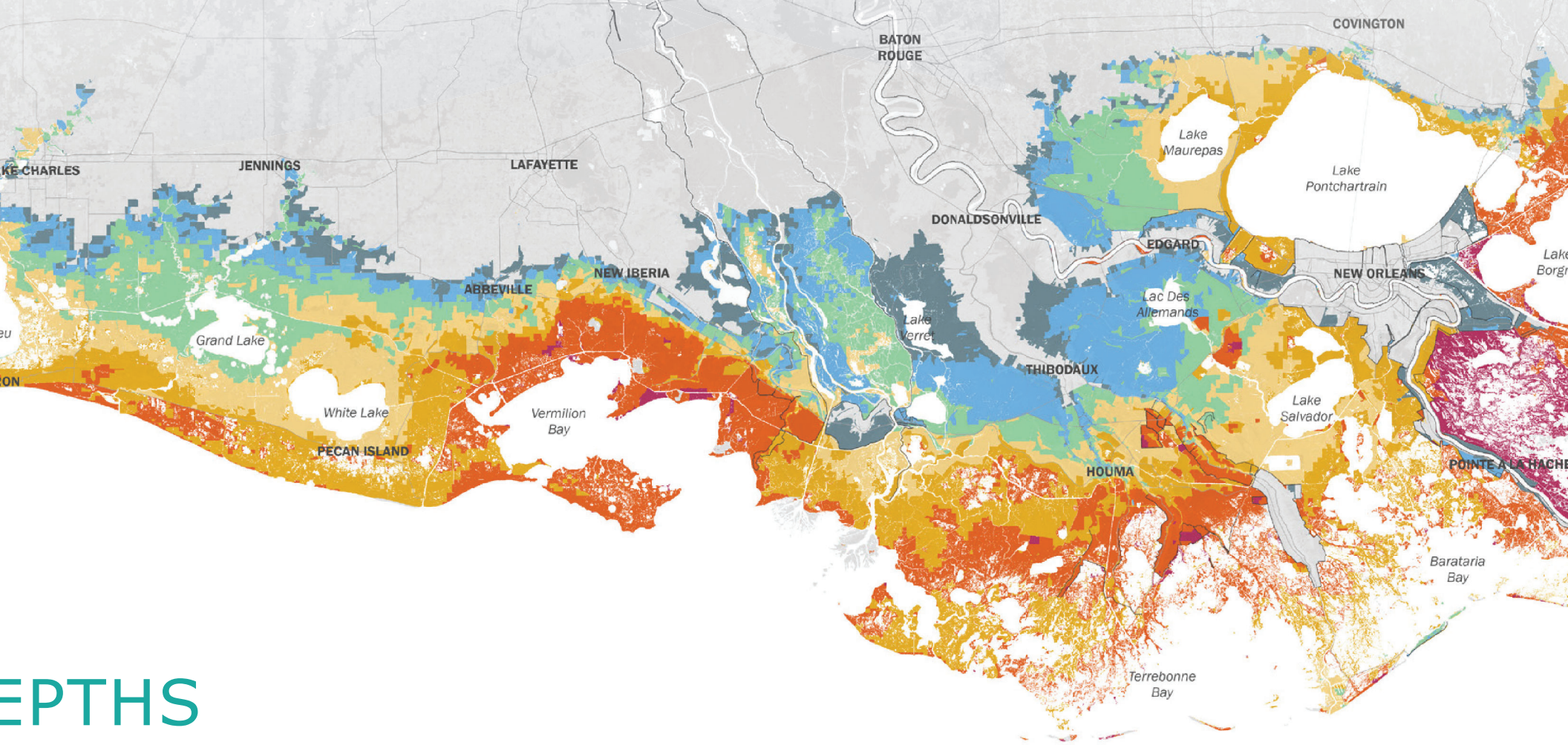
Due to uncertainty around future climate conditions, both scenarios are used in the development of the 2023 Coastal Master Plan to represent a range of future landscapes and to select robust projects that can provide benefits for the coast for whatever future conditions transpire.

>>> Go to **Chapter 5: Take Action** to read about how CPRA addresses these anticipated challenges through protection and restoration projects



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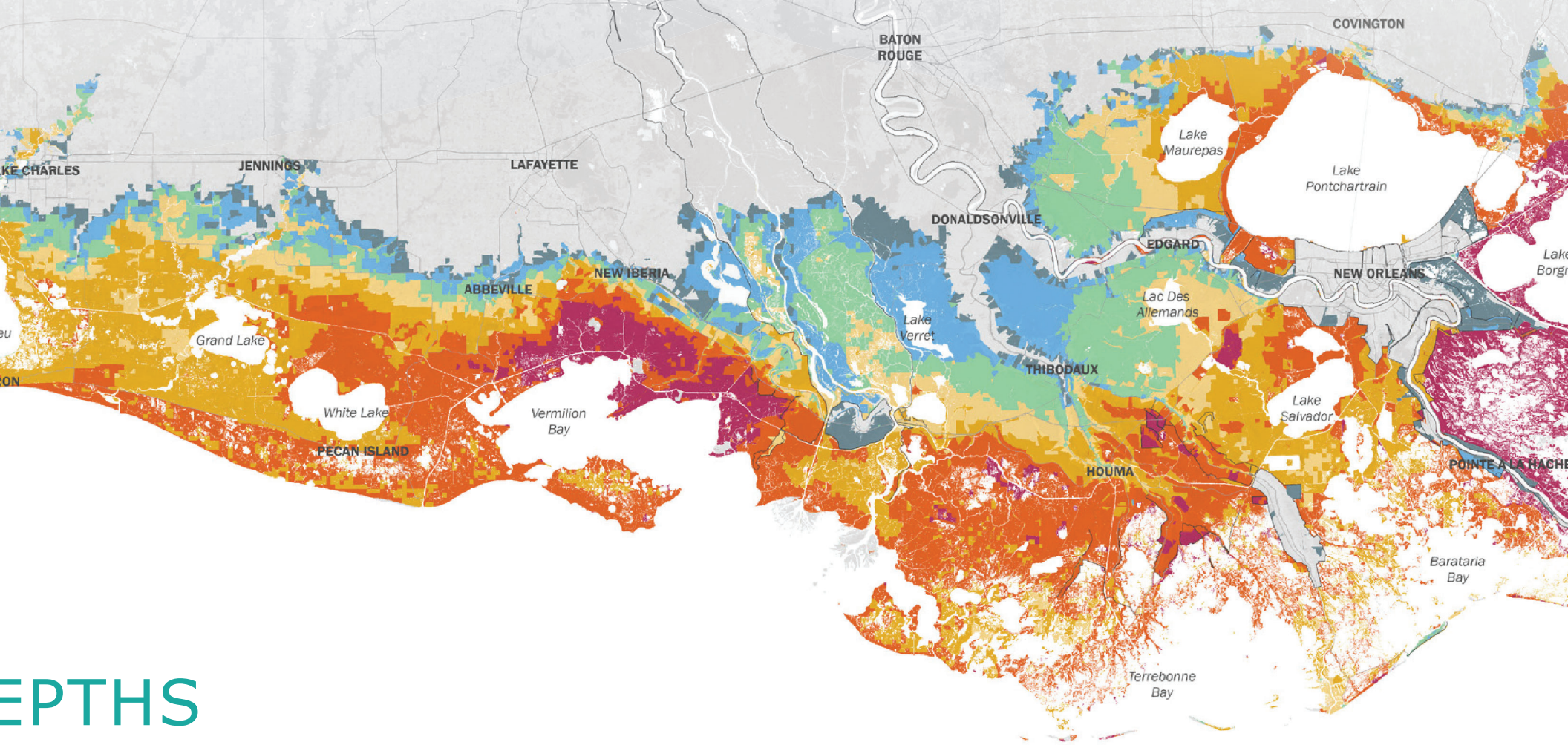
>>> Go to **Chapter 5: Take Action** to read about how CPRA addresses these anticipated challenges through protection and restoration projects



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Due to uncertainty around future climate conditions, both the lower and higher environmental scenarios are used in the development of the 2023 Coastal Master Plan to represent a range of future landscapes and to plan robust projects that can provide benefits for the coast under any plausible future condition.

>>> Go to **Chapter 5: Take Action** to read about how CPRA addresses these anticipated challenges through protection and restoration projects

UMBERS

E 2023 COASTAL MASTER PLAN

WIDE-RANGING IMPACTS
Natural resources and the built environment face more challenges from coastal change in a future without the master plan projects.

COMMUNITIES AT RISK
Communities are at risk of storm surge-based flooding and damages from increasingly strong hurricanes and storms in the future.

FREQUENTLY ASKED QUESTIONS

Two different maps are shown for land change – how do I know which one is right? The maps are based on different assumptions about the future, so neither is right nor wrong. Rather, they show us where land could be lost, where it could be built, and how much change could occur. If an area of land is lost – or built – in both maps, then we are more certain that type of change is going to occur. Both maps make assumptions about future climate and river conditions as well as how projects and structures, such as locks, are operated. If these assumptions do not play out exactly as predicted, the coastal map could be different from those presented.

I've always heard about flooding from a "100 year storm", but the master plan doesn't use this term – why? What is used instead? The master plan does not focus on recurrence intervals (e.g., 100-year storm), as those descriptions are based on long-term averages. As Louisianans have experienced, we can have a 100-year storm two years in a row. Instead, the maps show flood depths that have an AEP of 1% — that means every year there is a 1% chance that these flood depths will be met or exceeded. The depths and probabilities are calculated using flood depths associated with a set of storms that statistically reflect historical storm characteristics and the probability of those storms occurring in coastal Louisiana.

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PLANNING HORIZON

When planning, it is important to define the planning horizon — how far in the future will projects continue to yield results? In the master plan process, a 50-year planning horizon has been selected for a variety of reasons. Assessing project benefits over several decades allows long-term effects to be considered as well as near-term outcomes, and over 50 years the plan provides benefits for multiple generations.

Additionally, with the uncertainty inherent in the master plan process regarding both funding and climate change, a 50-year planning horizon is considered to be as far into the future as we can reasonably project those considerations with an acceptable level of confidence. The further into the future projections are made, the less certain we are about them.

Finally, 50 years is thought to be a sufficiently long planning horizon to be separated from political cycles at local, state, and federal levels and instead encourage “big picture” thinking and decision-making.

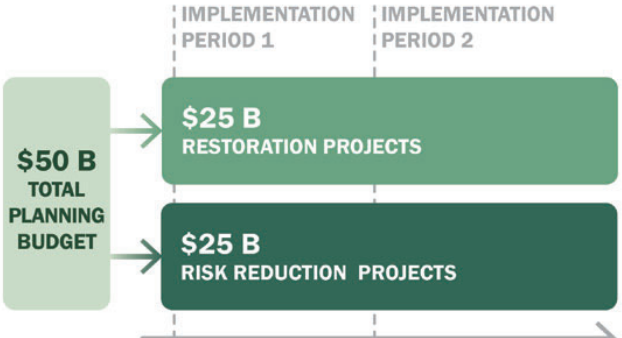

Image: Caminada Headlands Restoration Project, 2016 (CPRA)

CONSTRAINTS

The 2023 Coastal Master Plan was developed using two fundamental constraints. First, a $50 billion total planning budget for a 50-year period was selected with the funds divided evenly between restoration projects and risk reduction measures. This represents an aspirational but potentially achievable level of investment. While the State of Louisiana has budgeted more than $1 billion annually for the coastal program in recent years (as documented in the CPRA Fiscal Year 2023 Annual Plan), that level of funding has not been secured for the full 50 years considered in the master plan. Because funding for the coastal program is not guaranteed, the master plan is also divided into two implementation periods (IP1 [Years 1-20] and IP2 [Years 21-50]), with the most beneficial projects identified for near-term construction in the first 20 years of the plan with a budget of $25 billion. More information on funding and implementation periods can be found in Chapter 5.

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SUPPORTS MASTER PLAN OBJECTIVES

Beyond their individual benefits, the suite of master plan projects should collectively support master plan objectives (see Chapter 1 for more details). This is tracked through a series of metrics that consider whether the master plan as a whole supports the lives, livelihoods, and cultures of coastal Louisianans.

See the following pages for more information on the project types considered in the master plan analyses as well as examples of programmatic project types.

RISK REDUCTION PROJECTS

Structural Risk Reduction

One effective means to address storm surge-based flood risk in coastal Louisiana is through the implementation of structural risk reduction projects. This project type encompasses new and improved levees, flood gates, storm surge barriers, and other structural elements that reduce flooding.

Nonstructural Risk Reduction

Risk reduction can also be successfully achieved through nonstructural mitigation measures. For the 2023 Coastal Master Plan, nonstructural measures, including elevating residences, commercial floodproofing, and voluntary acquisition, are considered to be applicable across all coastal communities. More information on implementing nonstructural risk reduction can be found in Chapter 5.

RESTORATION PROJECTS

Restoration projects utilize varied approaches to restore, create, and sustain land. Projects using a single approach were considered for selection alongside integrated projects, which combine features from multiple project types into one integrated concept. In the end, a suite of restoration projects is planned and operated together to maximize their effectiveness and benefits over time, and surpass the benefits of any single project or project type.

- Ridge Restoration
- Marsh Creation
- Landbridge
- Diversion
- Hydrologic Restoration
- Integrated Projects

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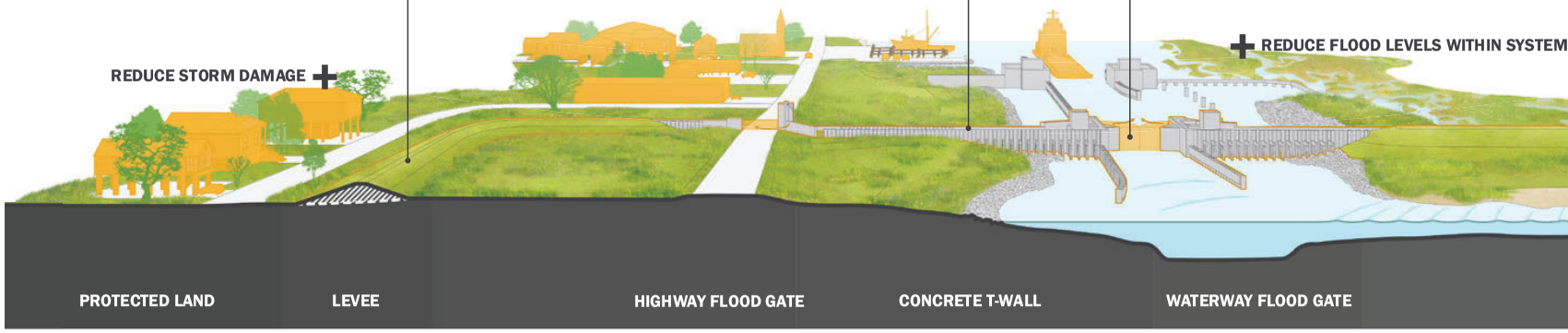
B. CONCRETE T-WALL CONSTRUCTION
Install concrete barriers and metal sheetpiles in combination with earthen levees to create a fortified system that protects surrounding communities from storm surge.

EARTHEN LEVEE CONSTRUCTION **A.**
Use earthen fill to construct a levee for increased storm surge protection for surrounding communities.

C. FLOOD GATE CONSTRUCTION
Install floodgates at critical navigation channels to allow for continued usage of waterways while still allowing flood barrier protection during storms.



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RECOMMENDED FOR VOLUNTARY ACQUISITION **C.**
For residential properties that are projected to experience greater than 14 feet of storm surge-based flooding for a 1% annual exceedance probability event, voluntary acquisition is a recommended risk reduction strategy.

A. RECOMMENDED FOR FLOODPROOFING
Floodproofing measures are recommended for commercial structures that are projected to experience 1-3 feet of flooding for a 1% annual exceedance probability event.

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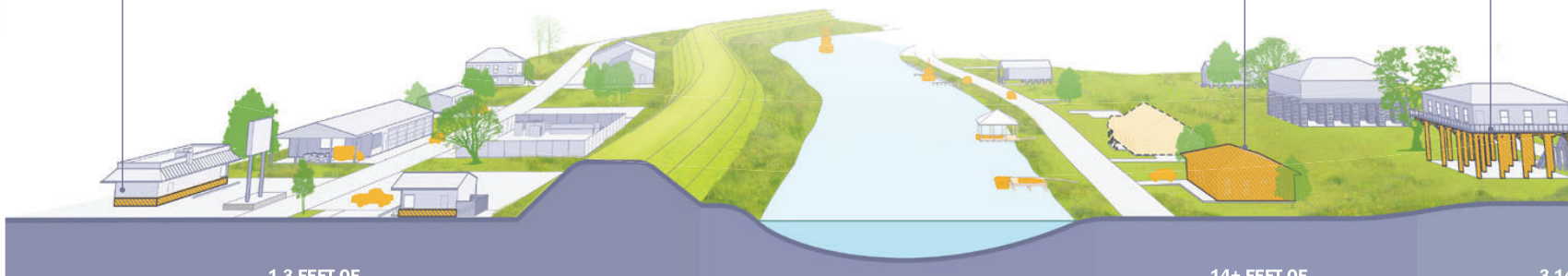

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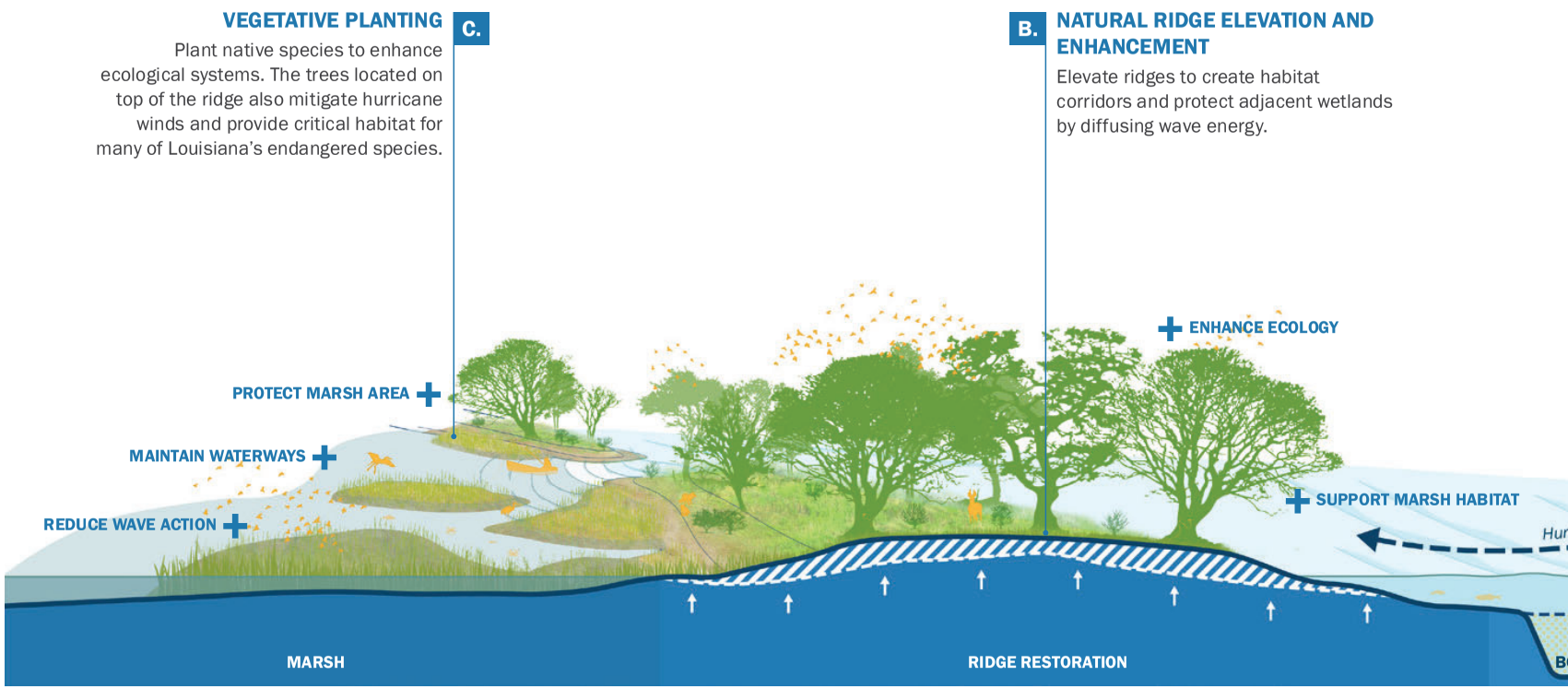

Figure 4.3:

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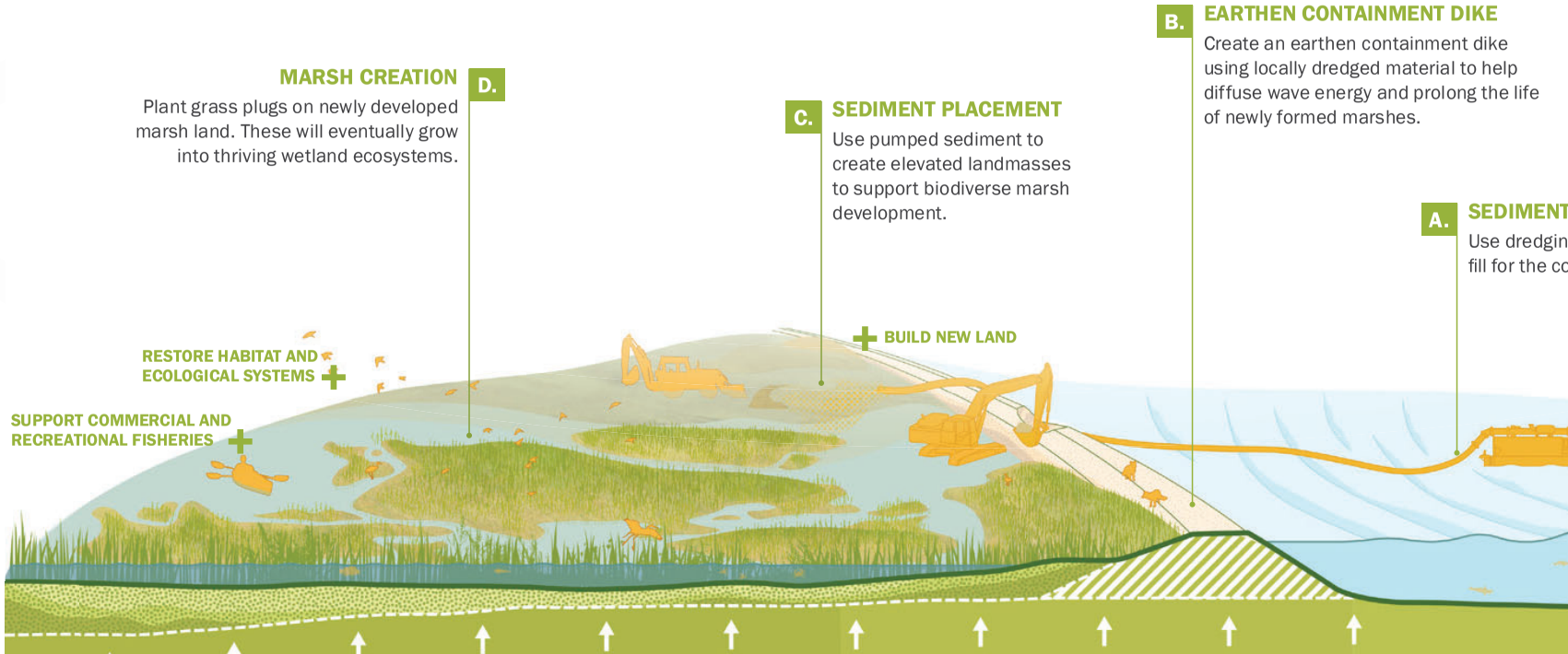

ucted marshes oriented
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ment from rivers into
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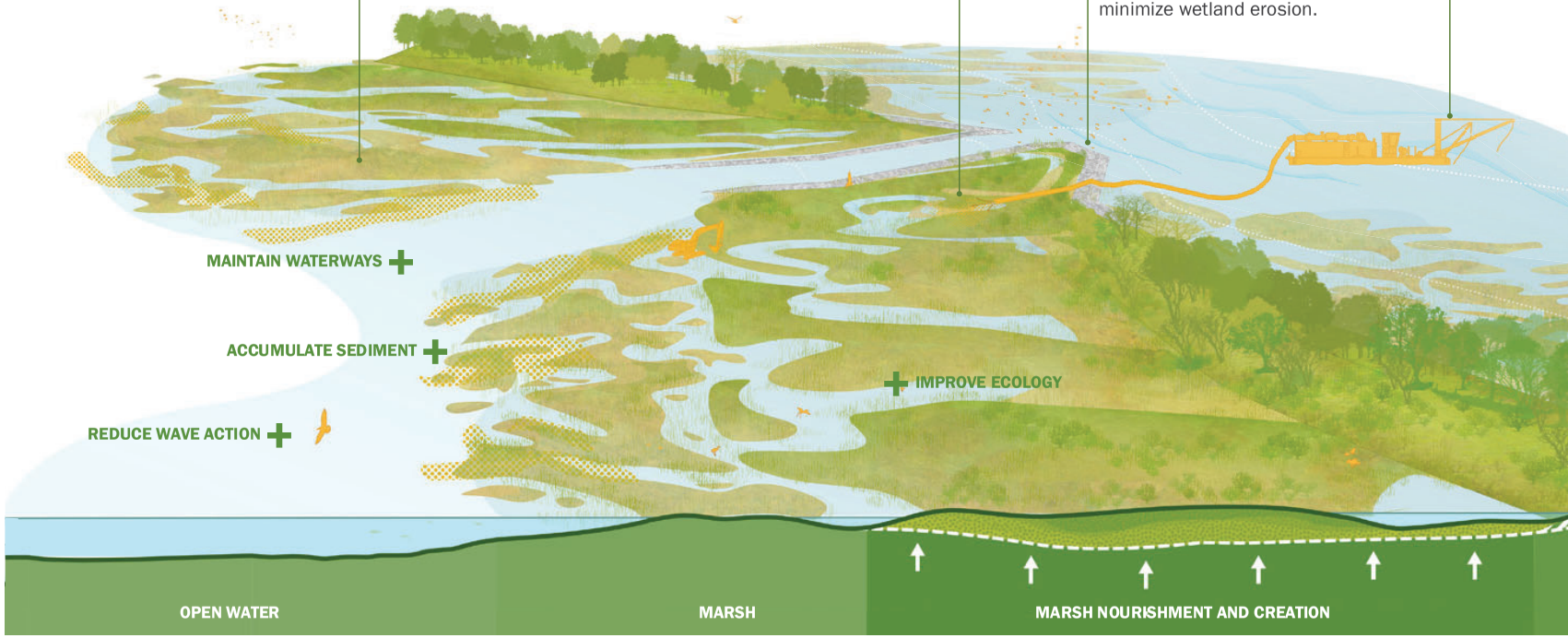
See pg. 58.

from sediment sources to create an elevated landmass to support biodiverse marsh development.

B. ARMORING
Use stone rip-rap to stabilize the shoreline and minimize wetland erosion.

Use dredging provide fill fo wetland area



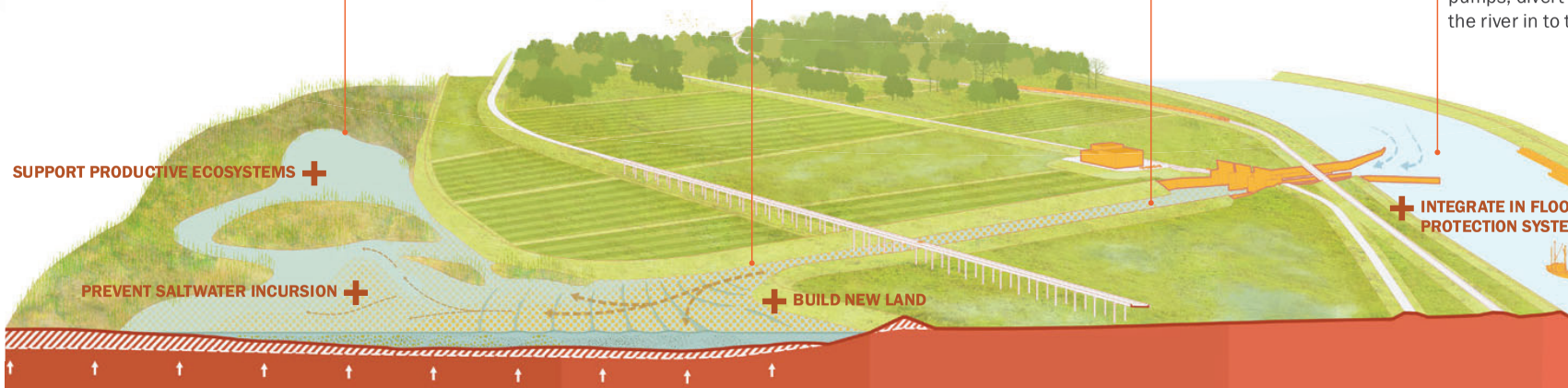
Figu

B. CREATE CONVEYANCE CHANNEL
Direct sediment and fresh water through the newly developed conveyance channel connecting the river source to the outfall area.

NOURISH EXISTING WETLANDS D.
Re-nourish existing wetlands through the infusion of nutrients carried by newly deposited sediment and fresh water.

C. DEPOSIT SEDIMENT
Deposit sediment from the diversion to help restore and create new marsh lands.

A. REDIRECT F
Using the intak pumps, divert the river in to t



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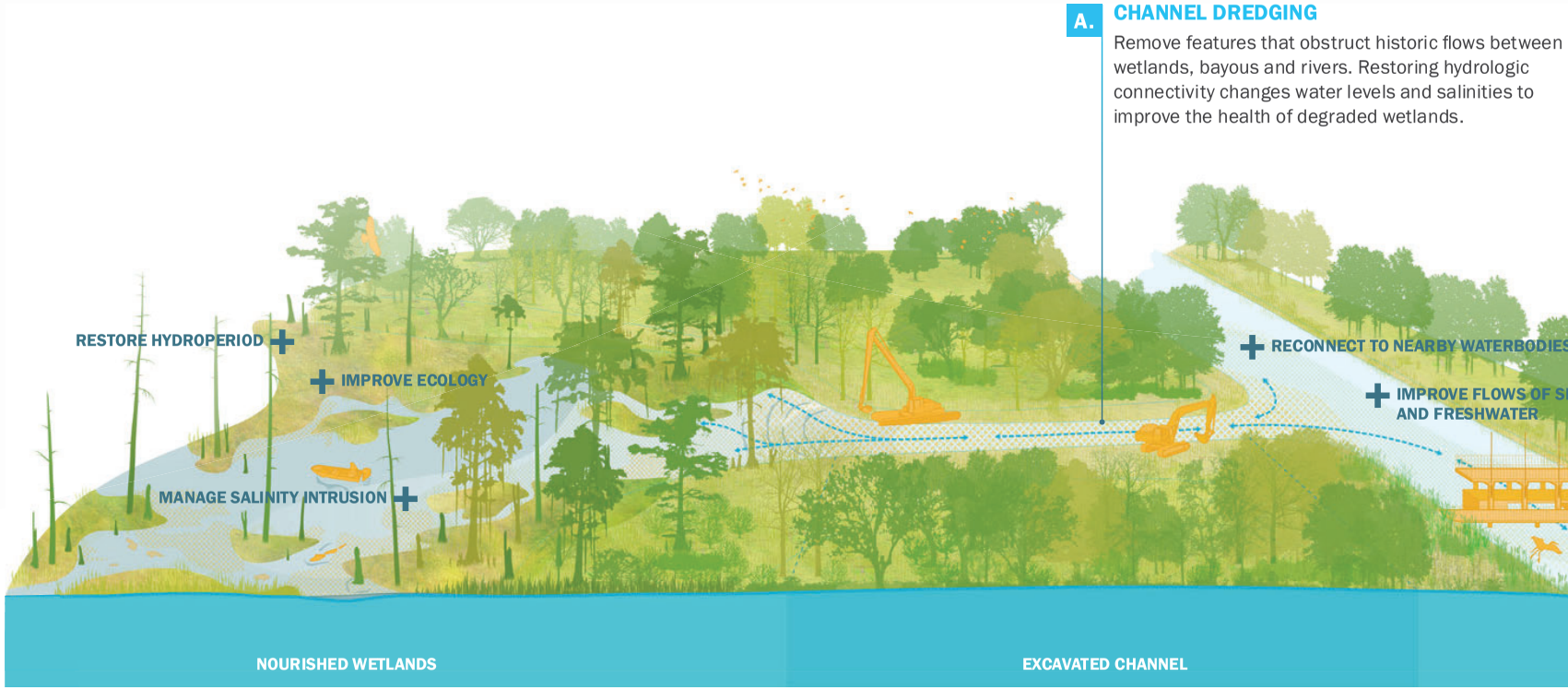

Figure 4.7: Hydr

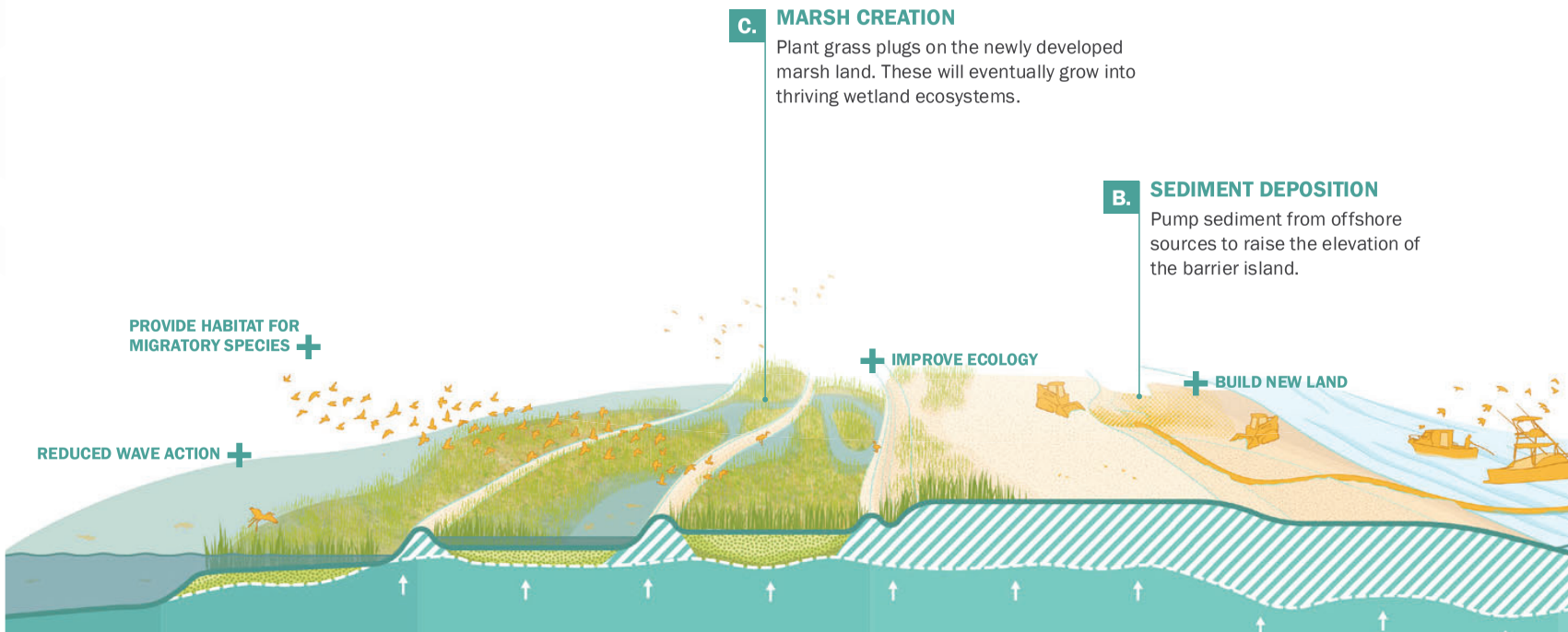

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Image: Vegetative Planting at Elmer's Island (CPRA)

Image: Living Shoreline Demonstration Project, St Bernard Parish, 2018 (CPRA)

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E PERFORMANCE

UPPORT DECISION-MAKING

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ROBUST PROJECT SELECTION

In previous master plans, projects were selected based on a single environmental scenario. The Planning Tool was updated to use a robust selection process for the 2023 Coastal Master Plan that considers both scenarios. This process first identifies high-confidence projects by formulating alternatives for each of the two scenarios – called "optimal" alternatives. Projects common to both optimal alternatives are referred to as high-confidence projects (see Figure 4.9).

The Planning Tool then iteratively increases the budgets for each optimal alternative until a set of high-confidence projects are defined that expend that original amount of funding. This process was applied for both IP1 and IP2 for restoration project selection. For structural risk reduction, fewer candidate projects were considered, and the same set of projects was chosen for each scenario for IP1.

A NEW APPROACH TO NONSTRUCTURAL PROJECTS

Risk reduction projects can be either structural or nonstructural. Previous master plans selected specific projects in both categories. For the 2023 Coastal Master Plan, the state recognizes that nonstructural damage mitigation is often carried out at the local scale through a number of different state and federal programs, and that its effectiveness is highly dependent on local participation that may not be well characterized in the predictive models. With this in mind, nonstructural projects are considered programmatically consistent. This means that the plan does not identify individual communities as 'selected' or not selected.

However we do define and evaluate nonstructural projects for each community as a way to help prioritize structural risk reduction projects and identify how much of the total budget could cost-effectively be invested in nonstructural. In IP1, nonstructural projects were identified, defined by 1% AEP flood depths at initial conditions and a 75% participation rate, and their benefits compared to those of structural protection projects by community. The Planning Tool used these to support the selection of structural risk reduction projects in two ways. First, for a single community, the Planning Tool could select only the structural or the nonstructural project, not both. Second, a structural project for a given community must perform favorably against all potential nonstructural projects, anywhere on the coast. In other words, if any nonstructural project was higher-performing than a given structural project, the structural project would be lower priority in the Planning Tool selection process.

In IP2, the flood depths used to define nonstructural projects were adjusted to account for future conditions, and the participation rate was adjusted based on the selection of projects in IP1. For both IP1 and IP2, the Planning Tool identified the best set of projects – from both structural and nonstructural options – to reduce storm surge-based flood damages.

BENEFITS OVER TIME

As the coastal landscape changes over time and sea level rise increases, the benefits of restoration and risk reduction projects change over the 50-year period of analysis. In previous master plans, specific points in time were averaged to characterize project

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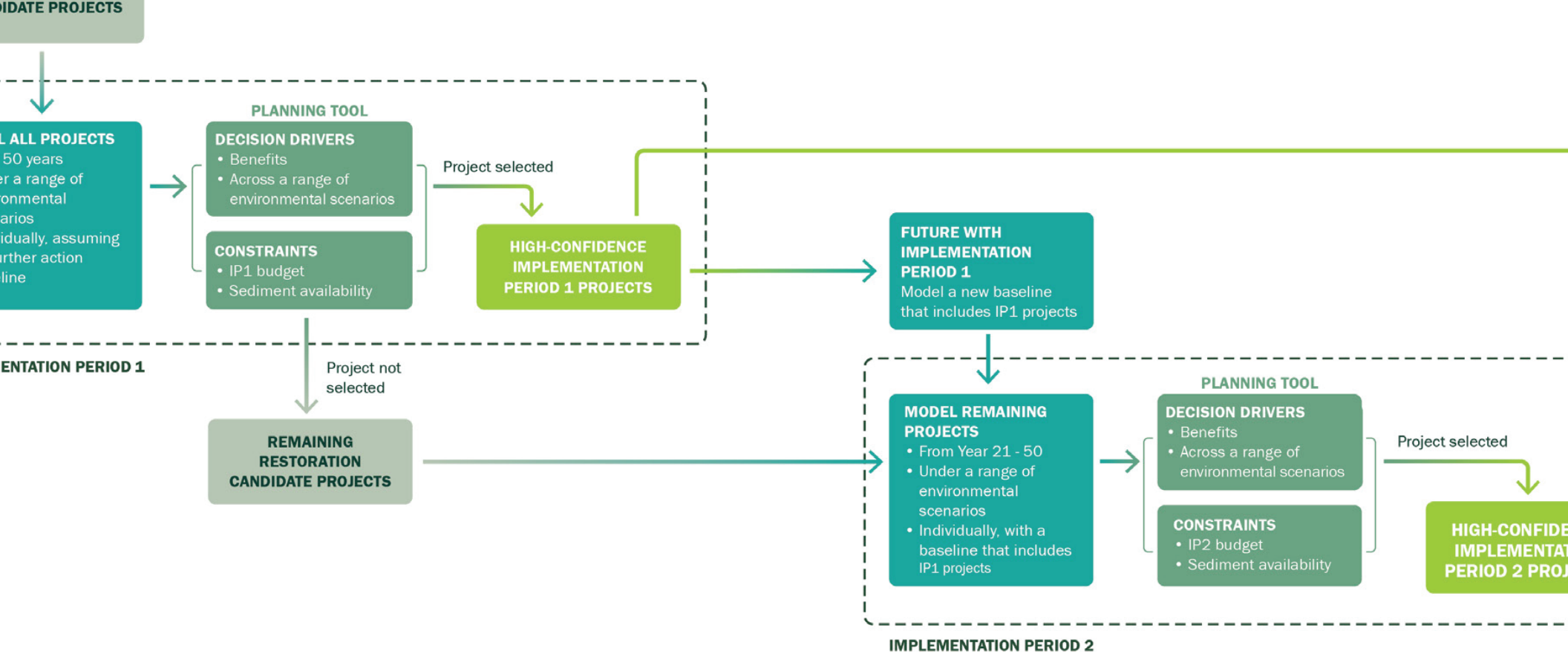

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SEDIMENT BORROW SOURCES

Sediment is an important resource for some types of restoration projects, and cost-effective sources in coastal Louisiana are limited. In previous master plans, each project requiring sediment was associated with a specific borrow area and sediment availability was a constraint. For the 2023 Coastal Master Plan, the Planning Tool was configured to allow an individual project or project element to borrow from more than one source, if cost efficient to do so. Thus, sediment availability is now a factor in the cost of a project and is reflected in the budget constraint, rather than being a separate constraint. For the 2023 analysis, 41 individual sediment sources were defined. For sources that are not within the Mississippi River channel, a single amount of sediment was specified that can be drawn upon until exhausted. For Mississippi River-based sources, sediment is considered renewable.

PROJECT SELECTION

The Planning Tool uses the outputs from the predictive models summarized by 25 geographic areas (or ecoregions) for restoration outcomes and 374 communities for damage reduction outcomes. Each selected project begins accruing engineering and design costs in the first year of IP1. Construction costs are incurred immediately following engineering and design, and operation and maintenance continues through the end of the 50-year planning horizon. For both restoration and risk reduction projects, the procedure first selects projects to implement in IP1. The Planning Tool assumes that these projects are implemented in the first year and that cost (and sediment requirements for restoration projects) for the first 20 years of each project must be met by IP1 funding and sediment sources. For some projects, construction costs and sediment

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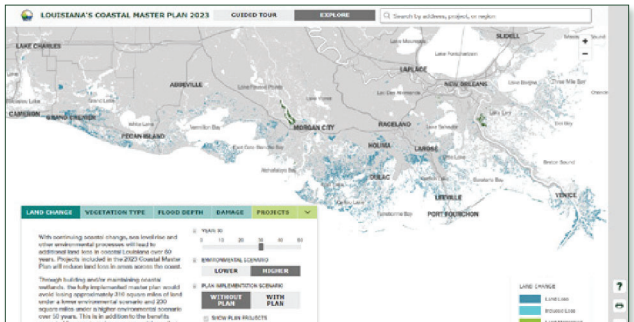
attachments that document the development process and provide details on models, outputs, and other topics. These resources are hosted on the website alongside outreach resources, such as technical webinars and corresponding presentation slides.

The Master Plan Data Viewer was updated, and a Guided Tour feature will help first-time users understand the nature of the coastal crisis and what implementation of this plan would accomplish. An Explore feature allows users to dive deeper into data from across the coast, including maps of the FWOA coast and the effects of the 2023 Coastal Master Plan. New features of the data viewer include a map export function to facilitate easy printing of master plan-related maps and expanded data download capabilities to ensure master plan-generated data is available for researchers and interested audiences.

Print materials were also developed to supplement technical documentation and presentations at outreach meetings. Four different types of fact sheets were developed to provide quick overviews of key master plan information. These fact sheets provide data at levels ranging from the individual project to regional overviews.



FREQUENTLY ASKED QUESTIONS

Which type of project is best at restoring the coast? Different project types perform best in different circumstances. Projects that restore hydrology or increase delivery of freshwater and sediment may perform well where saltwater intrusion and a lack of sediment contributes to land loss. Marsh creation projects do well in fragmented marsh areas; this is accomplished by filling shallow water areas and elevating the marsh surface. In some cases, integrated projects are needed to address multiple issues.

Why does CPRA use the Planning Tool to select restoration projects? If funding were the only constraint, ranking projects based on cost-effectiveness might be a reasonable approach to project selection. However, we recognize that sources of sediment near project sites are limited. The Planning Tool allows both funding and sediment to be considered simultaneously, allowing CPRA to choose robust project sets. It also enables the evaluation of how the master plan may benefit or impact other things that are important to Louisianans, such as habitat creation, navigation, and the working coast.

What are expected annual damages? Our analysis considers storms of different intensity and tracks, and their expected probability of occurring in any one year. The flood depths resulting from those storms change over time as the coast degrades and sea level rise increases water levels. Rather than selecting a single probability of flooding or a single time period, the Planning Tool combines the total damage from all possible flood events considered and the likelihood of each event occurring, or expected annual damages. The change in expected

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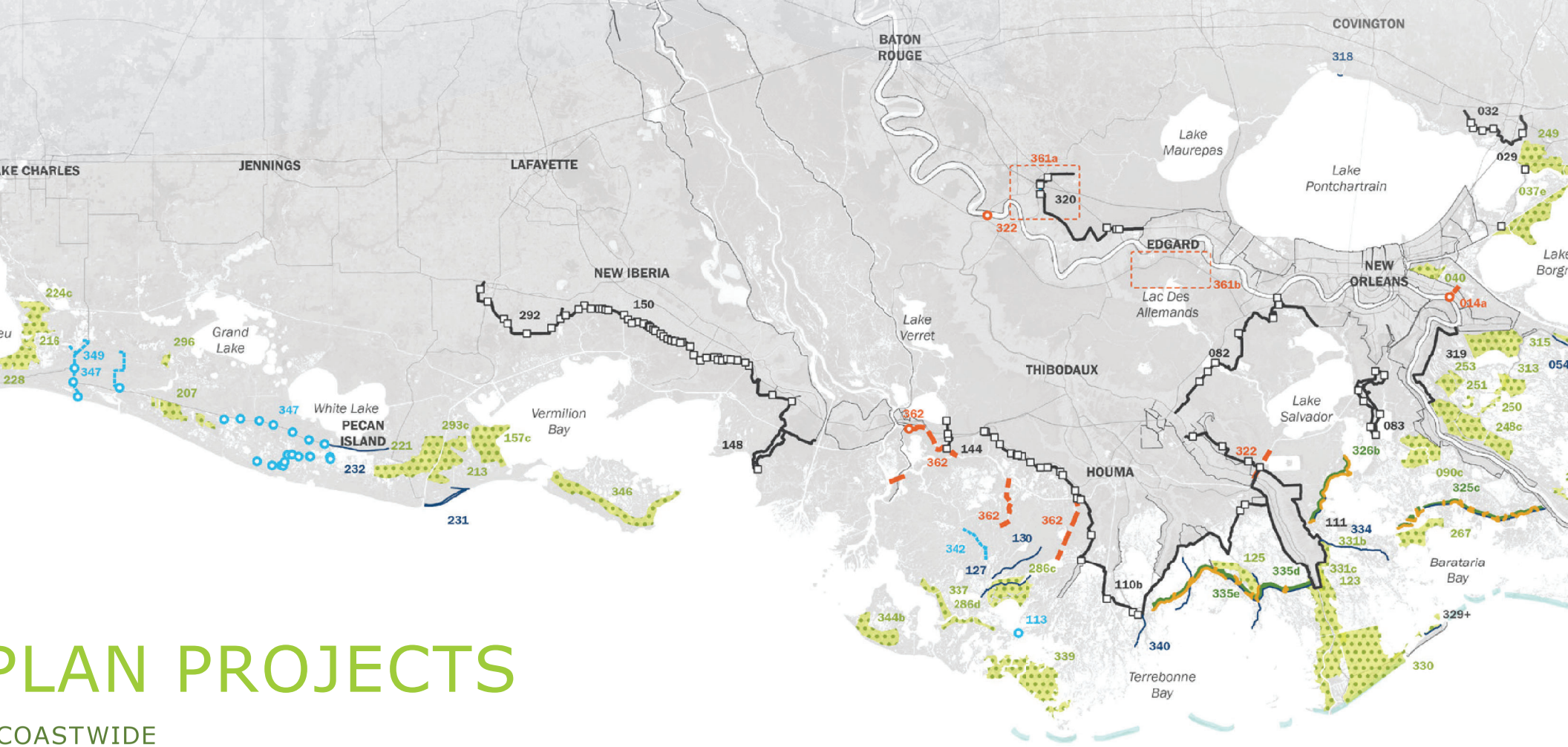

PLAN PROJECTS

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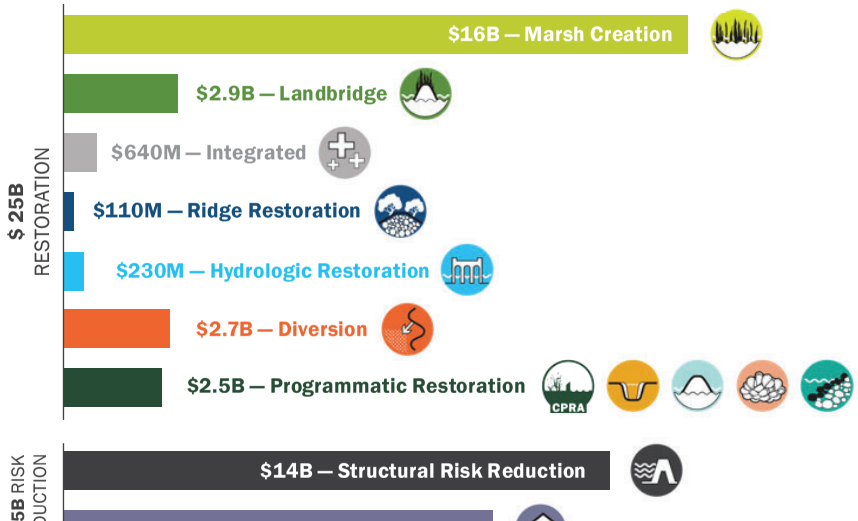
restoration. Additionally, $11.2 billion is allocated to nonstructural risk reduction activities across the coast.

Beyond the projects, the master plan acknowledges that the coastal area is dynamic, and additional adaptation will be required to continue living, working, and playing in coastal Louisiana. The plan alone is not sufficient to respond to all of the challenges the future may bring, but it is a catalyst for coordinating local, state, and federal efforts to help address our coastal land loss crisis and threats from storm surge-based flooding. The plan also highlights the need to continue to pursue the greenhouse gas reductions that are necessary to avoid the most severe impacts of climate change.



PROJECT TYPE	ID#	PROJECT NAME	IP	COST
logic Restoration	347	Mermentau Basin Hydrologic Restoration	1	$ 130M
	349	Cameron-Creole to the Gulf Hydrologic Restoration	1	$ 59M
	207	South Grand Chenier Marsh Creation	1	$ 390M
	210	Mud Lake Marsh Creation	1	$ 330M
	216	Southeast Calcasieu Lake Marsh Creation	2	$ 450M
	218	Cameron Meadows Marsh Creation	1	$ 150M
	221	East Pecan Island Marsh Creation	1	$ 650M
	224c	East Calcasieu Lake Marsh Creation	1	$ 340M
arsh Creation	228	Calcasieu Ship Channel Marsh Creation	1	$ 83M
	293c	Freshwater Bayou North Marsh Creation	1	$ 150M
	296	Little Chenier Marsh Creation	2	$ 51M
	298b	West Brown Lake Marsh Creation - North	2	$ 410M
	298c	West Brown Lake Marsh Creation - South	1	$ 240M
	300b	West Sabine Refuge Marsh Creation	2	$ 640M
	300c	West Sabine Refuge Marsh Creation - Central	1	$ 130M
ge Restoration	232	Pecan Island Ridge Restoration	1	$ 20M
	157c	East Rainey Marsh Creation	1	$ 350M
arsh Creation	213	West Rainey Marsh Creation	1	$ 400M
	344b	Central Coast Marsh Creation - Point Au Fer	1	$ 270M
	346	Marsh Island Barrier Marsh Creation	1	$ 710M
	148	Franklin and Vicinity	2	$ 310M
ructural Risk Reduction	150	Iberia/St. Mary Upland Levee	1	$ 1.7B
	292	Abbeville and Vicinity	2	$ 610M
ge Restoration	231	Cheniere au Tigre Ridge Restoration	1	$ 26M
	113	Central Terrebonne Hydrologic Restoration	1	$ 16M
logic Restoration	342	Western Terrebonne Hydrologic Restoration	1	$ 22M
	335d	Eastern Terrebonne Landbridge - East	1	$ 460M
Landbridge	335e	Eastern Terrebonne Landbridge - West and Central	2	$ 1.0B
	123	Belle Pass-Golden Meadow Marsh Creation	1	$ 1.2B
	125	North Terrebonne Bay Marsh Creation	1	$ 210M
	286c	North Lake Mechant Marsh Creation - East	1	$ 250M
arsh Creation	286d	North Lake Mechant Marsh Creation - West	2	$ 230M
	337	Fourleague Bay - Blue Hammock Bayou Marsh Creation	1	$ 370M
	339	West Terrebonne Marsh Creation Project	1	$ 1.5B
	127	Bayou Decade Ridge Restoration	1	$ 13M
ge Restoration	130	Mauvais Bois Ridge Restoration	1	$ 13M
	340	Lower Bayou Petit Caillou Ridge Restoration	1	$ 3.3M
Diversion	362	Atchafalaya Diversions	1	$ 790M
	110b	Morganza to the Gulf	1	$ 3.9B
ructural Risk Reduction	111	Larose to Golden Meadow	2	$ 500M

BARATARIA

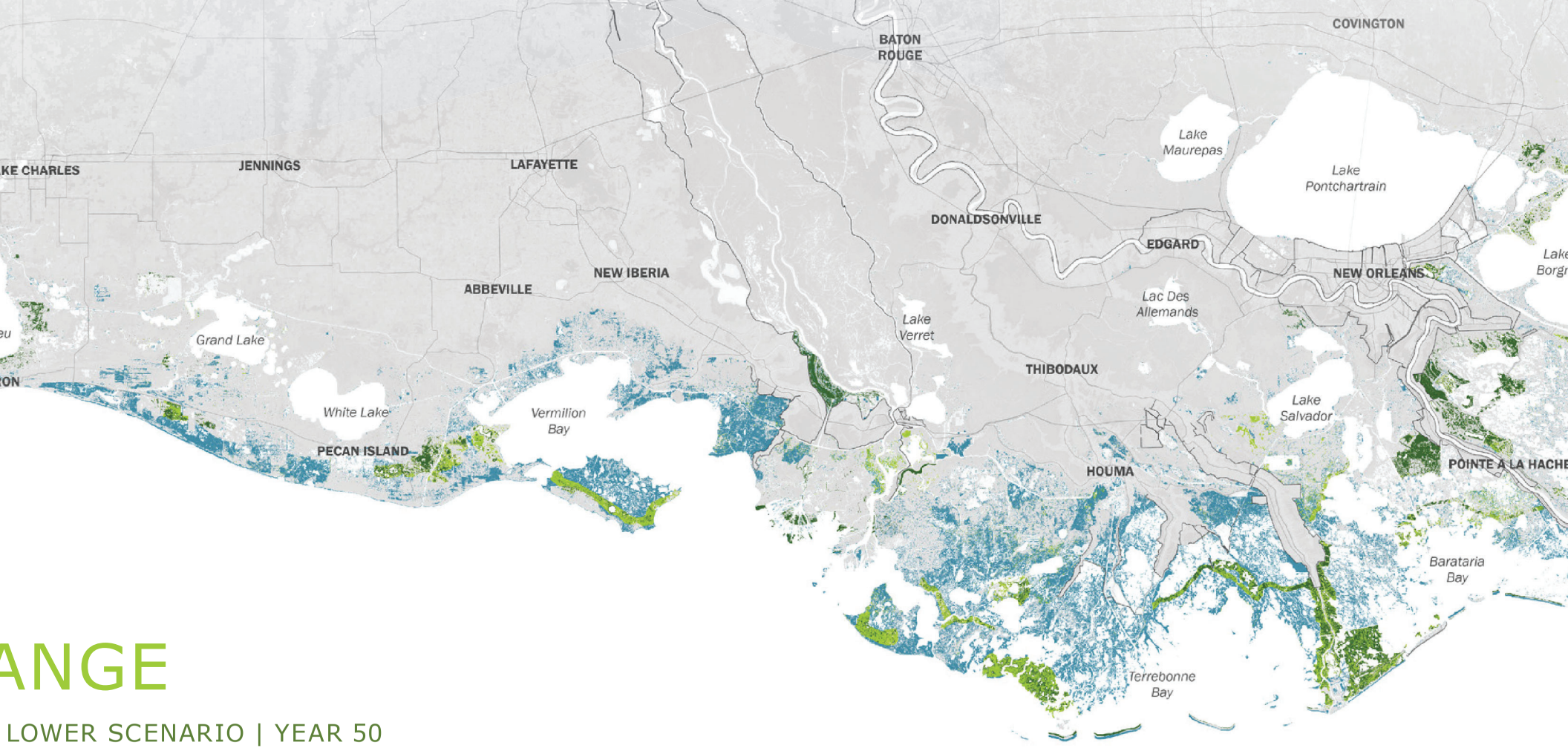
See page 134 for regional project map and project descriptions.

PROJECT TYPE	ID#	PROJECT NAME
Integrated Project	329	Caminada Bay Marsh Creat
Landbridge	325c	Lower Barataria Landbridg
	326b	Mid-Barataria Landbridge -
Marsh Creation	090c	Large-Scale Barataria Mars
	267	North Barataria Bay Marsh
	330	East Bayou Lafourche Mars
	331b	Southeast Golden Meadow M
	331c	Southeast Golden Meadow M
Ridge Restoration	334	Bayou L'Ours Ridge Restora
Diversion	322	Freshwater Delivery to Wes
	361b	Upper Basin Diversion Prog
Structural Risk Reduction	082	Upper Barataria Risk Redu
	083	Lafitte Ring Levee

PONTCHARTRAIN / BRETON

See page 146 for regional project map and project descriptions.

PROJECT TYPE	ID#	PROJECT NAME
Integrated Project	310	Three Mile Pass Marsh Cre Hydrologic Restoration
Marsh Creation	035	Hopedale Marsh Creation
	037e	New Orleans East Marsh Cr
	040	Central Wetlands Marsh Cr
	246	Sunrise Point Marsh Creati
	247	Uhlan Bay Marsh Creation
	248c	Pointe a la Hache and Carli
	249	Fritchie North Marsh Creat
	250	Oak River to Delacroix Mar
	251	Spanish Lake Marsh Creati
	253	Tiger Ridge/Maple Knoll M
	313	West Delacroix Marsh Crea
	314	Belle Pass Island Marsh Cr
	315	North and East Lake Lery M
	316	Chandeleur Sound Island R
Ridge Restoration	054	Bayou LaLoutre Ridge Rest
	318	Tchefuncte River Restorati
Diversion	014a	Central Wetlands Diversion
	361a	Upper Basin Diversion Prog
Structural Risk Reduction	029	Lake Pontchartrain Barrier
	032	Slidell Ring Levees
	319	Braithwaite to White Ditch
	320	St James-Ascension Parish



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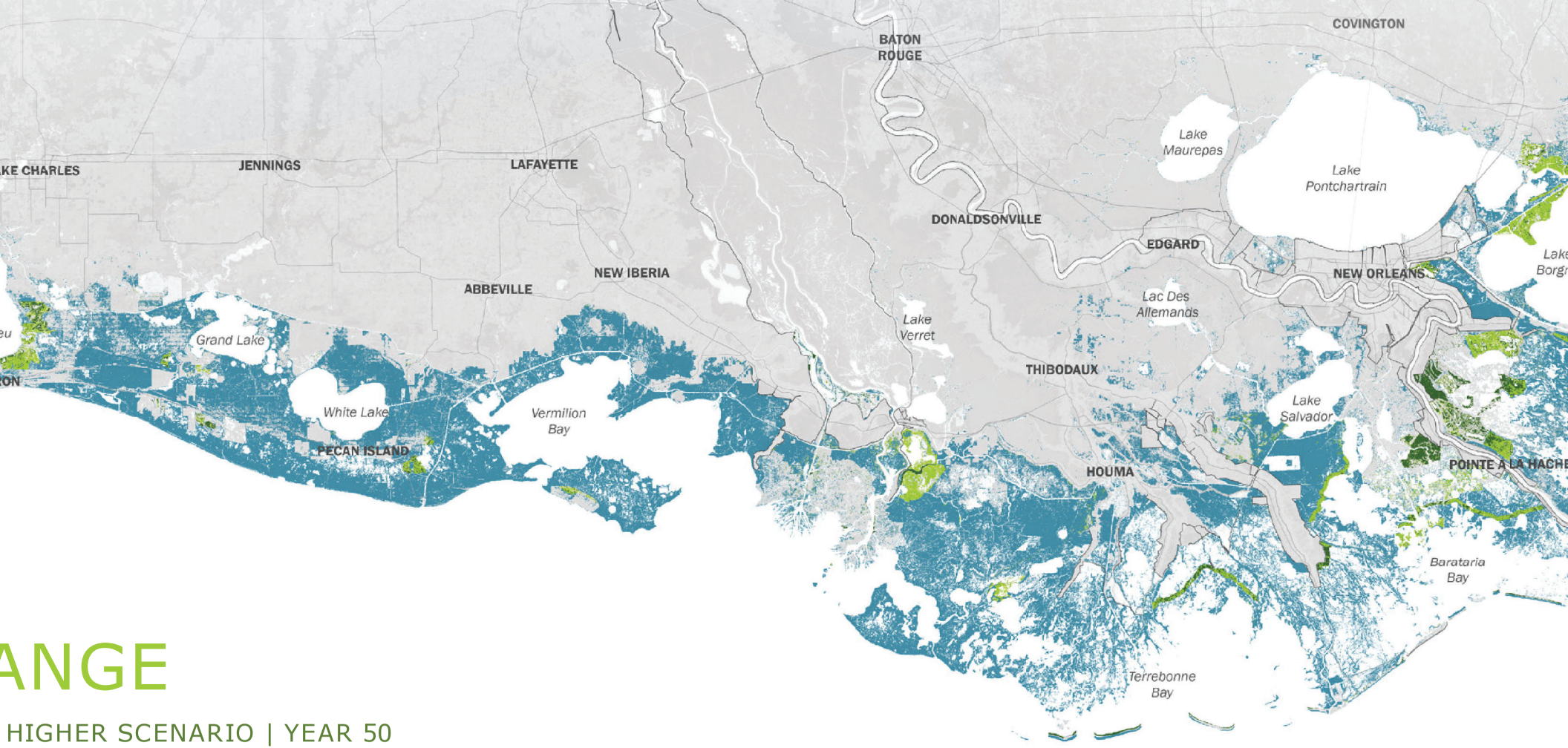
Marsh creation projects in western Terrebonne, on Marsh Island, and near Freshwater Bayou also bolster the land area in the lower estuaries. Landbridges in Barataria and eastern Terrebonne work synergistically with marsh creation projects to maintain land across the mid-basins. This is especially the case in eastern Terrebonne where there is extensive land loss. In the Chenier Plain, loss is reduced where marsh creation and hydrologic restoration projects sustain land that would otherwise be lost.

>>> Go to **Chapter 6: Regional Approach** for



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these areas, many of the marsh creation projects perform well until the later years; so, despite land being lost by Year 50 in many areas, the projects yield substantial benefits throughout much of the 50 years. Landbridges in Barataria and eastern Terrebonne provide continuous land through 50 years. Further west, where subsidence rates are lower, marsh creation in the Calcasieu and Sabine basins provide large areas of continuous wetlands south of the Gulf Intracoastal Waterway (GIWW).

>>> Go to **Chapter 6: Regional Approach** for more information on regional benefits of the

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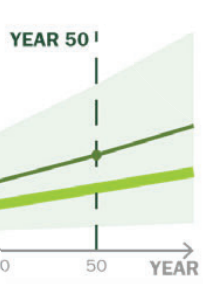

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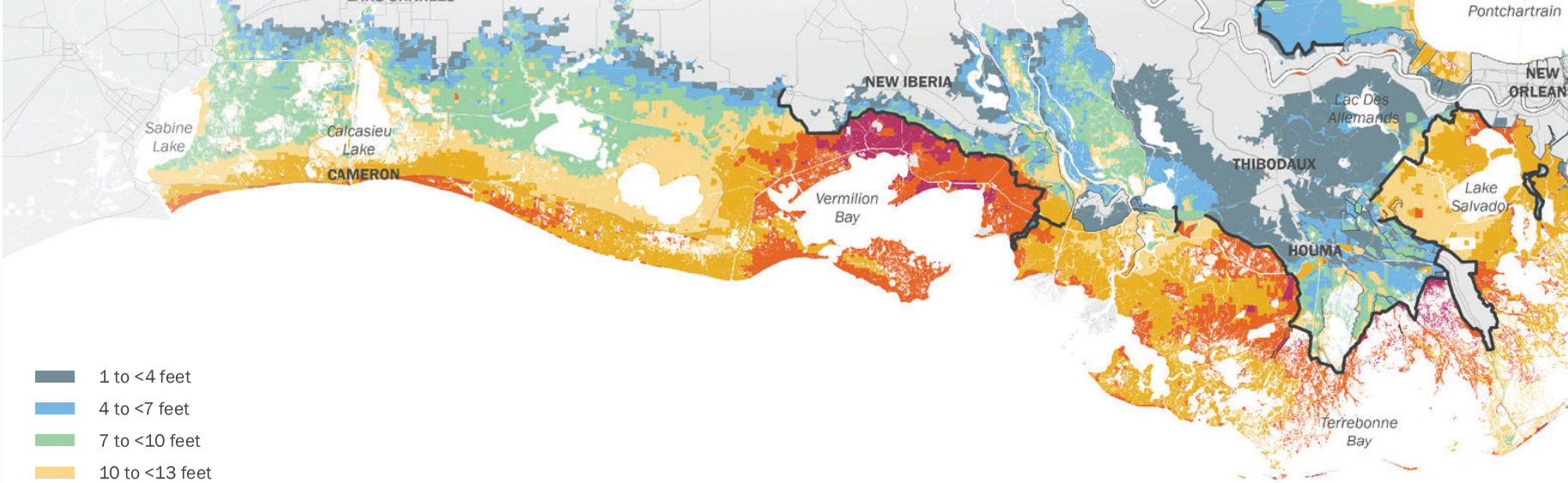
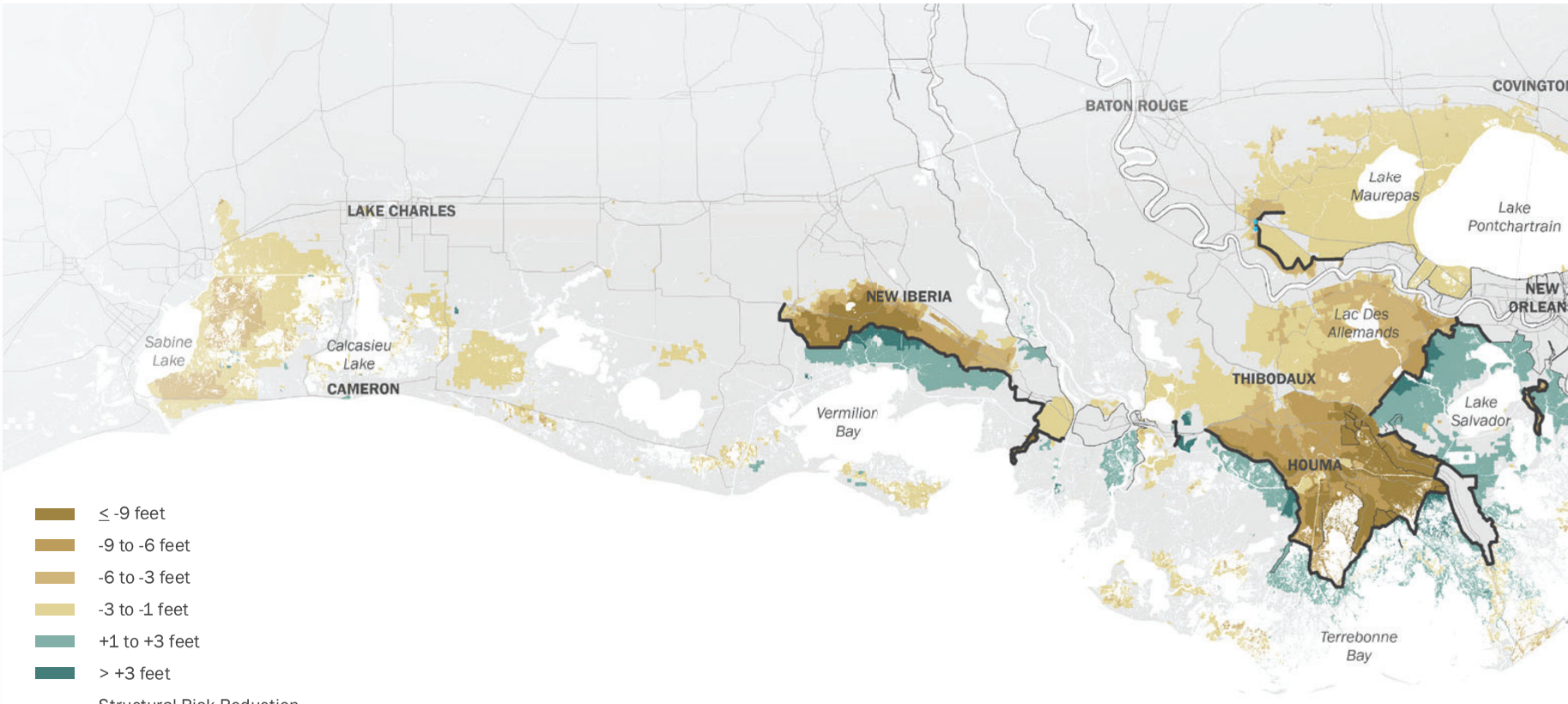


Map 5.4: Flood Depths, 1% Annual Exceedance Probability, Future With Action, Lower Scenario, Year 50.



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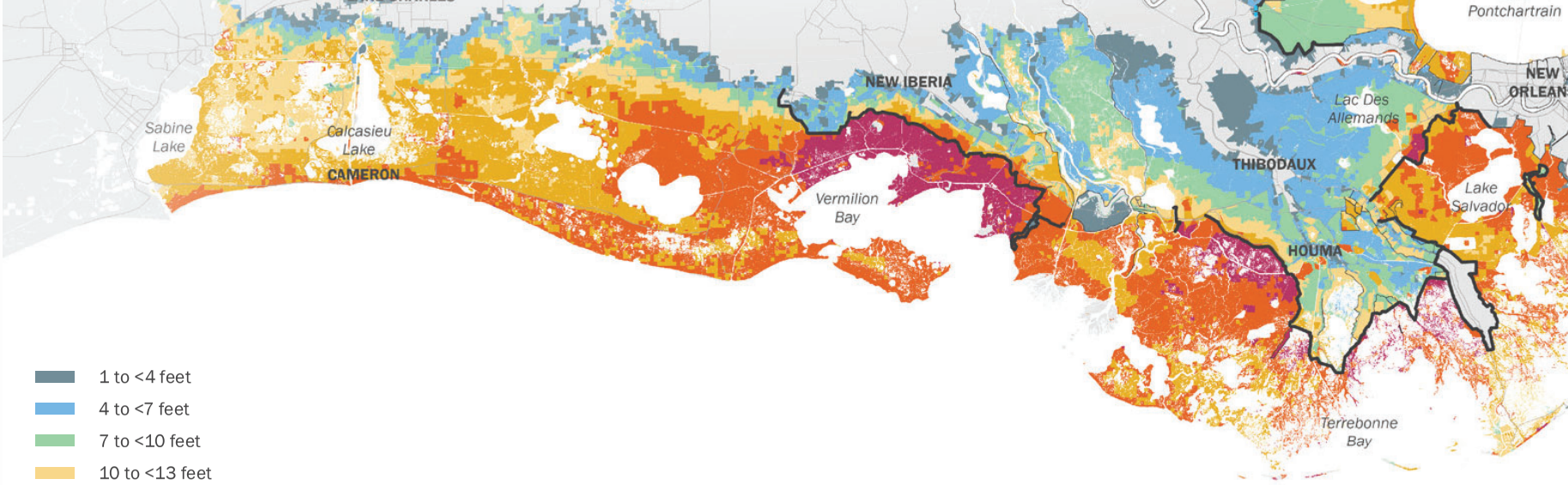
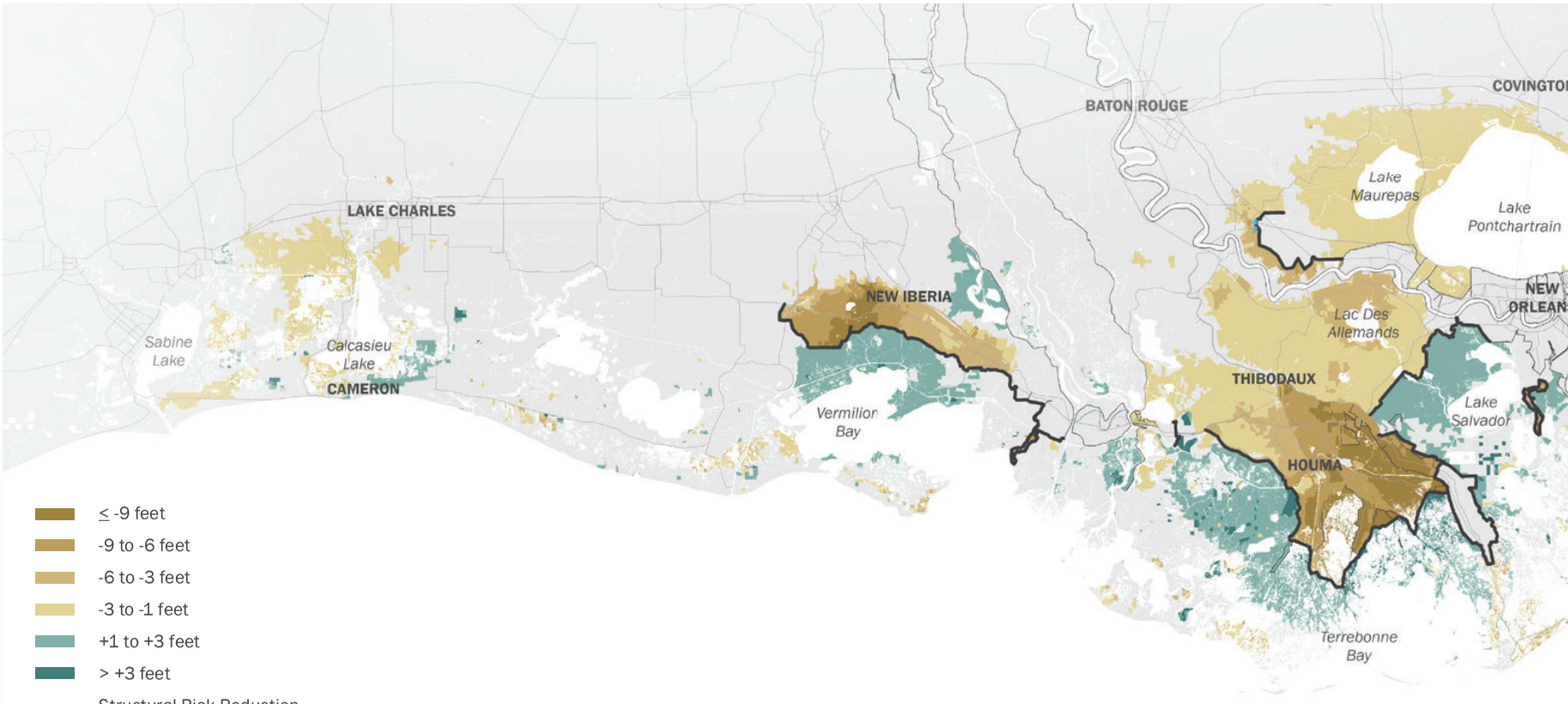


Map 5.6: Flood Depths, 1% Annual Exceedance Probability, Future With Action, Higher Scenario, Year 50.



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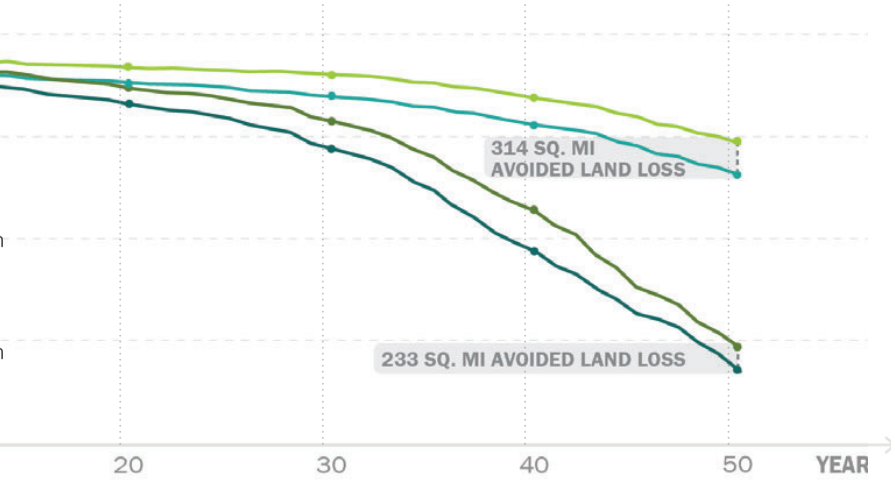
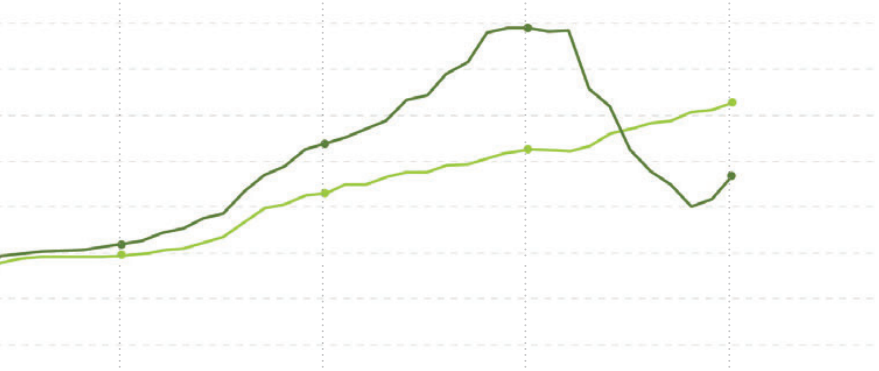


With and Without Action, Higher and Lower Scenario.



RISK AND DAMAGES

The plan identifies 12 structural risk reduction projects. By Year 50, these projects will reduce expected annual damage by $7.7 billion (EADD) under the lower scenarios and $10.7 billion (EADD) under the higher scenario compared to a future without action. The plan also allocates $11.2 billion in nonstructural measures which could further reduce expected annual damage by $3.0 billion (EADD) and $3.8 billion (EADD) under the lower and higher scenarios, respectively.

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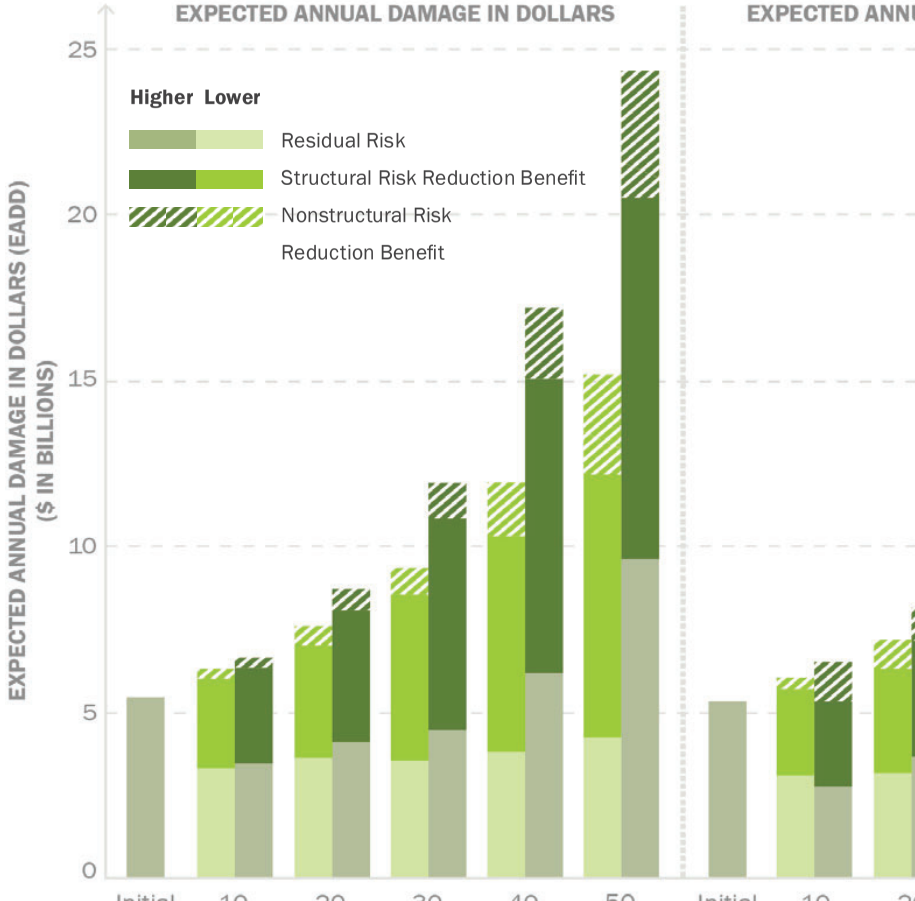

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>>> 2021 marked a monumental federal investment in coastal Louisiana that will benefit residents across the coast as $2.6 billion in funding was allocated to Louisiana to support hurricane risk reduction projects. Through the Extending Government Funding and Delivering Emergency Assistance Act (Supplemental Disaster Relief) and the Infrastructure Investment and Jobs Act (IIJA), USACE dedicated funding to several of CPRA's projects.

Congress provided more than $2 billion for coastal and other flood risk reduction projects in Louisiana to USACE, including the following:

- $783 million for New Orleans to Venice Hurricane Protection
- $453 million for West Shore Lake Pontchartrain
- $163 million for Atchafalaya Basin
- $128 million for Comite River Diversion
- $94.3 million for Southeast Louisiana
- $8 million for Upper Barataria Basin
- $3.8 million for Grand Isle and Vicinity
- $3.5 million for Bayou Segnette Waterway
- $3 million for Tangipahoa Parish

Congress provided more than $643 million in IIJA funding to USACE for 21 coastal and water management projects, including the following:

- $379 million for Morganza to the Gulf
- $125 million for Southwest Coastal
- $52.9 million for Atchafalaya Basin

DEEPWATER HORIZON RELATED FUNDING SOURCES

The RESTORE Act, signed into law on July 6, 2012, created the Gulf Coast Ecosystem Restoration Council (RESTORE Council). The Council's Gulf Coast Restoration Trust Fund (RESTORE Trust Fund) receives 80% of the Deepwater Horizon Oil Spill Clean Water Act civil penalties for purposes of restoring the long-term health of the natural ecosystems and economy of the Gulf Coast region. These funds are distributed over 15 years, ending on April 4, 2031. Louisiana's share will total more than $841 million, including $29 million for the Louisiana RESTORE Act Center of Excellence.

Under its approved RESTORE Plan, the state committed to funding two projects (Calcasieu-Sabine Large-Scale Marsh and Hydrologic Restoration project and the Houma Navigation Canal Lock Complex) and two programs (Adaptive Management Program and Parish Matching Fund Program) for a total of approximately $811.9 million, including contingency funds of approximately $26.4 million.

CPRA also has the opportunity to submit projects for funding under the Council-Selected Restoration Component. To date, funding has been received to support work on five projects totaling $182 million.

The NFWF Gulf Environmental Benefit Fund (GEBF) was established in early 2013 as an outcome of plea agreements for the Deepwater Horizon Oil Spill. Over five years, $2.54 billion was directed to NFWF to support projects that remedy harm to natural resources that were affected by the spill. In Louisiana, the funds must be allocated solely to barrier island restoration projects and river diversion projects along the Mississippi and Atchafalaya Rivers. From 2013 through 2018, GEBF

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IMPLEMENTING NONSTRUCTURAL RISK REDUCTION PROJECTS

Nonstructural risk reduction projects are unique in the master plan process in that they are typically smaller scaled projects – from floodproofing individual businesses to elevating multiple homes along a single road or even the voluntary acquisition of several residential properties in a neighborhood or community with particularly high flood risk. The nature of these projects, which require active participation of individuals and communities, means that pre-selecting a location for a particular project is exceedingly difficult. In practice, many individuals and communities have undertaken these mitigation measures following a storm event where their homes were damaged. Ideally, nonstructural risk reduction strategies should be implemented proactively, before damage occurs.

Additionally, because nonstructural projects are effective against many types of flooding (such as heavy rainfall and high tide flooding events) and not just the storm surge-based flooding that is considered in the master plan, they could potentially be funded by sources that do not typically provide funding for coastal projects. Nonstructural projects are also unique in that CPRA has not traditionally been involved in the implementation of these project types. One exception is the USACE Southwest Coastal Louisiana project. In October 2022, the project secured $296 million, mostly from the IIJA. To date, more than 3,900 structures have been preliminarily identified as eligible for either elevation or floodproofing measures. USACE is currently working with CPRA to execute a Project Partnership Agreement before proceeding to elevate homes that have been cleared for construction.

State agencies, such as the Office of Community Development (OCD) and the Governor's Office of Homeland Security and Preparedness (GOHSEP), are experienced in working with federal partners, such as the Department of Housing and Urban Development (HUD) and FEMA, to marshal funding and manage nonstructural project implementation. These agencies also have a role

Image: Elevated Home in Montegut, 2023 (CPRA)

Coastal communities are expected to face continuing sea level rise and subsidence into the future and rising water levels will continue to impact residents' way of life. Even if a community does not experience storm surge-based flooding, changing environmental conditions are expected to result in a number of challenges with roads flooding more frequently, rain draining more slowly, and events where a south wind can result in the closure of structures originally designed to prevent flooding from storm surge. As residents consider these and other challenges, some communities may consider moving inland. This is called managed retreat and is the proactive movement of people, structures, and infrastructure out of harm's way before conditions become unlivable. Managed retreat helps communities move away from vulnerable coastal areas and facilitates their transition inland. It involves more than just acquisition of homes and people moving away from harm – it ensures that the community has somewhere

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UMBERS

3 COASTAL MASTER PLAN

70 MILES OF BANK STABILIZATION
The length of all bank stabilization work proposed in the master plan.

360 MILES OF STRUCTURAL RISK REDUCTION
The length of all structural risk reduction efforts proposed in the master plan including levees, walls, and gates.

MILES OF RIDGE ORATION
ngth of all ridge ation efforts proposed master plan.

AVOIDED LAND LOSS
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233
QUARE MILES
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AVOIDED ANNUAL DAMAGES IN DOLLARS
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AVOIDED ANNUAL STRUCTURAL DAMAGES
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FREQUENTLY ASKED QUESTIONS

What if we don't have the funding to build all the projects in the master plan? The master plan is developed to provide a list that has more projects than the state currently has funding to implement. Funding for restoration and risk reduction projects comes from various sources and is often required to be used for certain project types or to meet particular goals. Because of this, the plan identifies a variety of worthy projects in anticipation of future funding opportunities. Additionally, the master plan is not an all-or-nothing undertaking. Each project is evaluated and selected based on its individual benefits before being modeled as part of the full master plan. This means that all investments toward project implementation, no matter the number or location, will provide benefits in terms of reducing land loss and/or flood risk.

Why is there still damage from storms if so much is spent on risk reduction projects? The project selection for risk reduction projects was based on maximizing the amount of flood risk reduction that could be attained across a wide range of storm surge events in coastal Louisiana. The structural risk reduction projects are designed to provide protection up to a given design event, often the 1% AEP flood depths. However, some storms and extreme events produce greater flood depths than these design elevations, possibly resulting in overtopping of levees and floodwalls. This means there will be some residual risk of damage from large events. It is simply not possible to protect every community from every possible eventuality.

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each of the regions. These conversations informed every step of the process from the development of project concepts to the analysis that informed the regionally-specific storylines in this chapter.

Through a better understanding of the unique concerns of each region, the 2023 Coastal Master Plan developed tailored approaches to address issues of future land loss and storm surge-based flood risk. The result is a master plan that better reflects the experiences of coastal residents and that supports those that live, work, and play in coastal

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PLAIN

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caverns that can hold up to 220.4 million barrels of oil. Agricultural communities also contribute to the region's economy with significant production of rice, crawfish, and cattle. According to 2019 data from the LSU AgCenter, 35% of Louisiana's total rice and crawfish acreage is located within the parishes that comprise the Chenier Plain region.

The Chenier Plain has suffered greatly from the impacts of hurricanes over the last two decades. In 2005, Hurricane Rita made landfall in Johnson Bayou with an 18 ft storm surge that flooded or destroyed most of the structures in Cameron, Holly Beach, Hackberry, Creole, Johnson Bayou, Grand Chenier, and Pecan Island. Three years later, Hurricane Ike brought a 22 ft storm surge that flooded many of these same communities. In August 2020, Hurricane Laura brought catastrophic flooding to many parts of Cameron Parish, including flood depths greater than 12 ft around the communities of Creole and Grand Chenier, and devastating winds throughout the Chenier Plain, including Lake Charles. Recovery efforts were delayed and damages were experienced again by Hurricane Delta that arrived just a month later. Today, many residents in the region are still struggling to recover. These recent hurricanes have brought renewed interest in structural risk reduction measures for the Chenier Plain. CPRA will help local

Image: Harvesting crawfish (Burt Tietje)

entities develop and evaluate structural measures using the tools developed for the master plan. In the near-term, communities and residents should take advantage of nonstructural and disaster recovery programs to mitigate and rebuild in resilient ways.

The Southwest Coastal Louisiana Study is the first federally authorized feasibility-level study with the dual purpose of addressing hurricane and storm damage risk reduction and restoring the coastal ecosystem. The project was authorized by Congress in 2016 and $296 million was appropriated through the 2022 IIJA. More information about Southwest Coastal can be found in Chapter 7.

The 2023 Coastal Master Plan proposes a number of marsh creation and hydrologic restoration projects for the region. The Chenier Plain's hydrology is highly managed with numerous major water control structures like locks and flap-gated culverts, as

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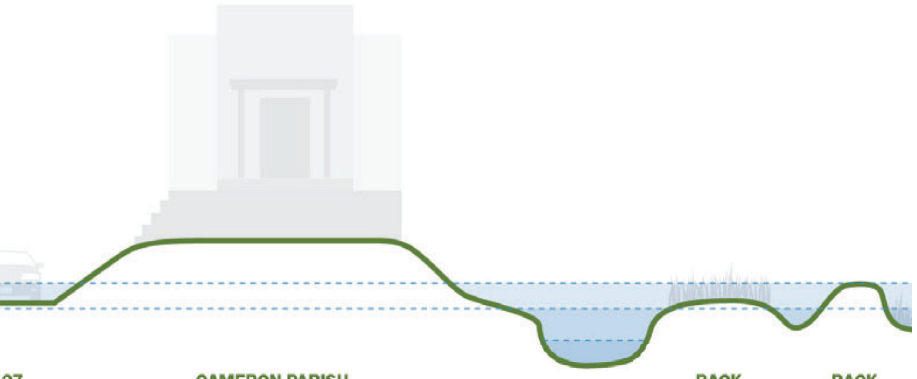
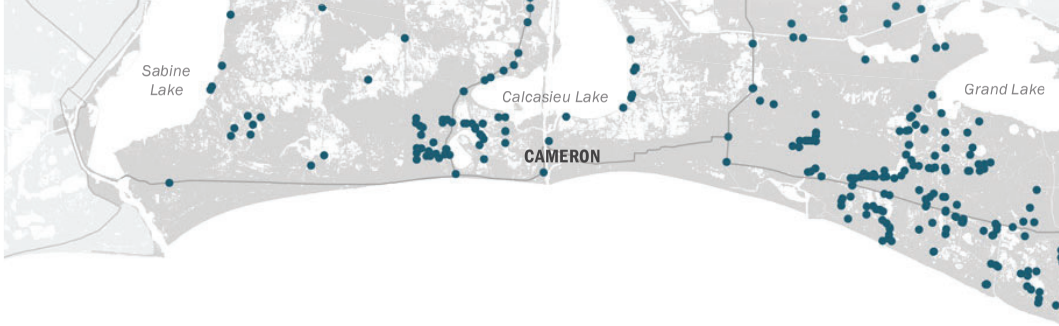
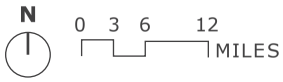
Image: Town of Cameron, Louisiana
(Louisiana Sea Grant College Program)

Image: Crabbing at Rockefeller Wildlife Refuge
(Louisiana Sea Grant College Program)







Map 6.2: Existing Hydraulic Control Structures
Identified throughout the Chenier Plain.

Image: Cameron-Creole Hydrologic Control Structure, 2022 (CPRA)

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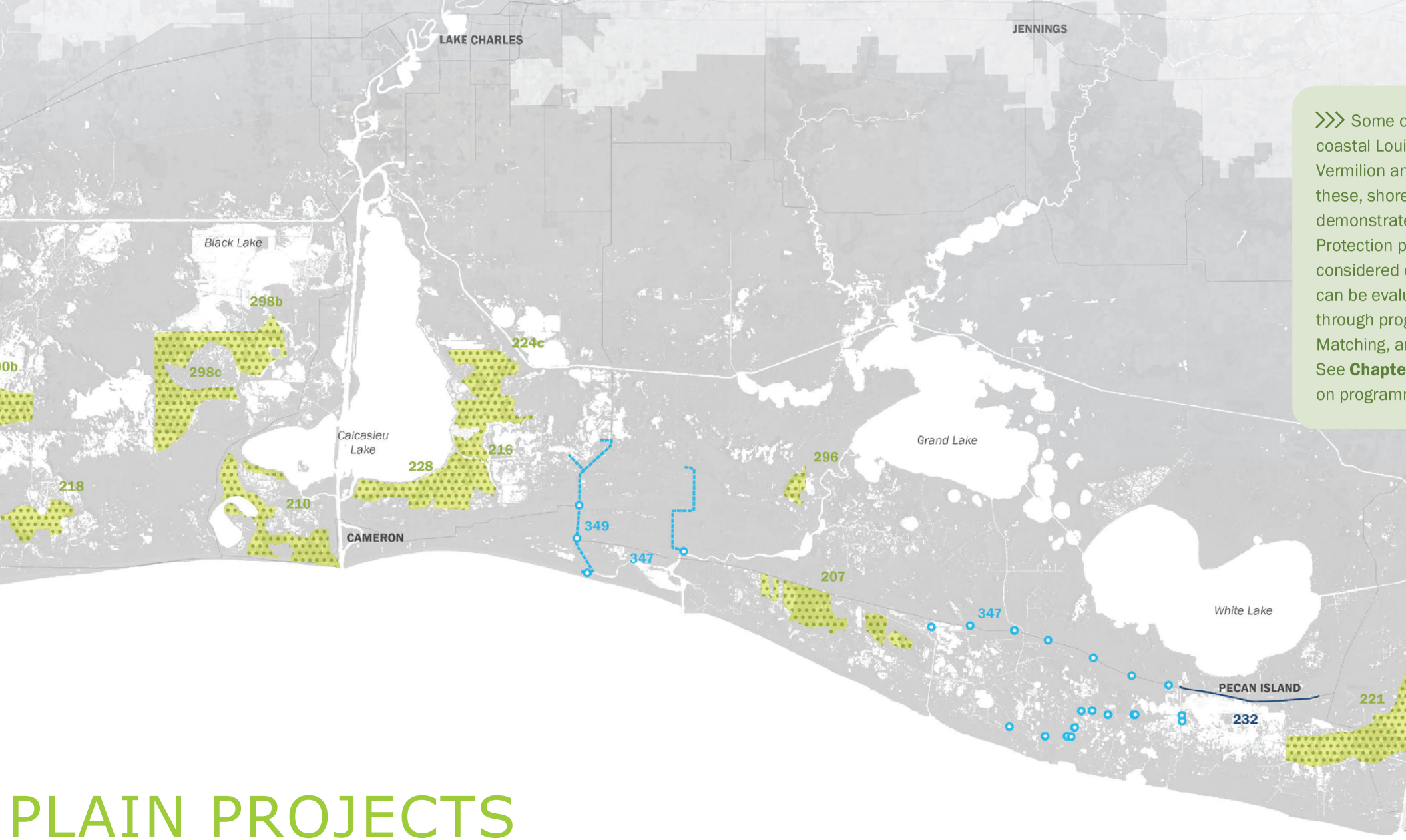

PLAIN PROJECTS

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strengthening the shoreline of Calcasieu Lake and other important regional water bodies. Large-scale hydrologic restoration projects were also selected for the region. These projects were designed, with input from our advisory groups, to provide improved drainage in both the upper Mermentau Basin and the Cameron Creole Watershed

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Opportunities for structural risk reduction measures vary across the coast, yet all regions face storm surge-based flood risk. For the 2023 Coastal Master Plan, $11B has been allocated to nonstructural risk reduction strategies, including in the Chenier Plain region. For more information on nonstructural risk reduction

Map 6.3: Ch

o. Kings Bayou: Channel dredging and cleanout in Little Chenier Canal and Kings Bayou as well as ree road crossings and increasing capacity at the Kings Bayou Control Structures with 15 60-inch lverts to increase drainage to the Mermentau River. Rockefeller: 105 60-inch flap gated culverts ay 82 and 120 60-inch flap gated culverts on the south and west boundaries of the Rockefeller t area to move water south across Highway 82.	1	$ 130M
storation increasing the capacity for drainage from the Cameron-Creole Watershed to the Gulf rough Creole Canal. Dredging and cleanout of Creole Canal; increasing cross-section at two road nstruction of a receiving pond in the western end of the Mermentau River; installing a 750 cfs pump the receiving pond to the Gulf to maintain the receiving pond stage at mean low water.	1	$ 59M
marsh within a footprint of approximately 6,900 acres south of Highway 82 near Grand Chenier to wetland habitat and restore degraded marsh.	1	$ 390M
marsh within a footprint of approximately 8,100 acres at Mud Lake south of West Cove Calcasieu Lake w wetland habitat, restore degraded marsh, and reduce wave erosion.	1	$ 330M
marsh within a footprint of approximately 9,200 acres southeast of Calcasieu Lake to create new tat, restore degraded marsh, and reduce wave erosion.	2	$ 450M
arsh within a footprint of approximately 3,700 acres at Cameron Meadows north of Johnson Bayou to etland habitat, restore degraded marsh, and reduce wave erosion.	1	$ 150M
marsh within a footprint of approximately 12,000 acres of the eastern portion of marsh between and the west bank of the Freshwater Bayou Canal to create new wetland habitat, restore degraded educe wave erosion.	1	$ 650M
marsh in the western portion of marsh in the eastern Cameron-Creole watershed to create new tat, restore degraded marsh, and reduce wave erosion.	1	$ 340M
marsh within a footprint of approximately 3,200 acres south of Calcasieu Lake near Cameron to wetland habitat, restore degraded marsh, and reduce wave erosion.	1	$ 83M
marsh in the northern portion in Vermilion Parish west of Freshwater Bayou to create new wetland ore degraded marsh, and reduce wave erosion.	1	$ 150M
marsh within a footprint of approximately 1,100 acres in Cameron Parish south of Grand Lake to wetland habitat, restore degraded marsh, and reduce wave erosion.	2	$ 51M
marsh in the eastern portion of marsh in Cameron Parish south of Black Lake to create new wetland ore degraded marsh, and reduce wave erosion.	2	$ 410M
marsh in the eastern portion of marsh in Cameron Parish south of Black Lake to create new wetland ore degraded marsh, and reduce wave erosion.	1	$ 240M
marsh in the western portion of marsh in Cameron Parish east of Sabine Lake to create new wetland ore degraded marsh, and reduce wave erosion.	2	$ 640M
marsh in the western portion of marsh in Cameron Parish east of Sabine Lake to create new wetland ore degraded marsh, and reduce wave erosion.	1	$ 130M
f approximately 44,000 feet of historic ridge in Pecan Island to provide coastal upland habitat, restore logy, and provide wave and storm surge attenuation.	1	$ 20M

Image: Cameron Meadows Restoration Project, 2020 (CPRA)

HYDROLOGIC RESTORATION PROJECTS

The Chenier Plain Regional Workgroup proposed several candidate projects to address persistent marsh flooding and lack of drainage. The Mermentau Basin Hydrologic Restoration and Cameron-Creole to the Gulf Hydrologic Restoration projects were selected for inclusion in IP1 of the 2023 Coastal Master Plan.

The Mermentau project moves water, by way of gravity drainage, southward across Highway 82 into the tidally connected canals throughout the Rockefeller National Wildlife Refuge, and the Cameron-Creole project reduces water levels by maintaining constant (via downstream pumps) mean low tide levels in the Creole Canal, allowing the Cameron-Creole system to efficiently gravity drain to the canal at all times. Combined, these projects relieve pressure on the Mermentau River allowing for more efficient drainage through existing waterways. This results in reduced water levels throughout the southern Mermentau and Cameron-Creole watersheds and healthier, more

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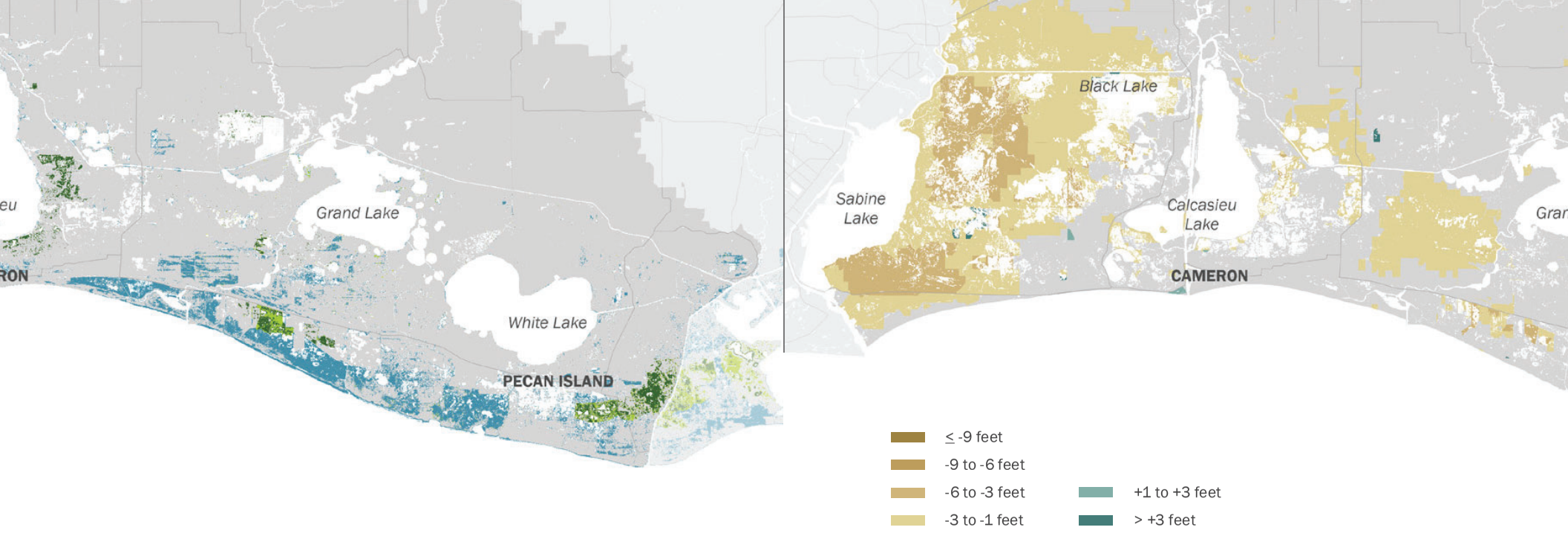

ith Action, Lower Scenario, Year 50.

Map 6.5: Chenier Plain, Flood Depths Difference between FWA and FWOA, 1% Annual Exceedance Probability, Lower Scenario, Year 50.

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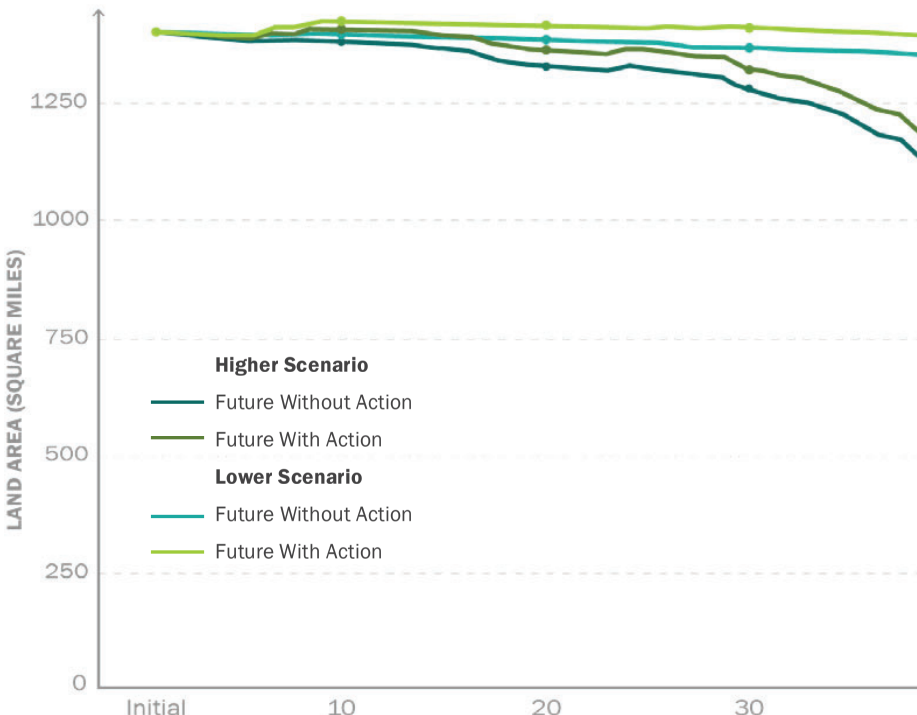
There were no structural risk reduction projects proposed in the Chenier Plain. The selected restoration projects do have an impact in attenuating storm surge and reducing risk. With the restoration projects on the landscape, the models show a reduction in risk. There is, of course, significant residual risk across the Chenier Plain, which illustrates the need for nonstructural risk reduction projects.



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Chitimacha Tribe is the only tribe in Louisiana to still occupy a portion of their original homeland, which once encompassed the entire Atchafalaya Basin, lands westward toward Lafayette, southward to the Gulf, and eastward to the New Orleans area.

The landscape of the Central Coast is shaped by the Atchafalaya River, which branches off the Mississippi River and carries up to 30% of its flow below the Old River Control Structure. Because of the proximity to the Gulf and the influence of the Atchafalaya River, the ecosystems in this region are diverse, from freshwater swamps to saline marshes. The region includes the Atchafalaya Delta Wildlife Management Area, the Marsh Island and Rainey State Wildlife Refuges, the Bayou Teche National Wildlife Refuge, and the National Audubon Society's 26,000 acre Paul J Rainey Wildlife Sanctuary. The Central Coast is one area of the state that is building land through active growth of the Atchafalaya River and the Wax Lake deltas, supporting a growing research economy around the study of natural and constructed river diversions.

The Central Coast region is widely recognized for its fresh seafood, bountiful agriculture, and beautiful and useful waterways. Important ports include the Port of Morgan City, Port of Iberia, and the Port of West St. Mary, which utilize local waterways and

Image: Sugarcane production in coastal Louisiana (Lindsey Janies)

their proximity to the GIWW and the Gulf. Intracoastal City is a hub for the local shrimp and pogie fleets on the GIWW near Vermilion Bay, and consistently ranks among the top six seafood ports in the country. Vermilion, Iberia, Lafayette, and St. Mary parishes among the top producing parishes for sugarcane in the state. Four of Louisiana's 11 operating raw sugar factories are located in the region in communities along Bayou Teche. Vermilion is also historically among the top producing parishes for rice. The region also boasts a thriving cultural and ecotourism industry, welcoming visitors drawing to the area's unique landscape and rich cultural heritage.

Despite these assets, the Central Coast faces challenges. The region's agriculture is, in many areas, impacted by subsidence and sea level rise, which make draining agricultural impoundments more difficult. This is expected to be more of a challenge with accelerating rates of sea level rise in the future. The region has also

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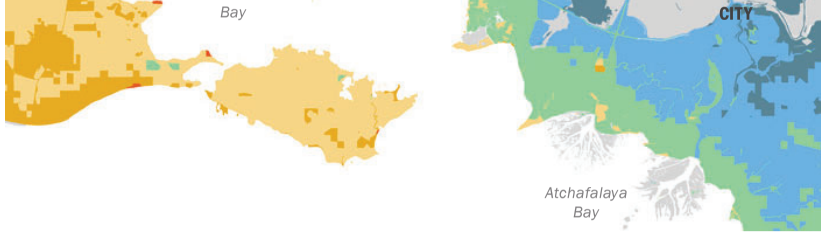
Image: Delcambre Shrimp Festival (Louisiana Sea Grant College Program)



Map 6.6: Hypothetical Hurricane Rita Impacts on Initial Conditions Landscape, Lower Scenario.

Map 6.7: Hypothetical Hur
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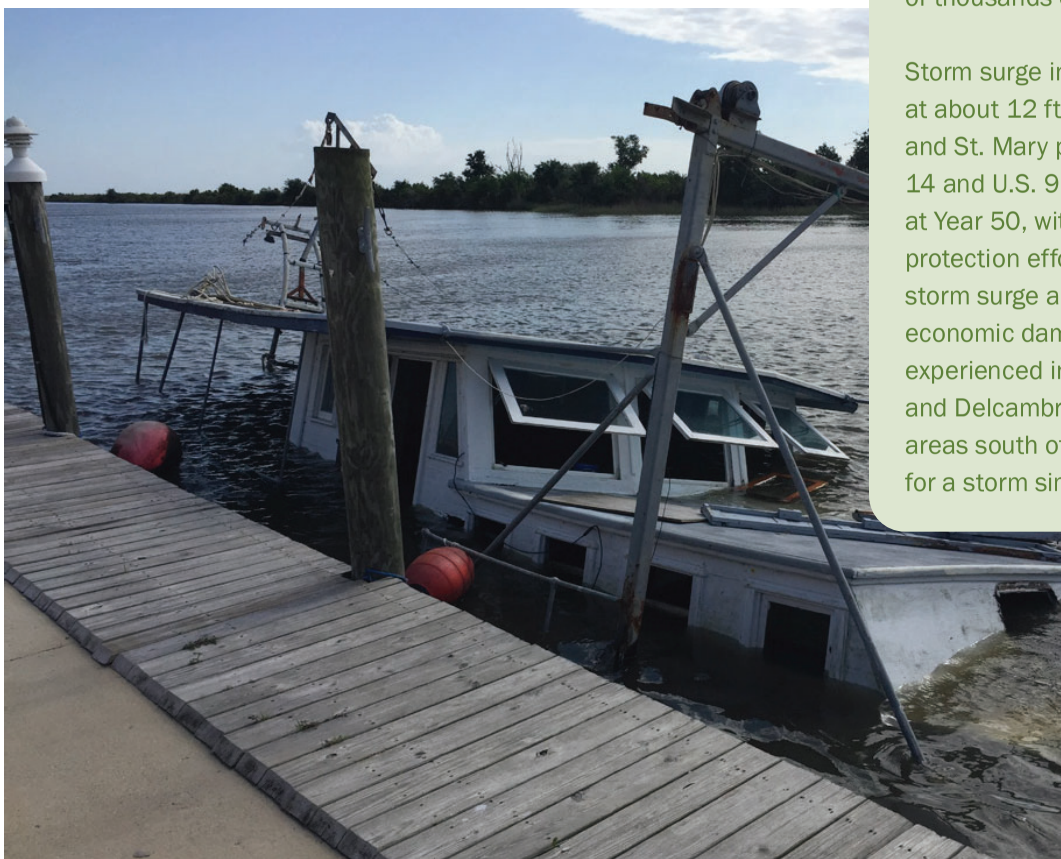

basins; however, it is a distinctive river swamp system with unique goals and solutions for restoration and enhancement. The Atchafalaya Basin Program, which is administered by CPRA, has been established to help meet these specific challenges. See **Chapter 7: Beyond the Master Plan** for more.

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COAST PROJECTS

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to focus on regional priorities, such as maintaining regionally important landforms. Structural risk reduction projects were also selected for the region that, in conjunction with nonstructural risk reduction measures, would reduce risk and damages from storm surge-based flooding in communities across the Central Coast.

Structural Risk Reduction
Ridge Restoration
Marsh Creation

Map 6.8: Central Coast 2023 Coastal Master Plan Projects.

marsh within a footprint of approximately 10,000 acres at Rainey Marsh near the southeast bank of er Bayou Canal to create new wetland habitat, restore degraded marsh, and reduce wave erosion.	1	$ 400M
marsh within a footprint of approximately 8,200 acres on Point Au Fer Island to create new wetland ore degraded marsh, and reduce wave erosion.	1	$ 270M
marsh within a footprint of approximately 16,000 acres on Marsh Island to create new wetland ore degraded marsh, and reduce wave erosion.	1	$ 710M
of approximately 78,000 feet of Bill and Cheniere au Tigre Ridges to an elevation of 5 feet NAVD88 to tal upland habitat, restore natural hydrology, and provide wave and storm surge attenuation.	1	$ 26M
s of a levee to an elevation between 12 and 18 feet NAVD88 from the Wax Lake Outlet to the Charenton as the Bayou Sale polder. Project features approximately 210,000 feet of earthen levee, approximately T-wall, a 30-foot roller gate and two sluice gates.	2	$ 310M
of a levee to an elevation between 15.5 to 20 feet NAVD88 in Iberia and St. Mary parishes between re Canal and the Charenton Canal. Project features approximately 150,000 feet of earthen levee, y 15,000 feet of T-wall, five 30-foot barge gates, three 110-foot barge gates, four 40-foot roller gates, es and seven pump stations.	1	$ 1.7B
of a levee to an elevation between 15.5 and 20 feet NAVD88 in the area south of Delcambre, Erath, and ghly following Highway 330. Project features approximately 100,000 feet of earthen levee, approximately T-wall, two 56-foot barge gates, two 20-foot stop log gates, two 30-foot stop log gates, and a sluice gate.	2	$ 610M

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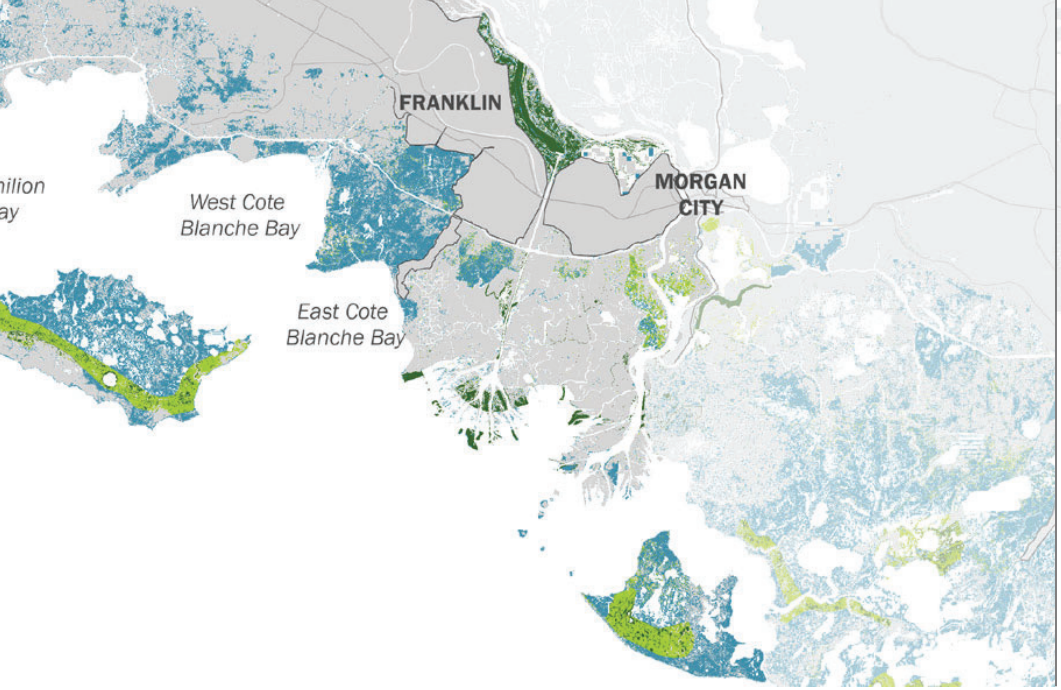
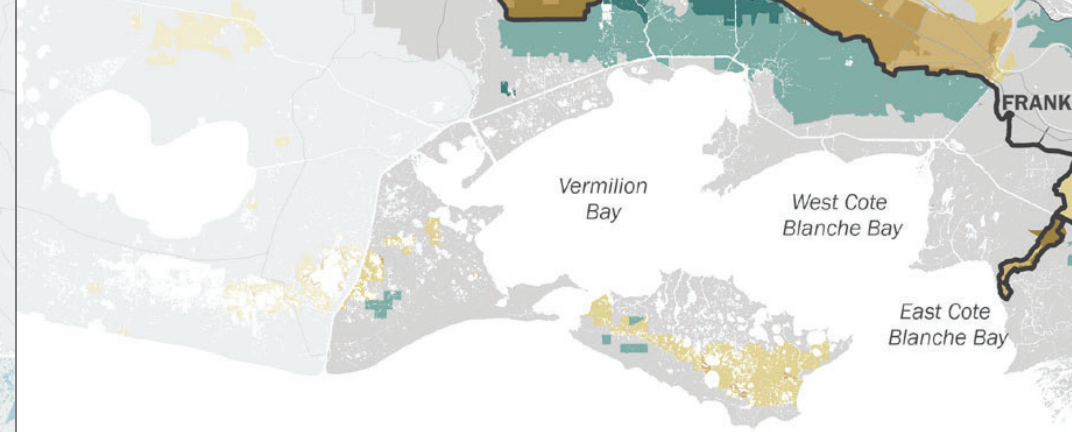
MARSH CREATION PROJECTS

Starting in 2018, CPRA established Regional Workgroups to consider regional issues and to help develop new project concepts and refine past project ideas. Regional Workgroup members were asked to consider how to restore lost areas, take into account projections of land change and hydrologic conditions, and identify the key landscape features to maintain and protect. Workgroup members continually emphasized the importance of maintaining Marsh Island and Point au Fer as barriers between the Gulf and the region's population centers, recommending that we refine past master plan projects in the area to focus on east-west alignments. Both projects were evaluated and ultimately selected for the plan.





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Structural Risk Reduction

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Map 6.10: Central Coast, Flood Depths Difference between FWA and FWOA, 1% Annual Exceedance Probability, Lower Scenario, Year 50.

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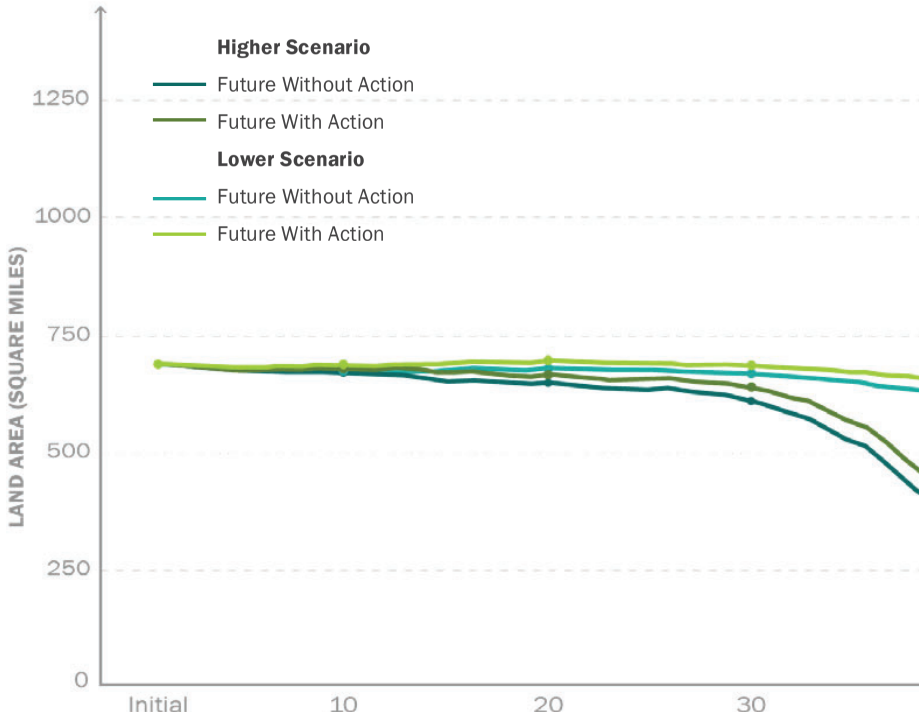
Three structural risk reduction projects were selected in the Central Coast region that together span from Abbeville to the Wax Lake Outlet Channel. These projects are predicted to reduce future surge-based flood risk in the region by 65%. These projects provide between $1 – $1.6 billion reduction in EADD at Year 50. Over half of that risk reduction is seen in the communities of Abbeville, Franklin, and New Iberia, which are projected to see dramatic increases in surge-based flood risk over the next 50 years without these projects.



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for centuries, living by trapping, fishing, hunting, and farming. Their ancestors were primarily of the historic Biloxi, Chitimacha, and Choctaw but also Atakapas and Acolapissa Tribes. To the east, the Pointe-au-Chien Indian Tribal Community is located in lower Pointe-aux-Chênes, a traditional village of their ancestors, the Chitimacha. The Pointe-au-Chien Indians also descend from the Biloxi, Acolapissa, and Atakapas Tribes. Terrebonne is also home to members of the United Houma Nation, a state-recognized tribe. Tribal members reside within a six-parish area along the southeastern coast of Louisiana. These peoples have strong cultural ties to the wetlands that are impacted by land loss, changing habitats, and erosion of key cultural sites, such as burial grounds. For these communities and others that call places like Pointe-aux-Chênes, Isle de Jean Charles, and Dulac home, land loss and rising sea levels pose an existential threat.

Ecosystems in the Terrebonne region include extensive bottomland hardwood and swamp forests in the Verret Basin and floating marshes in the Penchant Basin. Salt and brackish marshes are prevalent in eastern Terrebonne. The region includes the Elm Hall Wildlife Management Area in the Verret Basin and Pointe-aux-Chênes Wildlife Management Area in eastern Terrebonne, as well as the Isles Dernieres Barrier Islands Refuge and the Mandalay National Wildlife Refuge.

Image: Timbalier Island Site Visit, 2021 (CPRA)

Resource-based industries are prevalent in the Terrebonne region's economy, with the energy industry and seafood production as primary sources of revenue. Residents of communities like Houma, Chauvin, Cocodrie, and Dulac contribute to the region's productivity, with the area accounting for over 20% of Louisiana's seafood production. Many of the outlying communities are important hubs for commercial fishing, including shrimp, oysters, and crabs. For example, in 2020, almost 34% of total statewide shrimp landings were from the Terrebonne Basin. In 2018, almost 26% of commercial fishers who landed shrimp in Louisiana lived in Terrebonne Parish. The region also has important public and private oyster-growing areas, including Lake Chien and Sister Lake. Other economic activities in the region include agriculture, ship building and fabrication, and support for the offshore energy industry. Major population centers, such as Morgan City, Houma, and Thibodaux, provide services, such as

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Image: Egret in Dulac (Louisiana Sea Grant College Program)

Image: Shrimpers Row, Dulac (Louisiana Sea Grant College Program)

Image: Gulf Intracoastal Waterway (CPRA)

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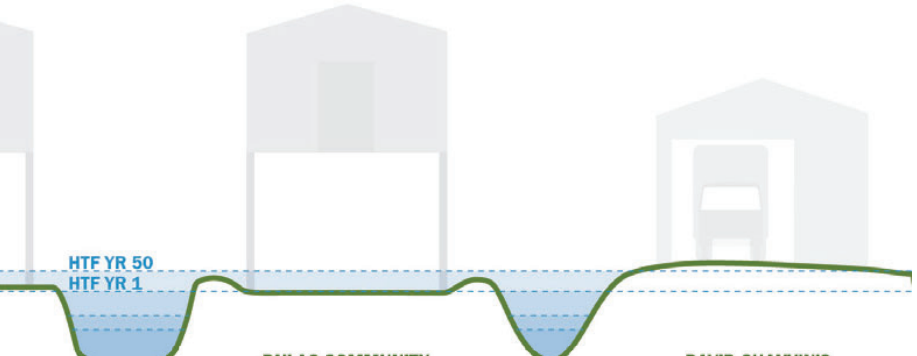

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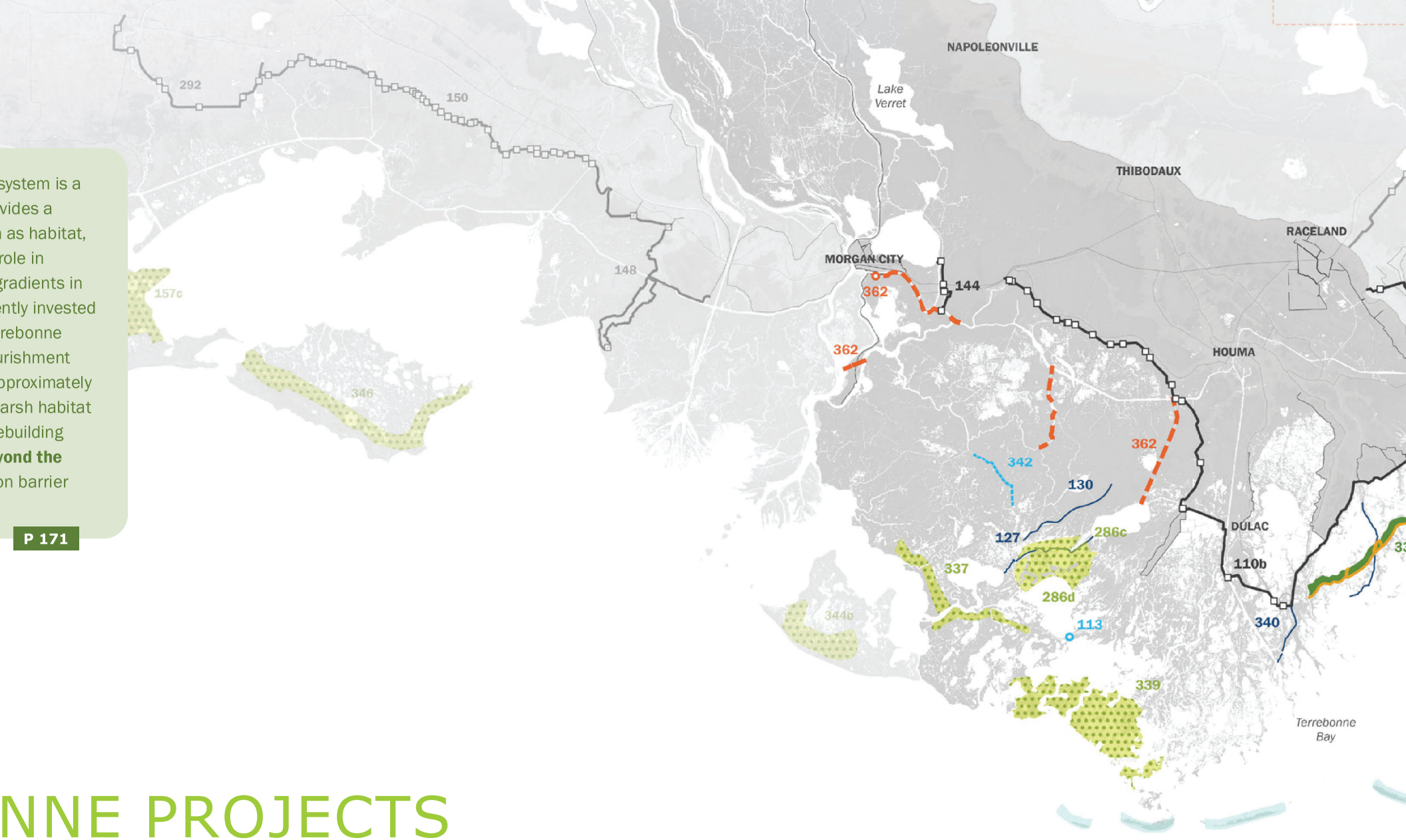

NNE PROJECTS

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Lake Mechant and support the ecosystems and habitat in the area. Several structural risk reduction projects were selected to reduce the impact of storm surge-based flooding to coastal communities across the region, such as Houma, Dulac, Larose, and Amelia. These projects, along with nonstructural

Map 6.11:

storation to reconnect freshwater flows from Bayou Penchant to southern Terrebonne marshes by re-flow through Bayou Carencro. Dredging portions of Carencro Bayou and installing a weir at Superior ease flow to the southeast through Bayou Carencro. Cleanout canal and install one-way culverts ou Carencro to allow freshwater further south.	1	$ 22M
marsh including filling areas deeper than 2.5 feet, from Bayou Pointe-aux-Chênes to the south Lafourche atfish Lake. 30,000 feet of shoreline revetment to limit erosion in exposed areas and channel armoring channels at current dimensions at Bayou Pointe-aux-Chênes and Bayou Blue to reduce the tidal prism new wetland habitat, restore degraded marsh, and reduce wave erosion. Restoration of approximately of Bayou Pointe-aux-Chênes Ridge.	1	$ 460M
marsh including filling areas deeper than 2.5 feet, from Bayou Terrebonne to Bayou Pointe-aux-Chênes e tidal prism and to create new wetland habitat, restore degraded marsh, and reduce wave erosion. t of shoreline revetment to limit erosion in exposed areas and channel armoring to maintain channels mensions to reduce the tidal prism and to create new wetland habitat, restore degraded marsh, and erosion.	2	$ 1.0B
marsh within a footprint of approximately 29,000 acres of northeast portion of marsh from Belle Pass eadow to create new wetland habitat, restore degraded marsh, and reduce wave erosion.	1	$ 1.2B
arsh within a footprint of approximately 6,200 acres south of Montegut between Bayou St. Jean Charles ointe-aux-Chênes to create new wetland habitat, restore degraded marsh, and reduce wave erosion.	1	$ 210M
marsh in Terrebonne Parish between Lake Decade and Lake Mechant to create new wetland habitat, aded marsh, and reduce wave erosion.	1	$ 250M
marsh in Terrebonne Parish between Lake Decade and Lake Mechant to create new wetland habitat, aded marsh, and reduce wave erosion.	2	$ 230M
marsh within a footprint of approximately 6,900 acres along the northeast rim of Fourleague Bay and ue Hammock Bayou to Bayou Dularge to create new wetland habitat, restore degraded marsh, and erosion.	1	$ 370M
marsh within a footprint of approximately 22,000 acres in between Caillou Lake and Caillou Bay in ebonne to create new wetland habitat, restore degraded marsh, and reduce wave erosion.	1	$ 1.5B
f approximately 43,000 feet of historic ridge along Bayou Decade to provide coastal upland habitat, al hydrology, and provide wave and storm surge attenuation.	1	$ 13M
f approximately 43,000 feet of historic ridge at Mauvais Bois to provide coastal upland habitat, restore logy, and provide wave and storm surge attenuation.	1	$ 13M
f approximately 24,000 feet of historic ridge with 3 armored navigable openings at the southernmost anza to the Gulf in Cocodrie, Louisiana to provide coastal upland habitat, restore natural hydrology, and and storm surge attenuation.	1	$ 3.3M
projects diverting water and sediment from the Atchafalaya River into the Penchant Basin and areas aluated for the plan—Atchafalaya River Diversion (108) and Increase Atchafalaya Flow to Terrebonne provided similar benefits to the region but in combination would induce excessive flooding. The hafalaya Flow to Terrebonne project is currently being engineered by CPRA (TE-110). CPRA will finalize and pursue construction of the TE-110 project with the Atchafalaya River Diversion (108) project as a rnative.	1	$ 790M
and improvement of a levee to an elevation between 13.5 and 19 feet NAVD88 around Houma and idge communities from Lockport to Humphreys Canal. Project features approximately 450,000 feet vee, approximately 22,000 feet of T-wall, four 30-foot barge gates, five 40-foot barge gates, a 56-foot 110-foot barge gate, a 180-foot barge gate, a 30-foot roller gate, two 40-foot roller gates, a 110-foot sluice gates.	1	$ 3.9B
s to a levee to an elevation between 12 and 21 feet NAVD88 within the Larose to Golden Meadow levee ct features approximately 250,000 feet of earthen levee and approximately 7,100 feet of T-wall.	2	$ 500M
of a levee to an elevation of 18 feet NAVD88 along the GIWW between Lake Palourde and the Bayou ear Amelia. Project features approximately 14,000 feet of earthen levee, approximately 15,000 feet all, a 110-foot barge gate, a 150-foot barge gate, three 40-foot swing gates, a 40-foot roller gate and	2	$ 840M

Image: Bayou Terrebonne Floodgate, 2016 (CPRA)

EASTERN TERREBONNE LANDBRIDGE

A newly selected project for the 2023 Coastal Master Plan, the Eastern Terrebonne Landbridge project extends across the eastern Terrebonne marshes and is planned to be built in phases over both implementation periods. In IP1, the eastern component from Bayou Lafourche to Bayou Pointe-aux-Chênes would be built, and in IP2, the western and central components from Bayou Pointe-aux-Chênes to Bayou Terrebonne would be built. The project will essentially fill all of the open water within the landbridge footprint with only a few bayous remaining open. This will limit water movement from Terrebonne Bay to the interior marshes, reducing salinity levels and land loss in some areas.

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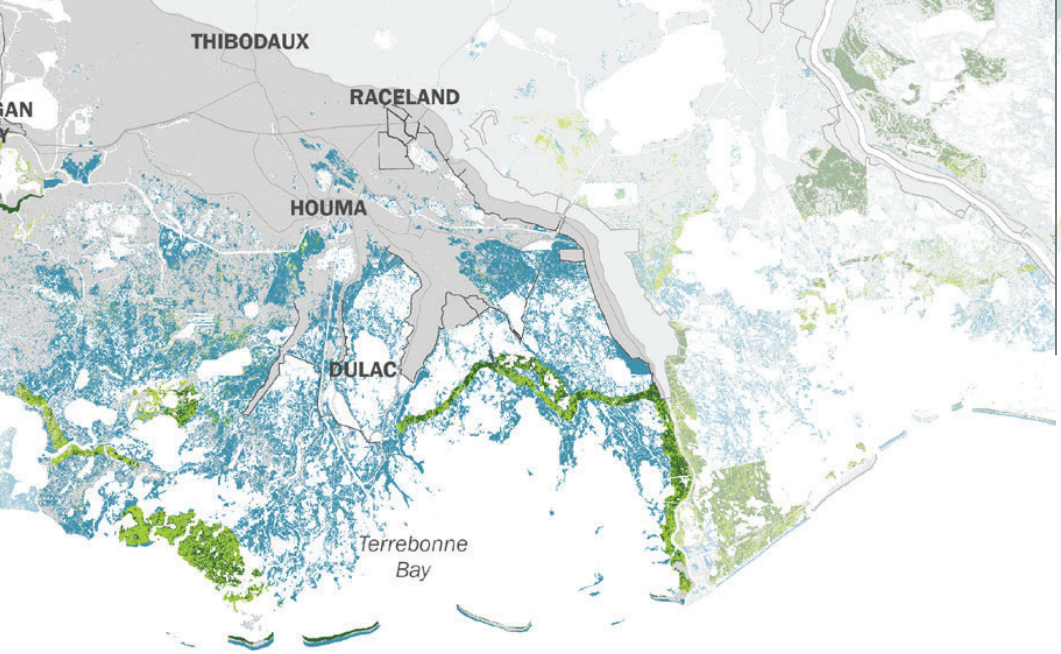

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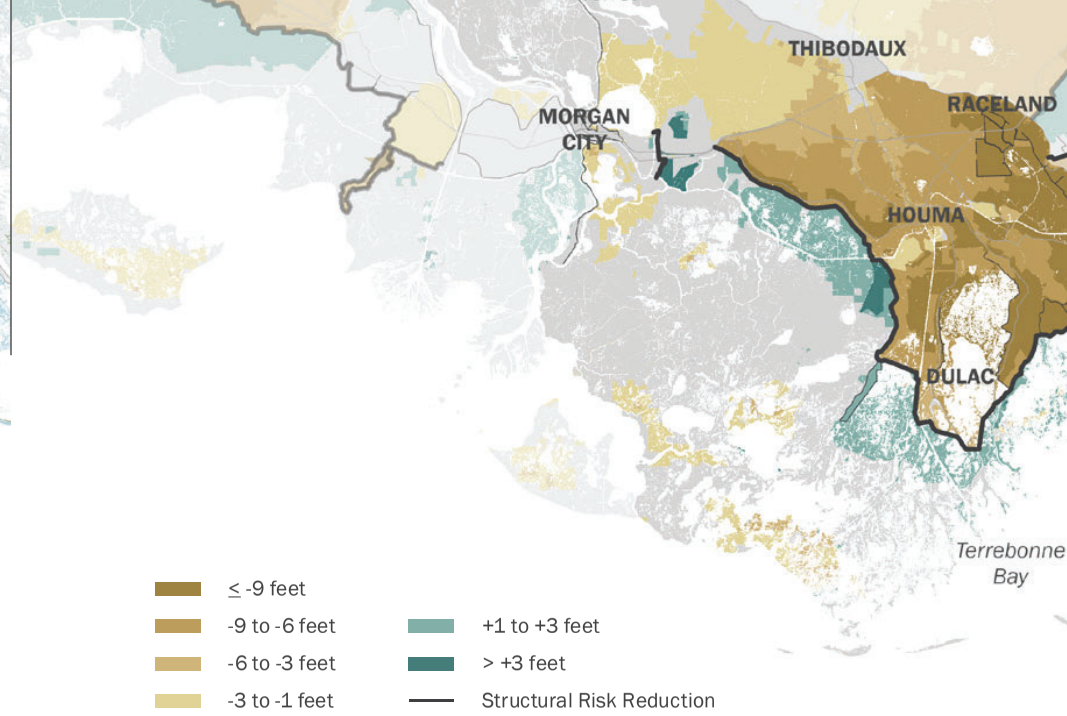

Map 6.13: Terrebonne, Flood Depths Difference between FWA and FWOA, 1% Annual Exceedance Probability, Lower Scenario, Year 50.

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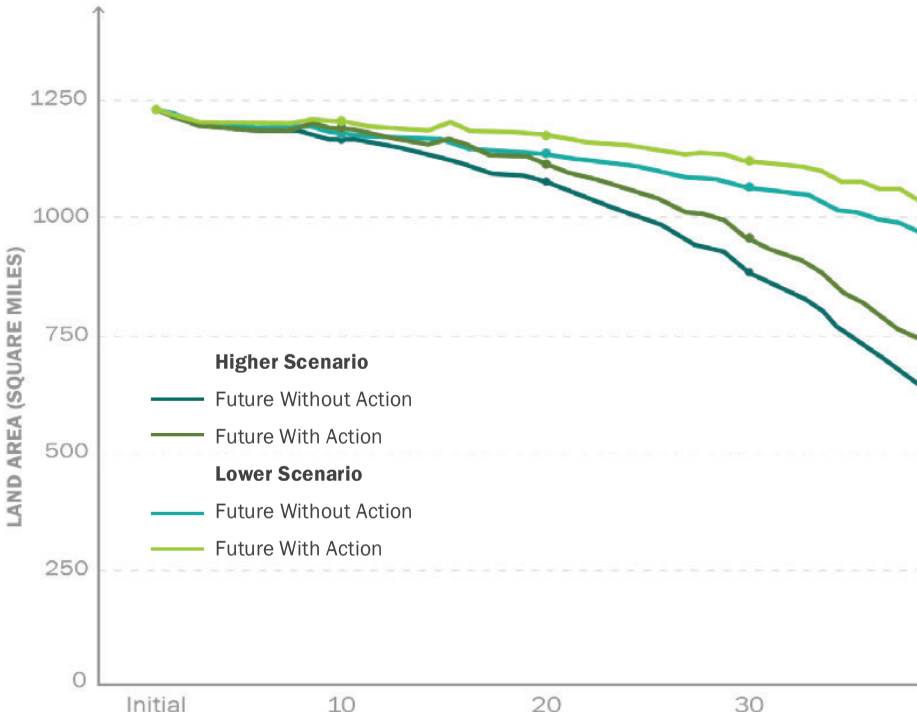
Three structural risk reduction projects were selected in the Terrebonne region including upgrades to the Larose to Golden Meadow system, which spans the Terrebonne and Barataria regions. In total, the projects reduce future storm surge-based flood risk in the region by 63% at Year 50 under the lower scenario. These projects provide a $3.7 billion reduction in EADD in at Year 50 under the lower scenario and a $5.2 billion reduction in EADD at Year 50 under the higher scenario. Even with the implementation of these structural risk reduction projects, significant residual risk both outside and inside of the levee systems remains.



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region has experienced rapid growth and business development over the past several decades, especially in areas such as St. Charles and Jefferson parishes, and also boasts a rich cultural heritage associated with the many Indigenous communities of the area.

The region's ecosystem is characterized by extensive swamps in the upper basin and floating marshes near Lac des Allemands and Lake Salvador. Fresh marshes grade into intermediate, brackish, and salt marshes closer to the Gulf. Several remnant natural ridges are in the area, including Bayou L'Ours, while the lower part of the basin is rimmed with barrier islands. The region includes Lake Boeuf and Salvador/Timken Wildlife Management Areas, the Elmer's Island Wildlife Refuge, and the Barataria Unit of Jean Lafitte National Historical Park and Preserve.

As in many parts of the coast, natural resources and navigable waterways provide opportunities for economic growth and activity. Refineries, petrochemical plants, and granaries employ residents from across the region. Home to the Port of South Louisiana, the largest port by tonnage of cargo handled in the western hemisphere, and Port Fourchon, the Barataria region is instrumental in the transportation and transfer of goods between ships, barges, and trucks for distribution throughout the United States.

Image: Pelicans on Queen Bess Island, 2020 (CPRA)

The waters and wetlands of Barataria Basin also support tremendous commercial and recreational fishing opportunities. Waterfowl hunting opportunities here have long been recognized as some of the best in the nation. In 2020, about 20% of total statewide shrimp landings were from the Barataria Basin. In that same year, the basin was responsible for nearly 44% of the statewide landings of oysters from private leases.

Changing environmental conditions are challenging the Barataria Region. Basin hydrology has been extensively altered since European settlement. The basin was isolated from the Mississippi River following the Great Flood of 1927, further limiting riverine inputs of sediment and freshwater to this region. Historic coastal storms impacting the region include Hurricane Betsy in 1965 and, more recently, Katrina (2005), Gustav and Ike (2008), Isaac (2012), and Ida (2021). Recent storm

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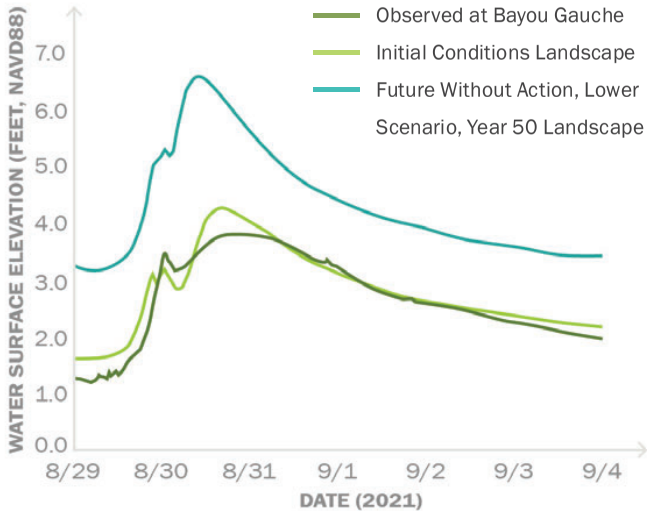
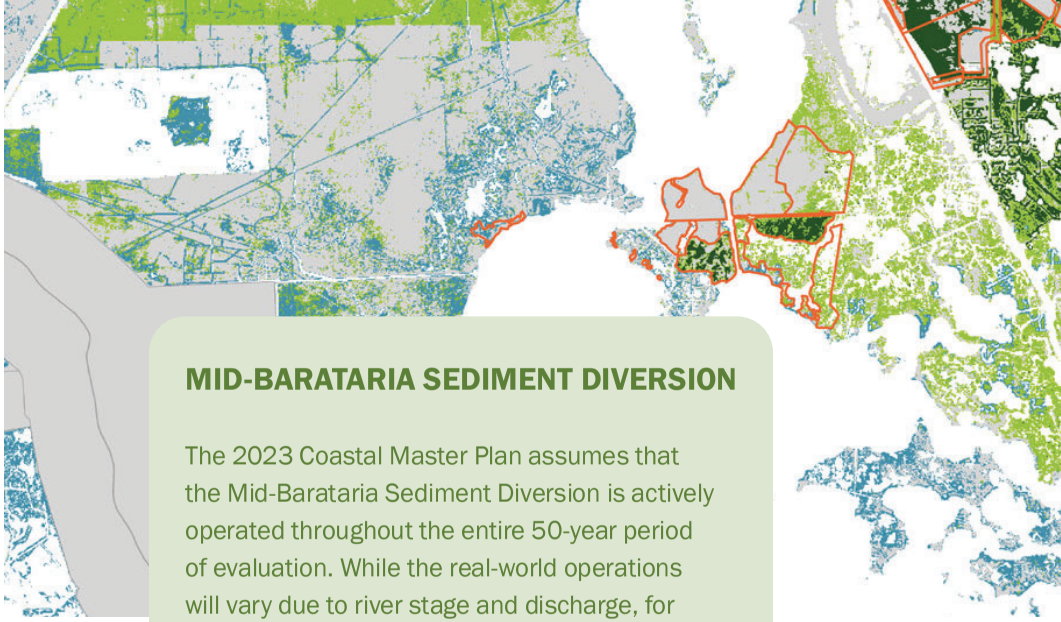


Figure 6.17: Hurricane Ida Storm Surge Simulations.



Map 6.14: Mid-Barat
FWOA and FWOCFP, Y

MID-BARATARIA SEDIMENT DIVERSION

The 2023 Coastal Master Plan assumes that the Mid-Barataria Sediment Diversion is actively operated throughout the entire 50-year period of evaluation. While the real-world operations will vary due to river stage and discharge, for modeling purposes, a single operational rule was followed for ICM simulations. When comparing FWOA against a FWOCFP, where the diversion is not active, one can see a large area of newly built wetlands in the immediate outfall of the diversion where river sediments deposit in open water bodies, eventually becoming land after approximately 20 years of operation. In addition to the newly built subaerial land, large portions of existing wetlands throughout the middle portions of Barataria Basin (i.e., areas northwest of Little Lake) are maintained into the future, whereas they are projected to be lost if the diversion were not active. The land is maintained due to a combination of suspended sediments nourishing the wetlands, increased organic matter accretion rates, and reduced salinities in these areas. It is important to keep in mind the sensitivity of these results to the exact operations of the diversion. Slight changes to the operational rules will impact the balance between sediment and freshwater delivery and inundation, which is one of many reasons why adaptively managing the operations will be critical to the long-term success of the project.

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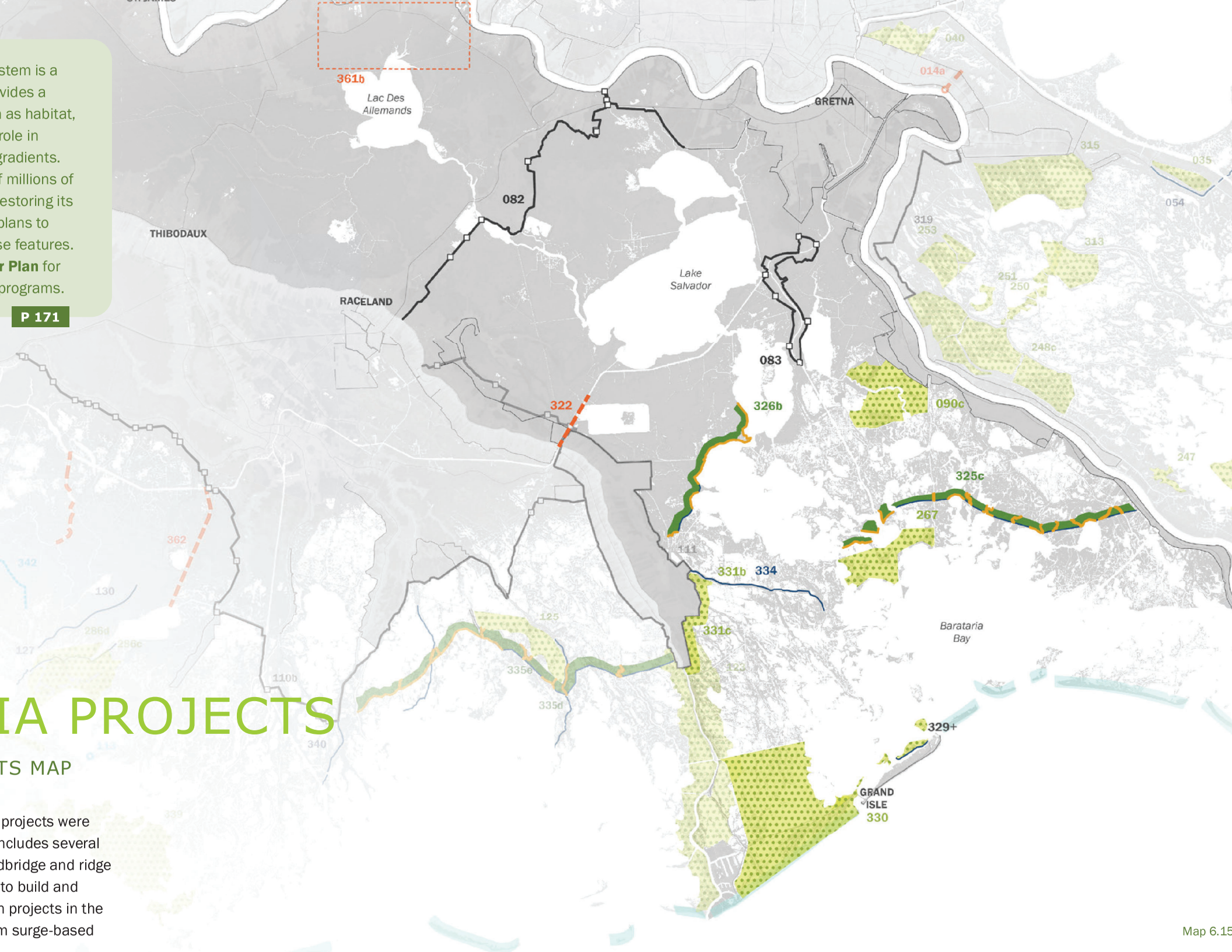

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marsh within a footprint of approximately 6,900 acres including filling areas deeper than 2.5 feet, Dogris to Port Sulphur. 130,000 feet of shoreline revetment to limit erosion in exposed areas and oring to maintain channels at current dimensions at Wilkinson Canal, Wilkinson Bayou, Bay Chene e channels north of Bay Batiste, Two Sisters Bayou, Socola Canal, and Grand Bayou to reduce the nd to create new wetland habitat, restore degraded marsh, and reduce wave erosion.	2	$ 840M
marsh within a footprint of approximately 3,800 acres including filling areas deeper than 2.5 feet, from ayou Perot. 63,000 feet of shoreline revetment to limit erosion in exposed areas and channel armoring hannels at two canals in the Clovelly Oil Field to reduce the tidal prism and to create new wetland re degraded marsh, and reduce wave erosion.	2	$ 520M
marsh within a footprint of approximately 15,000 acre in western portion of Large-Scale Barataria on project to create new wetland habitat, restore degraded marsh, and reduce wave erosion.	2	$ 560M
marsh within a footprint of approximately 7,200 acres on western portion of Barataria Bay shoreline to etland habitat, restore degraded marsh, and reduce wave erosion.	2	$ 220M
marsh within a footprint of approximately 33,000 acres east of Bayou Lafourche and along the eadland to create new wetland habitat, restore degraded marsh, and reduce wave erosion.	1	$ 1.3B
marsh including filling areas deeper than 2.5 feet along the along portions of the South Lafourche ent to create new wetland habitat and reduce wave energy on the levee system.	2	$ 270M
marsh including filling areas deeper than 2.5 feet along the along portions of the South Lafourche ent to create new wetland habitat and reduce wave energy on the levee system.	1	$ 100M
of approximately 54,000 feet of historic ridge along Bayou L'Ours to provide coastal upland habitat, al hydrology, and provide wave and storm surge attenuation.	1	$ 9.5M
mp capacity from Mississippi River to Bayou Lafourche by 500 cfs. Dredge GIWW east of Larose to -20 e salinity in western Barataria.	2	$ 120M
hwater and sediment diversions into the swamps of the Western Pontchartrain and Upper Barataria modeled for inclusion in the plan. These projects showed complex interactions with other diversions be operating on the landscape. This program will evaluate how diversions into the upper basins rated in conjunction with currently planned diversions to maintain swamps and coastal marshes, arine gradients, and aid in Mississippi River flood control. These studies will lead to the construction re diversion features into Barataria or Maurepas basins.	1	$ 750M
and improvement of a levee to an elevation between 10.5 and 15 feet NAVD88 along Highway 90 West Bank and Larose. Project includes approximately 200,000 feet of earthen levee, approximately T-wall, a 250-foot barge gate, two 40-foot roller gates, six sluice gates, and pump station s.	1	$ 510M
of a levee to an elevation of 16 feet NAVD88 around Lafitte. Project features include approximately t of earthen levee, approximately 30,000 feet of T-wall, two 30-foot barge gates, a 56-foot barge gate, ot barge gates, and a 40-foot roller gate.	2	$ 1.4B

Image: Davis Pond Freshwater Diversion, 2019 (CPRA)

UPPER BASIN DIVERSION PROGRAM

Modeling for the 2023 Coastal Master Plan made the assumption that the Mid-Barataria Sediment Diversion, Mid-Breton Sediment Diversion, and the River Reintroduction into Maurepas Swamp project would be implemented in the early years of the 50-year period, in addition to the freshwater diversions already constructed. Many of the additional diversion projects that had been effective as individual projects in building or maintaining land in the 2017 Coastal Master Plan showed mixed landscape results when interacting with other diversions. The combined effects of the additional diversion projects and those already assumed to be operational resulted in excessive water levels in the basin. These results highlight the need for basin wide management of diversions. Additional evaluations suggest that upper basin diversions could play an important role in maintaining swamps and coastal marshes, estuarine gradients, and in Mississippi River flood control. CPRA is proposing to further

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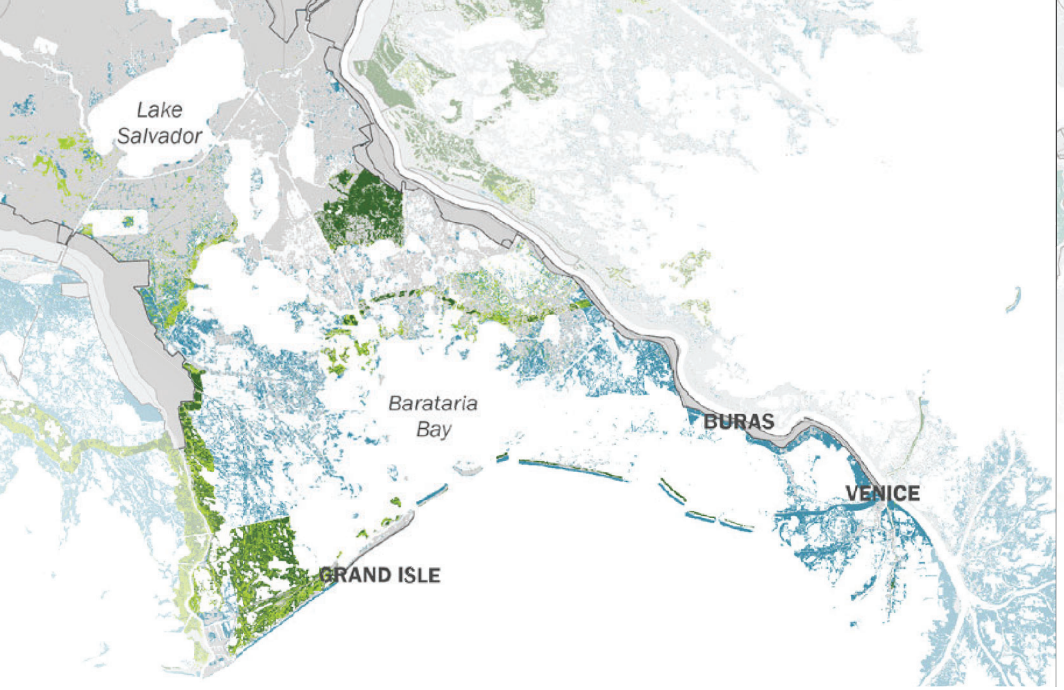
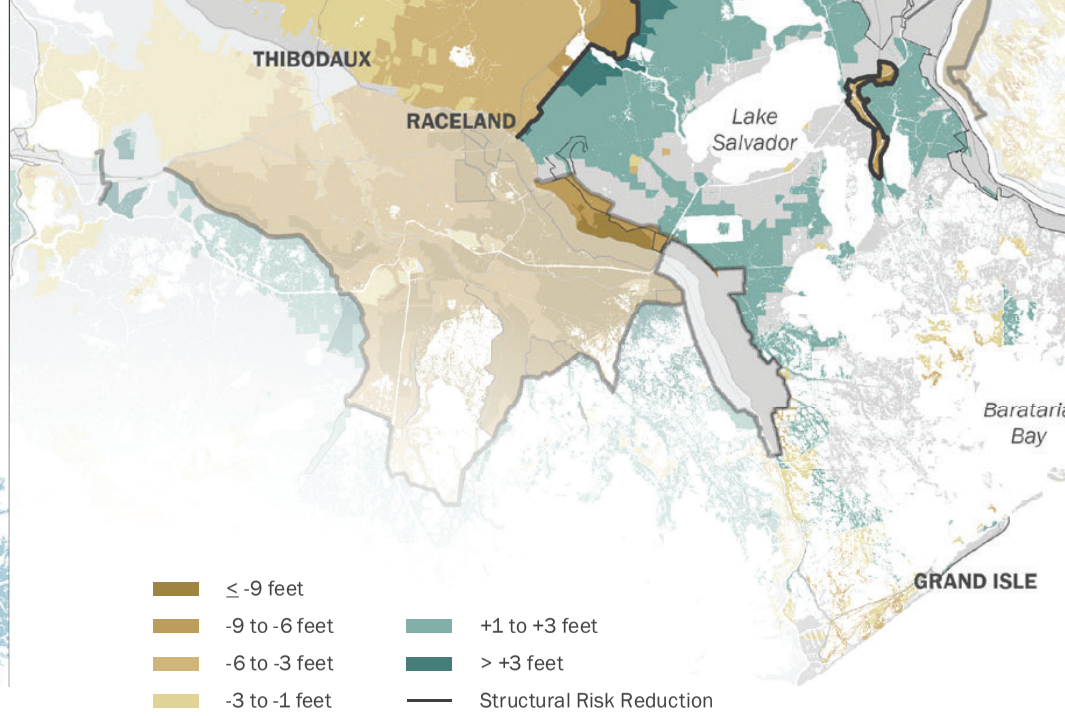


Action, Lower Scenario, Year 50.



Map 6.17: Barataria, Flood Depths Difference between FWA and FWOA, 1% Annual Exceedance Probability, Lower Scenario, Year 50.

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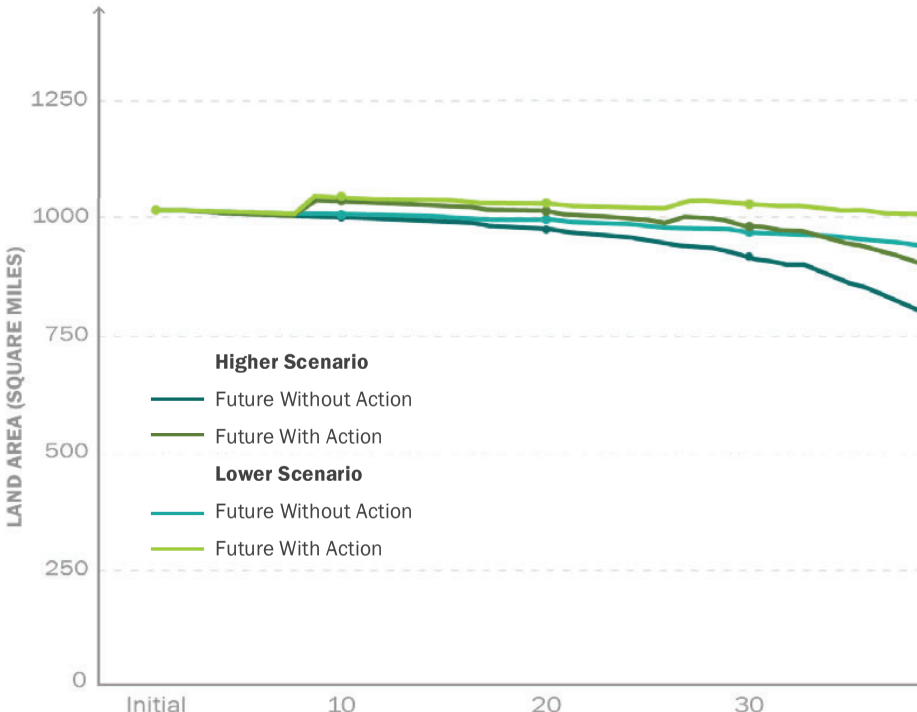
Three structural risk reduction projects were selected in the Barataria region, including upgrades to the Larose to Golden Meadow system which spans the Terrebonne and Barataria regions. In total, these projects reduce future surge-based flood risk in the region by 64% at Year 50 under the lower scenario. These projects provide a $2.0 billion reduction in EADD at Year 50.



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region reaches from the east bank of the
ssissippi border and includes New Orleans,
e region also includes Lakes Pontchartrain
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gion on the n region is celebrated ts music, ed by the , lakes, ape. The ls on the ce Hurricane f projects ultural and generations.

es all or part of hoa, St. Tammany, erson, St. John parishes, and is rleans, Metairie, r Parishes, Mississippi esidents with outheast in the area.

ation with distinct e, cross-cultural nnual Mardi Gras ear why this ng, hunting, and

bird watching – St. Bernard Parish has several stops on the America's Wetlands Birding Trail, and St. Tammany Parish includes recreational assets like the Tammany Trace and North Shore Fontainebleau State Park.

Other managed lands include Joyce Wildlife Management Area, St. Tammany Wildlife Refuge, the Big Branch Marsh, Bayou Sauvage, Delta and Breton National Wildlife Refuges. To the east, the Breton Wildlife Refuge provides important wintering habitat for the federally threatened piping plover. At the other end of the region, the Maurepas Swamp includes more than 100,000 acres of cypress tupelo swamp, bottomland hardwood forest, and fresh and intermediate marshes. Between these is a productive estuary, including Lake Pontchartrain, Lake Borgne, Breton Sound, and Chandeleur Sound and includes extensive areas of marsh on the Orleans Landbridge and Biloxi Marsh.

This landscape supports vibrant recreational and commercial fisheries. In 2020, the region accounted for 37% of the statewide crab landings. It also supports major industrial activity such as ports and petrochemical industries, as well as agriculture, including extensive sugarcane along the Mississippi River corridor.

Many communities within the Pontchartrain/Breton region have levees and other structures to protect them from storm surge-based flooding. Following Hurricane

Image: Delacroix, Louisiana (CPRA)

Katrina in 2005, HSDRRS was built to reduce flood risk in Orleans, Jefferson, St. Bernard, Plaquemines and parts of St. Charles parishes; much of the area on the East Bank; and other areas in this region. Master plan modeling suggests that, with prescribed maintenance, including authorized lifts, the system will continue to provide a 1% AEP level of risk reduction over the next 50 years even under the higher environmental scenario. In 2021, construction began on the West Shore Lake Pontchartrain Hurricane Protection project. Once complete, the structure will provide 100-year storm surge flood protection to 60,000 Louisianans in St. Charles, St. James, and St. John the Baptist parishes.

A number of innovative restoration projects have also been implemented in this region to maintain or restore degrading wetlands. The Caernarvon Freshwater Diversion, constructed in 1991, was initially designed to manage salinity levels in the Breton Sound area to be suitable for oysters in the public seed grounds. It has

is an uncontrolled and sediments on in the Bird's Foot D supports the curre region, including t Swamp and the M

In recent years, m Parish to Slidell ha these areas, comm undeveloped lowla are developed, ris flooding rises subs to mitigate this ris support smart gro appropriate policie building design to base flood elevati in flood-prone are eliminating unnec

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Image: Lafitte Post Hurricane Isaac, 2012 (CPRA)

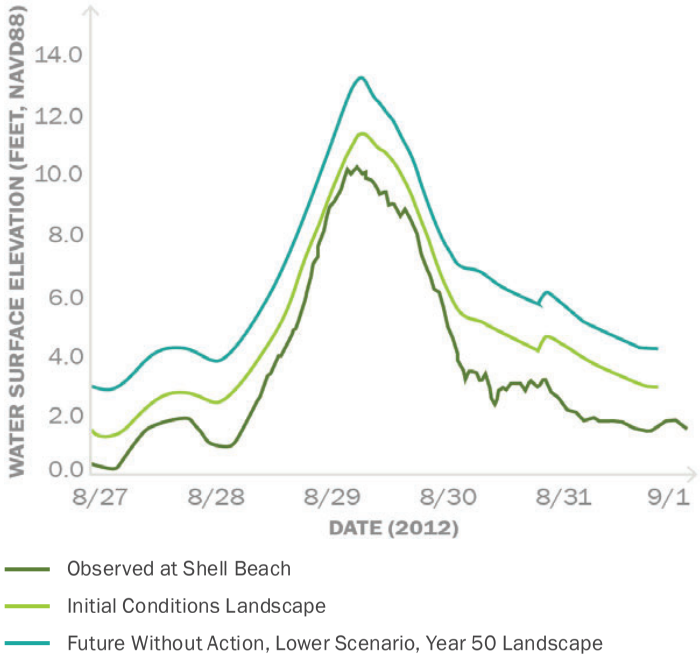


Figure 6.21: Hurricane Isaac Storm Surge Simulations.

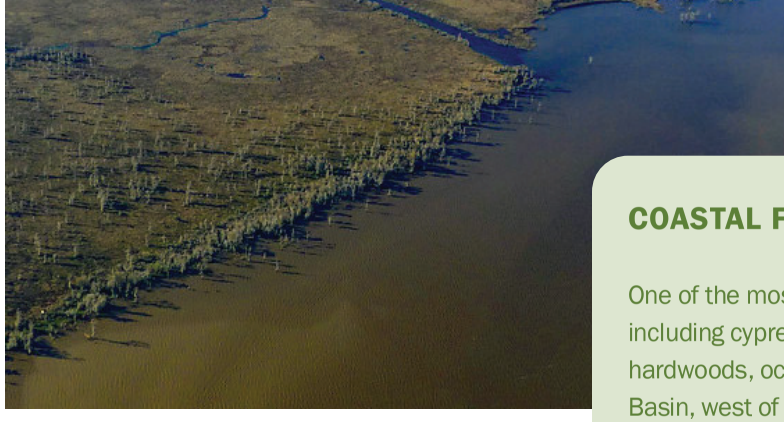
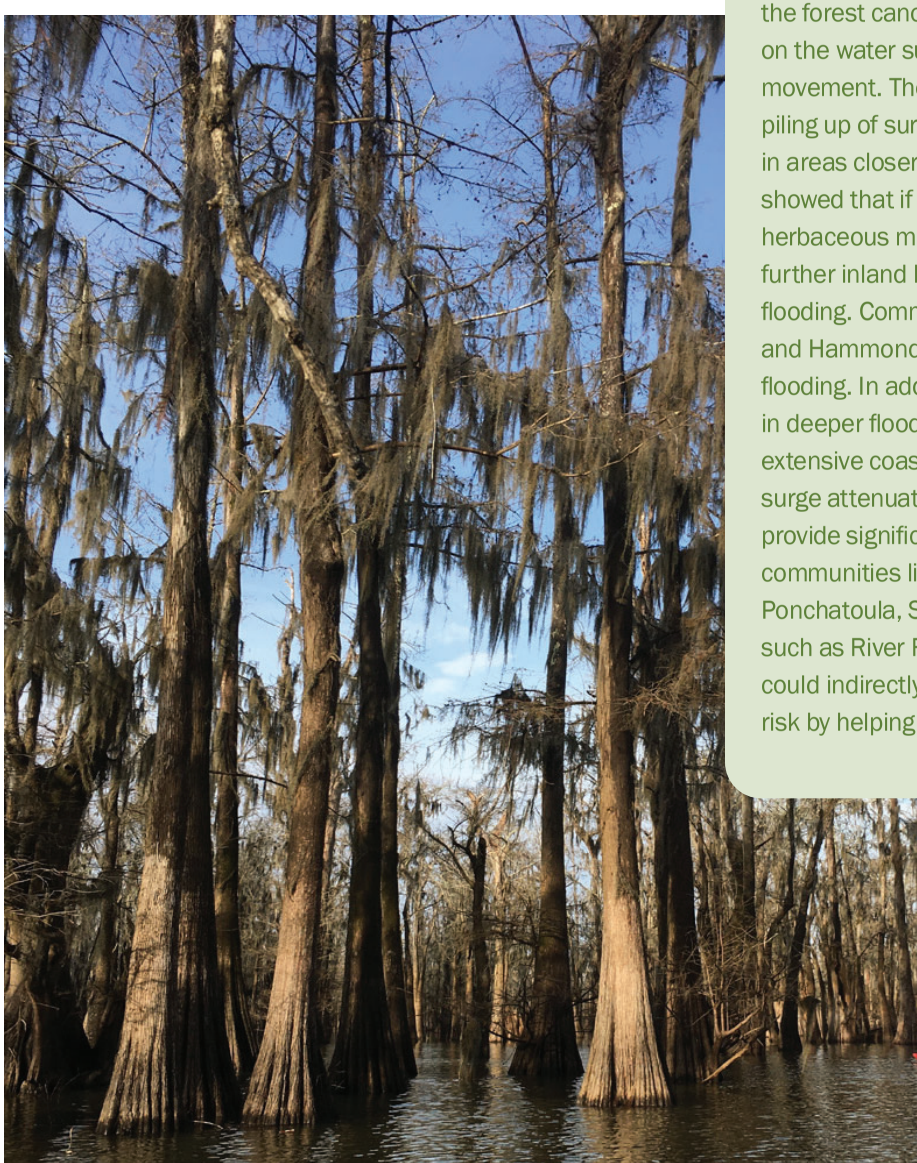


Image: Maurepas Swamp (CPRA)



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benefit several communities on the east bank of the Mississippi River as well as communities on the North Shore, which are expected to face significantly increased storm surge-based flood risk into the future.

20,000 feet of oyster reef creation along the created marsh in Three Mile Bay to reduce hydrologic between Mississippi and the interior of the Biloxi Marsh Complex.		
marsh within a footprint of approximately 1,900 acres in northern Breton Sound in the vicinity of create new wetland habitat, restore degraded marsh, and reduce wave erosion.	2	$ 160M
marsh within a footprint of approximately 29,000 acres in a portion of the New Orleans East Landbridge on project to create new wetland habitat, restore degraded marsh, and reduce wave erosion.	2	$ 1.1B
marsh within a footprint of approximately 3,800 acres in Central Wetlands near Bayou Bienvenue to wetland habitat, restore degraded marsh, and reduce wave erosion.	1	$ 49M
marsh within a footprint of approximately 2,200 acres on east bank of Plaquemines Parish around to create new wetland habitat, restore degraded marsh, and reduce wave erosion.	1	$ 47M
marsh within a footprint of approximately 960 acres on east bank of Plaquemines Parish around create new wetland habitat, restore degraded marsh, and reduce wave erosion.	1	$ 33M
marsh along the east side of the Mississippi River from White Ditch to Bohemia to create new wetland ore degraded marsh, and reduce wave erosion.	1	$ 860M
marsh within a footprint of approximately 4,400 acres in St. Tammany Parish along the eastern Lake n shoreline to create new wetland habitat, restore degraded marsh, and reduce wave erosion.	1	$ 110M
marsh within a footprint of approximately 2,400 acres in Plaquemines Parish between Grand Lake y to create new wetland habitat, restore degraded marsh, and reduce wave erosion.	1	$ 170M
marsh within a footprint of approximately 840 acres in Plaquemines Parish along the eastern shore of e to create new wetland habitat, restore degraded marsh, and reduce wave erosion.	2	$ 61M
marsh within a footprint of approximately 4,700 acres in Plaquemines Parish near Tiger Ridge to wetland habitat, restore degraded marsh, and reduce wave erosion.	1	$ 150M
marsh within a footprint of approximately 5,100 acres south and west of Delacroix Island to create habitat, restore degraded marsh, and reduce wave erosion.	1	$ 390M
marsh within a footprint of approximately 3,800 acres on Belle Pass Island near Bohemia to create habitat, restore degraded marsh, and reduce wave erosion.	1	$ 99M
marsh within a footprint of approximately 14,000 acres in north and east Lake Lery to create new tat, restore degraded marsh, and reduce wave erosion.	2	$ 890M
marsh within a footprint of approximately 940 acres in the eastern Biloxi Marsh Complex to create habitat, restore degraded marsh, and reduce wave erosion on Comfort Island, Mitchell Island, Martin Brush Island.	2	$ 57M
of approximately 110,000 feet of historic ridge along Bayou LaLoutre to provide coastal upland ore natural hydrology, and provide wave and storm surge attenuation.	2	$ 26M
of approximately 3,600 feet of historic ridge at the mouth of the Tchefuncte River to provide coastal at, restore natural hydrology, and provide wave and storm surge attenuation.	1	$ 1.9M
o Central Wetlands near Violet to provide sediment for emergent marsh creation and freshwater isting wetlands, 5,000 cfs capacity (modeled at a constant flow of 5,000 cfs, independent of the River flow). The location of the diversion channel will be further evaluated during feasibility studies.	2	$ 270M
hwater and sediment diversions into the swamps of the Western Pontchartrain and Upper Barataria modeled for inclusion in the plan. These projects showed complex interactions with other diversions be operating on the landscape. This program will evaluate how diversions into the upper basins rated in conjunction with currently planned diversions to maintain swamps and coastal marshes, arine gradients, and aid in Mississippi River flood control. These studies will lead to the construction re diversion features into Barataria or Maurepas basins.	1	$ 750M
of closure gates and weirs to an elevation of 2 feet NAVD88 across the passes at Chef Menteur and for storm surge risk reduction within the Lake Pontchartrain Basin.	1	$ 2.4B
and improvement of a levee to an elevation between 13 to 17 feet NAVD88 around the City of Slidell. res approximately 76,000 feet of earthen levee, approximately 11,000 feet of T-wall, a 30-foot barge oot barge gate, a 220-foot barge gate, a 20-foot stop log gate, and a 30-foot stop log gate.	1	$ 420M
s of a levee to an elevation of 15 feet NAVD88 between Braithwaite and White Ditch. Project features y 94,000 feet of earthen levee and approximately 280 feet of T-wall.	1	$ 440M
of a levee to an elevation of 16 feet NAVD88 protecting areas between Geismer and Gramercy. Project		

Image: Marsh Creation construction of the New Orleans Landbridge, 2022 (CPRA)

NORTH SHORE STRUCTURAL RISK REDUCTION

The communities of Slidell, Eden Isles, and Pearl River collectively have among the highest risk from storm surge-based flooding in coastal Louisiana – an estimated $845 million EADD under current conditions, which is expected to triple over the next 50 years under the lower environmental scenario. The Slidell Ring Levee project reduces roughly 35% of the risk in these communities. Fully addressing this risk will require both structural and nonstructural mitigation measures. The Slidell Ring Levee project includes the construction or improvement of nearly 17 mi of levees and floodwalls around Slidell. The levee alignment is based on USACE's St. Tammany Parish Feasibility Study Tentatively Selected Plan (TSP). USACE's TSP included a significant nonstructural component, but excludes structural protection for communities like Eden Isles. CPRA will implement structural risk reduction measures (e.g., flood gate, pump station,

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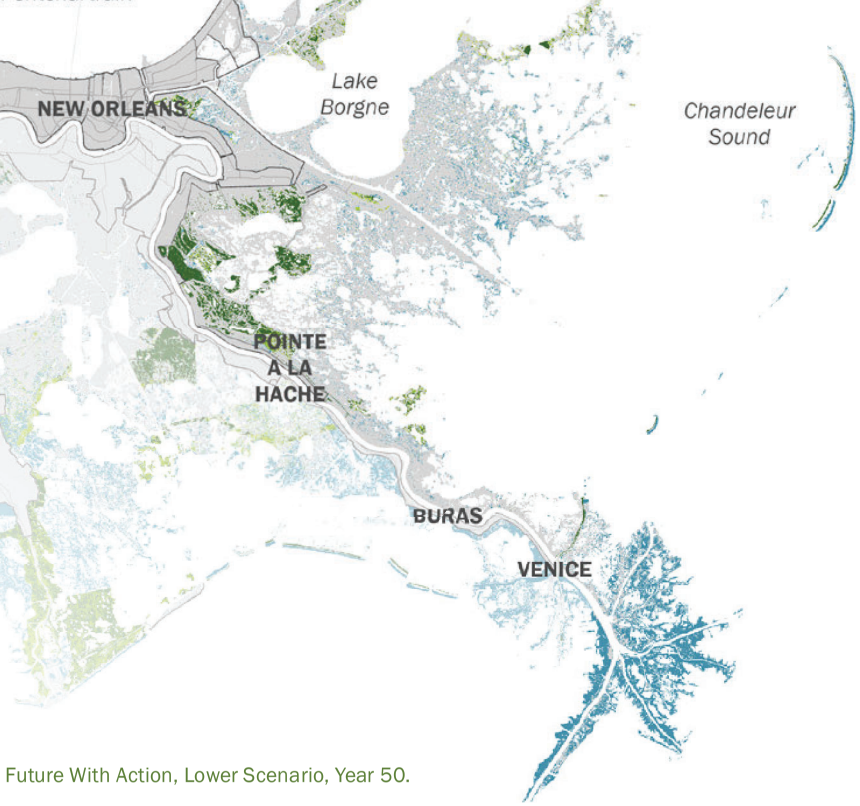
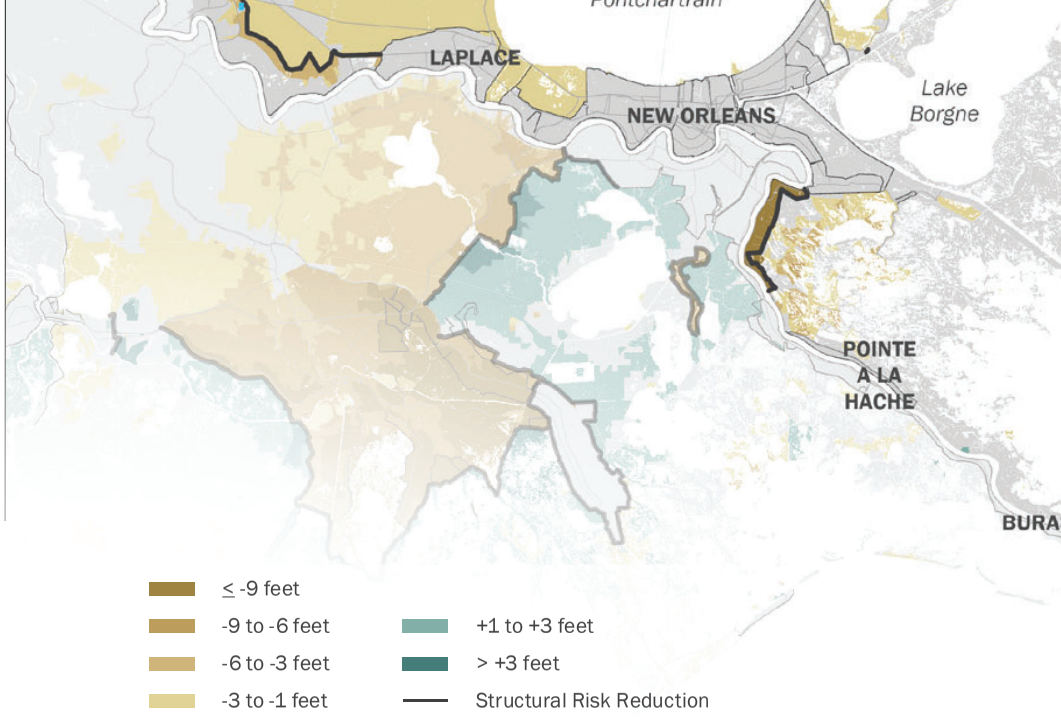


Future With Action, Lower Scenario, Year 50.



Map 6.20: Pontchartrain/Breton, Flood Depths Difference between FWA and FWOA, 1% Annual Exceedance Probability, Lower Scenario, Year 50.

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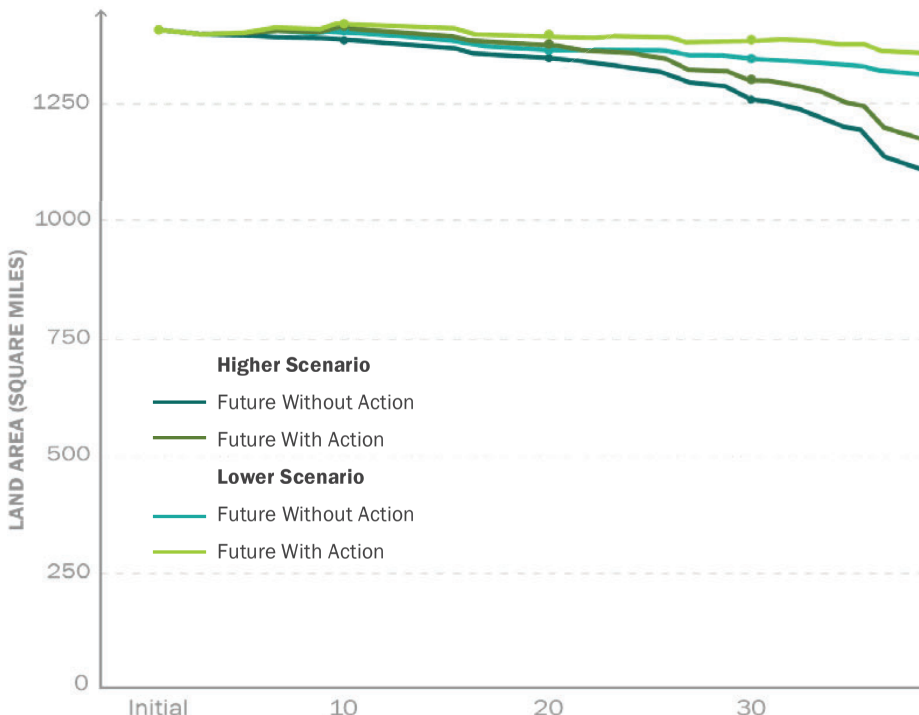
Four structural risk reduction projects were selected in the Pontchartrain/Breton region. In aggregate, they reduce future surge-based flood risk in the region by 35%. These projects provide a $1.6 billion reduction in EADD at Year 50 under the lower scenario and a $2.5 billion reduction in EADD at Year 50 under the higher scenario. Even with the implementation of these structural risk reduction projects, significant residual risk remains, especially on the North Shore. Our analysis shows a significant need and opportunity for nonstructural risk reduction in these communities.



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processes. This approach maximizes the success of the coastal protection and restoration program by iteratively incorporating new information into each step of the planning and decision-making process.

In addition to updating and implementing the master plan, CPRA is also responsible for administering several programs tied to specific regions of the coast. Examples of these programs include the Atchafalaya Basin Program (ABP), the Lowermost Mississippi River Management Program (LMRMP), and the Barrier Island System Management Program (BISM).

The ABP was established to develop and implement a comprehensive plan to address the priority issues affecting the Atchafalaya Basin Floodway System. Implementation of the program occurs through an annual planning process.

Of key importance to the nation, and Louisiana is another river – the Mississippi River. The LMRMP is a $9.3 million effort that aims to move toward a more holistic approach for water and sediment management that supports the long-term sustainability of the Lowermost Mississippi River.

Barrier islands are another critical component of the coastal landscape that CPRA works to maintain. BISM is a holistic, system wide approach to island management that guides when and where to focus restoration resources (funding and sediment) to maintain barrier island systems.

Although CPRA is solely responsible for developing and implementing many coastal projects,

federal partners across the coast. Collective efforts forged through both long-standing and more recent collaborations yield synergistic results. Example collaborative efforts include the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) program, the Southwest Coastal Louisiana Study, and the Louisiana Watershed Initiative (LWI).

The purpose of the CWPPRA program is to identify, prepare, and fund construction of restoration projects throughout coastal Louisiana as well as to promote research and implement wetland preservation. This program has a long history of implementing restoration and monitoring across the coast. The Chairman of the CPRA Board sits on the CWPPRA Task Force.

The Southwest Coastal Louisiana Study was completed in 2016 by USACE with CPRA as the local sponsor; it recommended both risk reduction and ecosystem restoration measures across Calcasieu, Cameron, and Vermilion parishes. Through the Infrastructure Investment and Jobs Act of 2022 and Fiscal Year 22 Community Projects Funding, $296 million has been secured for implementation of voluntary nonstructural risk reduction measures recommended by the study.

Although CPRA primarily focuses on coastal restoration and protection, the agency participates in important initiatives that extend beyond the coastal area. One example is LWI. CPRA serves as one of five state agencies on the Council on Watershed Management, which administers LWI. LWI represents a new watershed-based approach to

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One significant improvement to the user experience is that the landing screen now has the option to take a guided tour that explains why there is a need for a master plan and illustrates the viewer's features and the types of information available. This new guided tour option allows us to share important context and background on the viewer's data to improve coastal Louisiana residents' understanding and usability of the information, and in turn increases their flood risk awareness and provides them with important information needed to prepare and plan for their futures.

Other important updates to highlight are the ability to access and easily use the 2023 Master Plan Data Viewer on mobile phones and tablets, literally putting the data within arm's reach. This has proved to be invaluable in sharing information and discussion both with and among community members. In addition, the viewer's search bar functionality has expanded beyond entering addresses so you can now search for keywords, such as part of a project name. Additional features include new zoom and highlighting functions whereby clicking on a project name zooms to that location, and clicking on a project type highlights them across the coast.

Explore the 2023 Master Plan Data Viewer and send any questions or feedback to masterplan@la.gov.

Explore more on CPRA's website: https://coastal.la.gov/our-plan/2023-coastal-master-plan/

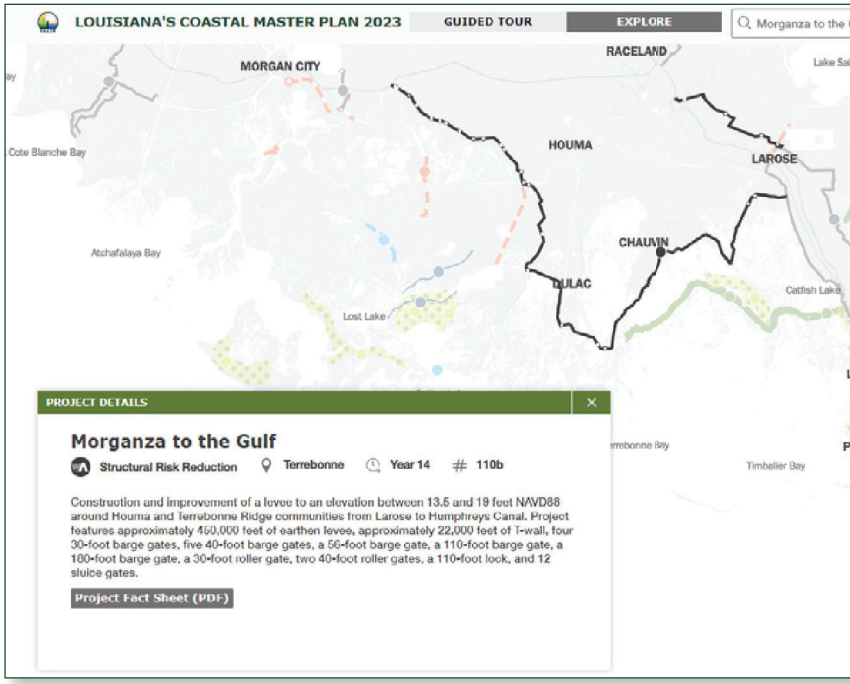

Figure 7.1: Desktop View of the Master Plan Data Viewer Showing Project Information.

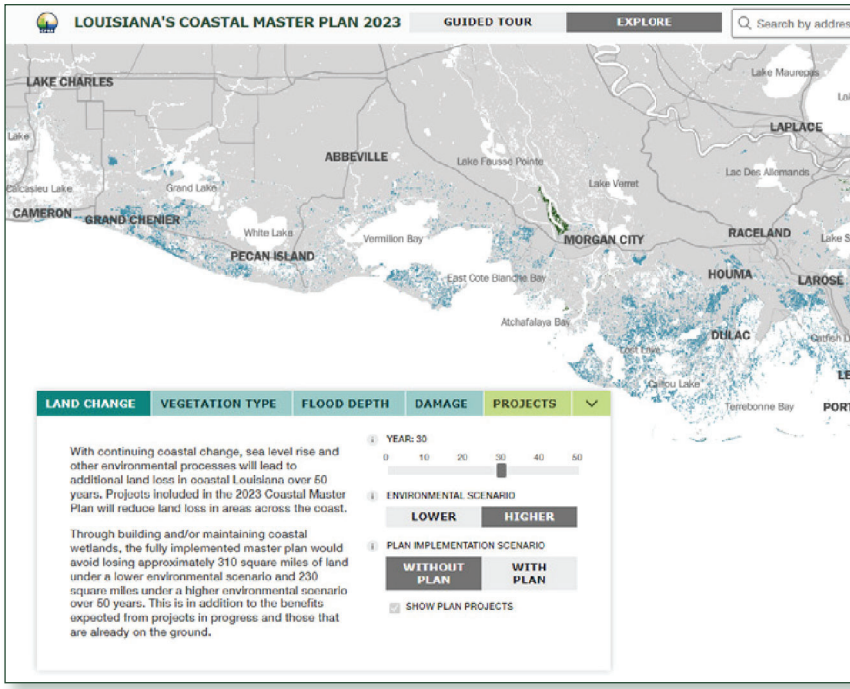

Figure 7.2: Desktop View of the Master Plan Data Viewer Showing Coastwide Land Change Data.

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Each of these agencies also has a role to play in building a more resilient coast. Coastal resilience spans several spheres of state government — it includes a robust built environment, a sustainable natural environment, a strong economy, and health and opportunity for all coastal residents.

The Adaptive Governance Initiative (AGI) asks agencies to consider their role in proactively planning for coastal resilience and ensuring that they can continue to meet their mission in the face of increasing coastal change. Such a multi-sector, holistic approach to the coastal crisis is necessary to support coastal residents and business in the face of rapid change.

The crisis on the coast is punctuated by singular disasters like hurricanes, but it also brings chronic stressors for the people, communities, natural resources, and economies of Louisiana as water levels rise and land degrades. These chronic issues often manifest in higher management costs, increased workloads, and extended periods of emergency operations within state agencies. Through the AGI each agency is identifying ways to adapt to these changes while also elevating the challenges and needs that are common across several agencies.

Together, agencies are helping to build a more resilient state by supporting more comprehensive and adaptable programs and assets that meet the changing needs of our coastal populations.

Louisiana's master plan offers a foundation for the agencies' work by providing analysis and insights into

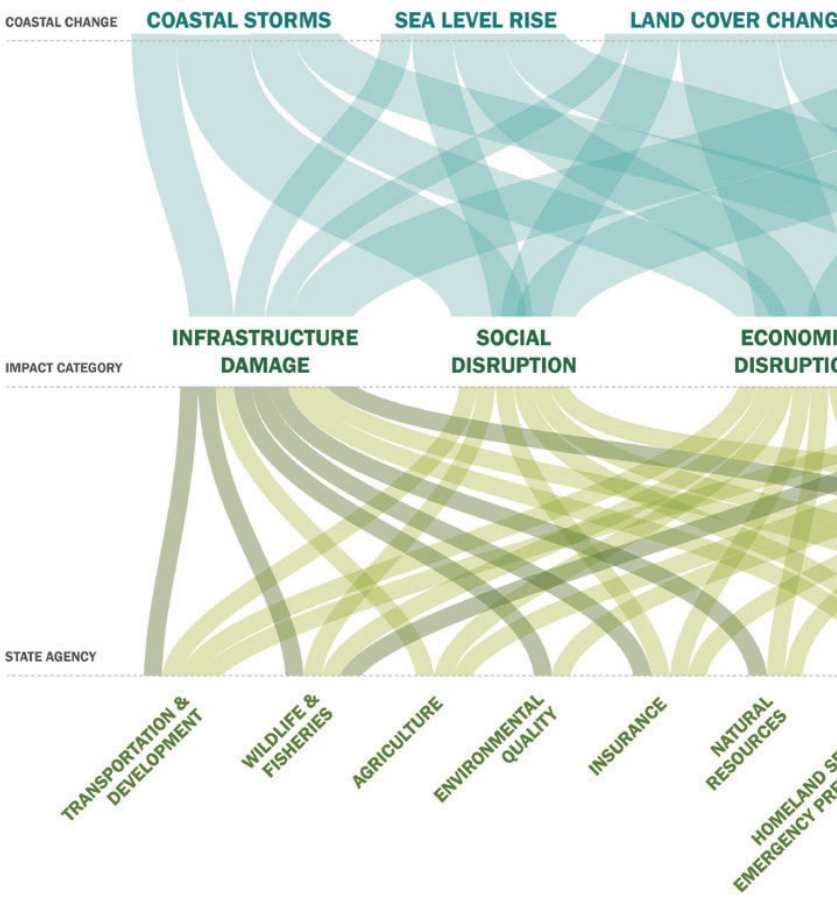

Figure 7.3: Cascading Impacts of Coastal Change to a Selection of State Agencies.

which areas may face increasing environmental risk and which may have more time to adapt. Equipped with this critical information, agencies across government can better plan their investments in assets and adjust their programs to serve the people of Louisiana and carry out their missions more effectively and efficiently today and in the future.

The AGI is a joint effort of the Office of the Governor and the Center for Planning Excellence (CPEX) and is being implemented with support from the Walton Family Foundation, the Kresge Foundation, Foundation for Louisiana, Greater New Orleans Foundation, and CPRA.

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is to improve water quality and improve access to the basin through the implementation of hydrologic restoration projects. Through the implementation of these projects, the program ensures that the ongoing work aligns with the state's coastal priorities.

Although ABP is administered by CPRA, many entities provide recommendations and guidance such as the Atchafalaya River Basin Restoration and Enhancement Task Force (ARBRE). ARBRE is made up of stakeholders that include state and local leaders, academics, private citizens, and state agency representatives. ARBRE is chaired and staffed by the Governor's Office of Coastal Activities (GOCA). ARBRE was created to identify major concerns and develop strategies and recommendations to the CPRA Board.

ARBRE works to elevate critical issues facing the Atchafalaya Basin, identify and build support for new and recurring sources of funding, identify shared goals and values for restoration and enhancement of the basin, and serve as a proactive means to build consensus and advise ABP on matters relating to the implementation of the Atchafalaya Basin Floodway System. Once ARBRE was established, its primary mission was to study the Atchafalaya Basin and develop an initial report on findings for the CPRA Board. The recommendations included the following:

- Enhance outreach that highlights the importance of the Atchafalaya Basin locally
- Urge and request Congress to fully fund construction of finalized USACE studies relevant to the management of the Atchafalaya Basin as well as fund authorized studies
- Urge USACE to approach management of the ecological restoration as a primary component along with flood control and navigation
- Request the CPRA Board evaluate inclusion of the remainder of the Atchafalaya Basin within the Louisiana Coastal Zone
- Restore the north/south sheet flow within the basin
- Restore and conserve deep water habitats within the basin
- Examine ways to better manage sediment within the Atchafalaya Basin
- Examine the current hydrology of the Atchafalaya Basin, including management of the Old River Control Complex and the Atchafalaya Basin channel outlets
- Update the state's Atchafalaya Basin Master Plan to include current conditions and challenges as determined by the ARBRE Task Force
- Recommend the CPRA Board and CPRA

Image: Atchafalaya Swamp, 2018 (Louisiana Sea Grant College Program)

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legal, and financial considerations. The 23-member body set priorities for the overall planning process as well as an approved set of recommendations for the Climate Action Plan. The Task Force was chaired and staffed by the Governor's Office of Coastal Activities (GOCA). Under leadership of the Governor's Executive Assistant for Coastal Activities, GOCA served as the staff and managers of the Task Force, advisory groups, and sector committees in coordination with advisory and committee chairs.

Louisiana is among the most vulnerable states in the United States to the impacts of climate change. The state's hot and humid climate and location at the mouth of the Mississippi River and the edge of the Gulf of Mexico carry environmental challenges that have direct and indirect impacts on local communities. Throughout the state, whole communities are being displaced. Louisiana is home to people, critical industries, cultural resources, and tourism economies. The coastal plain and low-lying regions of the southeast are extremely vulnerable to climate change impacts. Flood frequencies, extreme rainfall events, and sea level rise affect property values and the viability of infrastructure. Extreme heat and changing seasonal climates are projected to have impacts on exposure-linked health and economic vulnerabilities in agricultural, timber, and manufacturing sectors.

The Louisiana Climate Action Plan contains 28 strategies and 84 specific actions to reduce GHG emissions across the state's economy. The report provides details from activities across the economy about where Louisiana's GHG emissions originate, where they are naturally absorbed from the atmosphere, and direction about how to approach

Report was developed through the Structured Decision Making approach, which integrates science and policy to break down complex decisions and identify solutions that achieve the desired ends.

With the technical support of the Louisiana State University (LSU), the LSU Center for Energy Studies conducted an update to Louisiana's GHG inventory using the United States Environmental Protection Agency's State Inventory Tool methodology to ensure consistency with the methodology used to prepare the state's previous inventory. A Science Advisory Group provided oversight and direction to guide the GHG inventory update process, including two rounds of comments. The inventory estimates and assesses the state's GHG emissions from all major sources, activity types, economic sectors, and pollutant types and provides an important updated snapshot in time of Louisiana's GHG baseline. Overall, the findings of this inventory suggest that industrial decarbonization is critical to achieve future GHG emission goals in Louisiana.

A presentation of draft findings was shared with the Task Force in its July 2021 meeting. The plan recommends strategies (high-level approaches) and actions (practical and implementable policy steps) to reduce GHG emissions to net zero by 2050 and avert the worst impacts of climate change.

The recommendations span eight sections and include the following:

- Clean energy transition
- Industrial decarbonization
- Actively managed methane emissions
- Transportation, development

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Construction funding was added to the 2022 Infrastructure Investment and Jobs Act in the amount of $120 million. The funds are only available for the storm damage risk reduction features of the project. Additional USACE guidance is forthcoming once the funds are made available. The $296 million investment is projected to elevate over 500 structures.

USACE will work closely with the CPRA Board, who will serve as the non-federal sponsor, to execute a Project Partnership Agreement. Once the agreement is in place, USACE will solicit and award a Design/Build Construction Contract to prepare individual plans. Once agreed to by the homeowner, the CPRA Board and USACE will issue a notice to proceed to elevate the structure to the projected Year 2075 100-year base flood elevation. Homeowners will be required to sign a floodproofing agreement stating that they cannot use the space below the first floor for living space along with other terms.

To date, 27 structures have been approved for construction and elevation — 10 in Calcasieu Parish and 17 in Vermilion Parish. USACE prioritized the structures by their first floor elevation and the low to moderate income area status. Approximately 150 voluntary applications have been received for inclusion in the project from the targeted list of homeowners, and elevation of the first structures is expected in early 2023.

BARRIER ISLAND SY
MANAGEMENT

Coastal Louisiana's barrier island systems are an important component of the Mississippi River Delta Plain, providing a variety of ecosystem services, such as habitat, storm surge buffering, and maintenance of marine and estuarine gradients. For decades, there have been efforts to restore and protect these rapidly degrading barrier islands. In 2021, CPRA developed the Barrier Island System Management (BISM) program with facilitation by the Water Institute of the Gulf. BISM is a holistic, system-wide approach to barrier island management that guides when and where to focus restoration resources to maintain barrier island integrity, while minimizing overall system maintenance costs and reducing project implementation times.

Two databases were created to support the BISM program. The BISM Database of Databases is an inventory of data relevant to barrier island restoration decisions. The BISM Stakeholder Concern Inventory details decision-maker and stakeholder interests relevant to barrier island restoration, including potential funding entities and regulatory authorities.

Louisiana has also developed the Barrier Island Restoration Tradeoff Analysis (BIRTA) toolkit to support quantitative analysis of restoration project consequences, identify future sediment and funding needs, and provide input into the design of monitoring programs. Because the model is probabilistic and driven directly by available data, it can identify the largest uncertainties and most critical gaps in barrier island restoration prioritization.

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evaluate project costs, need, feasibility, and the overall benefit. The CWPPRA Technical Committee conducts public hearings to release findings and receive comments about the candidate projects. The Technical Committee recommends up to four of the 10 candidate projects for the CWPPRA Task Force to select projects to receive funding.

CWPPRA project funding is allocated through an annual funding stream, with a mix of federal and state funds. Federal funding comes through the Sport Fish Restoration and Boating Trust Fund, which is funded by taxes on marine fuel, boater registrations, and fishing equipment. There is an 85% federal, 15% state cost share, with roughly $5 million allocated for planning, $3 to $4 million allocated for engineering and design projects, and project-dependent funding for construction and post completion monitoring/maintenance. Funded projects provide for the long-term conservation of wetlands and dependent fish and wildlife populations with cost-effective plans for creating, restoring, protecting, or enhancing coastal wetlands.

Considered the backbone for restoration throughout the state, CWPPRA has an entire suite of projects identified for restorative habitat. Administered by USACE, typical projects undertaken through CWPPRA include marsh creation, shoreline protection, hydrologic restoration, beneficial use of dredged material, terracing, sediment trapping, vegetative planting, barrier island restoration, and bank stabilization. Funded projects provide for the long-term conservation of wetlands and dependent

LOWERMOST MISSIS
RIVER MANAGEMEN
PROGRAM

The Lowermost Mississippi River Management Program (LMRMP) aims to move toward a more holistic approach for water and sediment management that supports the long-term sustainability of the Lowermost Mississippi River (LMR), defined for purposes of the program as the Mississippi River and its outlets in southern Louisiana below, and inclusive of, the Old River Control Structure.

LMRMP effort was launched in 2018 and will conclude in fall 2023 and is supported primarily by a $9.3 million award to CPRA from the Gulf Coast Ecosystem Restoration Council-funded Component of the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States (RESTORE) Act. CPRA also leveraged external funding from the National Wildlife Federation. It builds upon the Louisiana Coastal Area Mississippi River Hydrodynamic and Delta Management Study previously conducted by USACE and CPRA and serves to further develop the science needed to adequately inform decision-makers on future LMR management.

LMRMP is structured to strengthen partnerships, improve/develop science and technical tools, and help advance holistic water and sediment management that yield practical benefits across all interests.
CPRA objectives for managing LMR include:

- Support the long-term sustainability of the coast and reduce land loss to the extent possible,
- Maintain and enhance channels that support use of the LMR for navigation,
- Enhance the health of ecosystems associated with the LMR,
- Support holis
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- Improving the way residents and governments understand, address, and respond to flood risk
- Organizing a structure for making decisions and improvements on a regional scale
- Developing the modeling, planning, and data tools needed to inform and support effective watershed-based decisions and projects

In August 2019, the Council agreed to use eight watershed regions as a starting point to coordinate efforts among parishes and distribute project funds.

Following the launch of LWI, the U.S. Department of Housing and Development (HUD) allocated approximately $1.2 billion to Louisiana in Community Development Block Grant Mitigation (CDBG-MIT) funding for the purpose of mitigating current and future flood risk, providing an unprecedented opportunity to enhance and expedite LWI efforts. Guided by a federally approved Action Plan, LWI is utilizing these funds to support statewide planning, watershed modeling, data collection, and flood mitigation projects that reduce flood risk across the state. In administering this grant, the state and its various jurisdictions and political subdivisions are coordinating expenditures and activities throughout LWI to improve statewide floodplain management.

More information on LWI, including its various programs — many of which are ongoing and supported by the CDBG-MIT funding stream —can be found at https://watershed.la.gov/.

HYPOXIA TASK FORC

The Mississippi River/Gulf of Mexico Watershed Nutrient Task Force, or “Hypoxia Task Force,” is a partnership of 12 states along the Mississippi River, five federal agencies, and Tribes working in collaboration to reduce nutrient pollution in the Mississippi/Atchafalaya River Basins and the extent of the hypoxic zone in the Gulf of Mexico. Established in 1997 to understand the causes and effects of eutrophication in the Gulf of Mexico and to coordinate management activities throughout the Mississippi-Atchafalaya River Basin, Hypoxia Task Force activities include improvements in management of both point sources and nonpoint sources of nutrient pollution to reduce inputs into the river system. The goal of the Hypoxia Task Force is to reduce the hypoxic zone to less than 5,000 km^2 by 2035 with an interim target to reduce nitrogen and phosphorus loading 20% by 2025 (relative to the 1980-1996 baseline average loading to the Gulf).

Every five years, the Hypoxia Task Force updates its Gulf Hypoxia Action Plan to assess actions taken, discuss success stories, and prioritize future efforts. A critical component to the state aligning to the goals of the Gulf Hypoxia Action Plan has been development and implementation of Louisiana’s Nutrient Reduction and Management Strategy.

The implementation strategy focuses on six key areas: river diversions, nonpoint source pollution management, point source pollution management, incentives, leveraging opportunities, and new science-

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Rating System (CRS). Prior to RR2.0, all NFIP policyholders had been subject to premium increases; the annual rate increases were capped at 18% for most policyholders and increases were applied to all properties. Under RR2.0, premiums are tailored to an individual property and annual rate increases will continue at no more than 18% per year until an individual property's "full risk-based rate" is met. With the implementation of RR2.0, 80% of Louisiana policyholders saw an increase in insurance rates.

While the goals of the NFIP are in line with the 2023 Coastal Master Plan's goal of reducing flood risk, there are concerns about the impact of the implementation of the RR2.0 methodology in Louisiana. Increases to flood insurance rates may make it harder to ensure a stable and affordable housing market which is necessary to not unduly disrupt local revenues, culture, productive fisheries, and the productive economy of Louisiana's working coast. Because the storm surge-based flood risk modeling undertaken for the master plan incorporates the latest details on Louisiana's storm surge risk reduction activities, it could be leveraged by FEMA for determining tractable, accurate, and defensible flood risk exposure values for use in NFIP policy-writing within coastal Louisiana.

Additionally, the proposed structural and nonstructural risk reduction projects, as well as wetland restoration projects, identified in the 2023 Coastal Master Plan provide a direct path forward for reducing storm surge-based flood risk for coastal residents in Louisiana. The construction of new levees, such as those included in this plan, as well as individual nonstructural

Image: Pointe-aux-Chênes, 2020. (Louisiana Sea Grant College Program)

and regularly updated in the NFIP premium-determination process. However, under RR2.0, the benefits of structural and nonstructural flood protection are no longer tightly coupled to premium rates due to a smaller impact of home elevation (relative to base flood elevation) in the overall rate-setting calculations. Incorporating additional factors such as proximity to water complicates the rate-setting and likely has the unintended consequence of reducing the insurance-related incentive for homeowners to elevate their homes.

The state, parishes, levee districts, congressional delegates, and Governor John Bel Edwards have all asked for clarity from FEMA; specifically, that details are provided on exactly how the new "full risk-based rates" were determined in our state in areas protected by levees or otherwise. The

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RD) (retired)
Levee District
tment of Marine

d Fur / Louisiana

f Agriculture and

vancy (TNC)

Keith Lovell, Louisiana Department of Natural Resources (LDNR) – Office of Coastal Management
Kimberly Davis Reyher, Coalition to Restore Coastal Louisiana (CRCL)
Laurie Cormier*, Calcasieu Parish
Lori Leblanc*, Mid-Continent Oil and Gas
Mike Carloss*, Ducks Unlimited
Michael Miller, Associated Brand Pilots
Michelle Gonzales, Jefferson Parish
Natalie Snider, MRD / Environmental Defense Fund (EDF)
Patrick Forbes, Louisiana Office of Community Development (OCD)
Patrick Landry, Louisiana Department of Transportation and Development (DOTD)
Patrick Witty, Louisiana Economic Development (LED) – Small Business
Paul Frey*, Louisiana Landowners Association (LLA)
Quenton Fontenot, Nicholls State University
Quin Kinler, U.S. Department of Agriculture - Natural Resources Conservation Service (USDA – NRCS)
Robert Twilley, LSU Coastal Sustainability Studio
Ron Boustany, USDA – NRCS
Ronald Paille, U.S. Fish and Wildlife Service (USFWS)
Sam Bentley, LSU Coastal Studies Institute (CSI)
Scott Kirkpatrick, Coast Builders Coalition
Sharon Osowski, U.S. Environmental Protection Agency (EPA) – Region 6
Sidney Coffee*, America's Wetland Foundation
Simone Maloz, MRD
Spencer Murphy, Canal Barge Co. Inc.
Steve Cochran*, MRD
Susan Bergeron*, Barataria-Terrebonne National Estuary (BTNEP)
Tim Matte, St. Mary Levee District
Todd Baker*, LDWF
Tokesha Collins-Wright, Louisiana Chemical Association
Tyler Gray*, Mid-Continent Oil and Gas

REGIONAL WORKGROUPS (RWs)

CHENIER PLAIN RW

Andrew (Andy) MacInnes, USACE
Charles Hebert, USACE
Chad Courville, Miami Corporation
Chad Lege, Vermilion Parish Police Jurors
Dennis Scott*, Calcasieu Parish
Doug Miller, Sweet Lake Land & Oil
George Melancon, LDWF – Fisheries
Glenn Harris, U.S. Fish and Wildlife Service (USFWS) – Southwest Louisiana National Wildlife Refuge Complex Manager
Greg Linscombe, Continental Land and Fur
Jenneke Visser, University of Louisiana at Lafayette (retired)
John ("Andy") Nyman, LSU Renewable Natural Resources (RNR)
Kara Bonsall, Cameron Parish Police Jury
Kevin Sagrera*, Vermilion Parish Police Jurors
Kevin Savoie, LSU AgCenter / Louisiana Sea Grant
Laurie Cormier*, Calcasieu Parish
Phillip ("Scooter") Trosclair, LDWF – Wildlife
Regan Brown, Port of Lake Charles
Rica Canik*, Cameron Parish Police Jury
Ryan Bourriaque*, Cameron Parish Police Jury

CENTRAL COAST RW

Ann Howard*, LDWF
Billy Broussard, Vermilion Corp
Cassidy Lejeune, Ducks Unlimited
Chad Lege, Vermilion Parish Police Jurors
Donald Sagrera, Teche Vermilion Freshwater District
John ("Andy") Nyman, LSU RNR
Karen Westphal*, MRD / National Audubon Society
Kevin Sagrera*, Vermilion Parish Police Jurors
Lance Campbell, LDWF – Wildlife
Mark Shirley, LSU AgCenter
Randy Moertle†, McIlhenny Corp
Ralph Libersat†, Chenier Plain Coastal Restoration & Protection Authority
Robert Twilley, LSU Coastal Sustainability Studio (CSS)
Ron Boustany, USDA – NRCS
Scott Saunier, Iberia Parish
Tim Matte, St. Mary Levee District

TERREBONNE B

Alex Kolker, Loui (LUMCON)
Amanda Voisin,
Brady Carter, LD
Chris Swarzensk
Dwayne Bourgeo
Earl Melancon, L
Greg Linscombe
Jennifer Gerbasi Government (
Jonathan Willis,
Lance Campbell
Leslie Suazo, Du
Mart Black, TPC
Matt Benoit, BT
Quenton Fonten
Reggie Dupre, Te
Richard Demay*
Ronald Paille, US
Simone Maloz*,
Tim Allen, Apach
Victoria Bourque
Windell Curole, S

BARATARIA BAS

Alisha Renfro, N
Amanda Voisin,
Blaise Gravois*,
Brady Carter, LD
Craig Gothreaux
Dwayne Bourgeo
Earl Matherne, S
Joni Tuck, Lafour
Julie Whitbeck,
Kevin Roy, USFW
Lance Campbell
Lauren Averill*,
Michael Massim
Michael Miller, A
Michelle Gonzal
Ordis (Buddy) Sn
Robert Spears, F
Sam Bentley, LS

TECHNICAL ADVISORY COMMITTEES

PREDICTIVE MODELS TECHNICAL ADVISORY COMMITTEE (PM-TAC)

Jen Irish, Virginia Tech – Chair
Courtney Harris, Virginia Institute of Marine Science, William & Mary
Wim Kimmerer, San Francisco State University
Matthew Kirwan, Virginia Institute of Marine Science, William & Mary
A.R. Siders, University of Delaware
Mark Stacy, University of California, Berkeley
Samuel Brody*, Texas A&M

MODELING TEAMS

ICM-HYDROLOGY

Md Nazmul Azim Beg, Tulane University
Martijn Bregman, The Water Institute of the Gulf
Kevin Hanegan, Moffatt & Nichol
Kelin Hu, Tulane University
Alex McCorquodale, The Water Institute of the Gulf
Ehab Meselhe, Tulane University
Christopher Siverd, Moffatt & Nichol
Yushi Wang, The Water Institute of the Gulf
Zhanxian Jonathan Wang, Moffatt & Nichol
Eric D. White, CPRA
Chia-Yu Wu*, Tulane University

ICM-MORPHOLOGY AND ICM-VEGETATION

Melissa M. Baustian*, The Water Institute of the Gulf
Brady Couvillion, USGS
Kristin DeMarco, LSU
Scott Duke-Sylvester†, University of Louisiana at Lafayette
Madeline Foster-Martinez, University of New Orleans
Madeline LeBlanc Hatfield, CPRA
Elizabeth Jarrell*, CPRA
Tommy McGinnis, CPRA
Denise Reed, University of New Orleans
Donald Schoolmaster, USGS
Leigh Anne Sharp, CPRA
Gregg Snedden, USGS
Jenneke Visser, University of Louisiana at Lafayette (retired)

ICM-HABITAT SUITABILITY INDEX (HSI)

Brady Carter, LDWF
Laura D'Acunto, USGS Wetland and Aquatic Research Center
Ann C. Hijuelos, USACE (formerly with USGS)
Erik Johnson, Audubon Louisiana
Megan K. La Peyre, USGS, Louisiana Fish and Wildlife Cooperative Research Unit
Summer Langlois, CPRA
David Lindquist, CPRA
Nicole Michel, Audubon Louisiana
Lindsay Nakashima, Audubon Louisiana
Ann M. O'Connell, University of New Orleans
Brett Patton, USGS Wetland & Aquatic Research Center
Katie Percy, Audubon Louisiana
Elizabeth M. Robinson, LSU AgCenter
Shaye E. Sable, Dynamic Solutions LLC
Eric D. White, CPRA

ICM-BARRIER ISLANDS

Ben Beasley, Applied Coastal
Jonathan Bridgeman*, CPRA
Zach Cobell, The Water Institute of the Gulf
Soupy Dalyander, The Water Institute of the Gulf
Ovel Díaz García, The Water Institute of the Gulf
Diana Di Leonardo, The Water Institute of the Gulf
Zhifei Dong, APTIM
Catherine Fitzpatrick*, CPRA
Madeline Foster-Martinez, University of New Orleans
Ioannis Georgiou, The Water Institute of the Gulf
Madeline LeBlanc Hatfield, CPRA
Elizabeth Jarrell*, CPRA
Darin Lee, CPRA
Michael Miner, The Water Institute of the Gulf
Eric D. White, CPRA

STORM SURGE AND RISK ASSESSMENT

Stuart Brown, CPRA
Ashley C. Cobb, CPRA
Zach Cobell, The Water Institute of the Gulf
Ovel Díaz García, The Water Institute of the Gulf
David DeSmet, RAND Corporation
Jordan Fischbach, The Water Institute of the Gulf
Angelina Freeman, CPRA

Krista L. Jankow
Elizabeth Jarrell
David Johnson, F
Patrick Kane, Th
Abby Littman, Th
Sam Martin, CPR
Mikaela Meyer,
Hugh Roberts, Th
Chuck Stelzner,
Jingya Wang, Pu
Michael Wilson,
Eric D. White, CP

HIGH TIDE FLOO

Harris Bienn, The
Ashley C. Cobb,
Zach Cobell, The
Dexter Ellis, The
Jordan Fischbac
Scott Hemmerlin
Krista L. Jankow
Elizabeth Jarrell
David Johnson, F
Sam Martin, CPR
Brett McMann, T
Jessi Parfait*, Th
Hugh Roberts, Th
Rachelle Sander
Yushi Wang, The
Eric D. White, CP

PLANNING TO

Stuart Brown, CP
Jake DeWeese, F
David Groves, RA
Elizabeth Jarrell
Krista L. Jankow
Madeline LeBlan
Sam Martin, CPR
Christina Panis,
Denise Reed, Un
Michael Wilson,
Eric D. White, CP

E (PDD)

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e development
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XSEDE) grant:

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T SUPPORT

PORT

TECHNICAL CONTRIBUTORS

Jacques Boudreaux, CPRA
Angelina Freeman, CPRA
Blaire Hutchison, USGS
Syed Khalil, CPRA
Jim Pahl, CPRA
Jas Singh, CPRA
Joe Wyble, CPRA

MASTER PLAN MODEL DEVELOPMENT TEAM

Stuart Brown, CPRA
Ashley C. Cobb, CPRA
Catherine Fitzpatrick*, CPRA
Andrea Galinski*, CPRA
Mandy Green*, CPRA
Madeline LeBlanc Hatfield, CPRA
Valencia Henderson, CPRA
Krista L. Jankowski, CPRA
Elizabeth Jarrell*, CPRA
David Lindquist, CPRA
Sam Martin, CPRA
Denise Reed, University of New Orleans
Zachary Rosen*, CPRA
Rachelle Sanderson*, CPRA
Forrest Town*, CPRA
Eric D. White, CPRA

STRATEGY TEAM

Stuart Brown, CPRA
Ashley C. Cobb, CPRA
Catherine Fitzpatrick*, CPRA
Mandy Green*, CPRA
Madeline LeBlanc Hatfield, CPRA
Valencia Henderson, CPRA
Krista L. Jankowski, CPRA
Elizabeth Jarrell*, CPRA
Sam Martin, CPRA
Denise Reed, University of New Orleans
Forrest Town*, CPRA

GLOSSARY

Annual Exceedance Probability (AEP) Flood Depth: The flood depth, at a specific location, that has a likelihood of being met or exceeded in any given year. For example, a 1% AEP flood depth is the depth that has a 1% (or 1-in-100) chance of occurring (or being exceeded) in any given year; this specific example is often referred to as a 100-year flood.

Environmental Scenarios: Sets of assumptions about key environmental drivers affecting land change and flood risk. These include several climate and non-climate drivers of change such as sea level rise, precipitation, and subsidence. To evaluate and prioritize projects, this process utilized two scenarios that represent a range of plausible future environmental conditions that were utilized to account for uncertainty in planning.

Expected Annual Damage in Dollars (EADD): An annualized estimate of storm surge damage. Includes damage to structures, their contents, and other direct losses incurred during the recovery period after a storm event, such as lost wages, costs associated with evacuation and temporary displacement, and other considerations. Measured in $USD.

Expected Annual Structural Damage (EASD): An annualized estimate of structural damage that represents an aggregate risk to structures, with damage to each structure expressed as a proportion of its replacement cost. Considers equity in project selection process by eliminating the role of property values in estimating damages. Measured in structure equivalents.

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COASTAL PROTECTION AND RESTORATION AUTHORITY OF LOUISIANA
coastal.la.gov