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2023 COASTAL MASTER PLAN  
*COMMITTED TO OUR COAST*

# LOUISIANA'S COASTAL MASTER PLAN 101



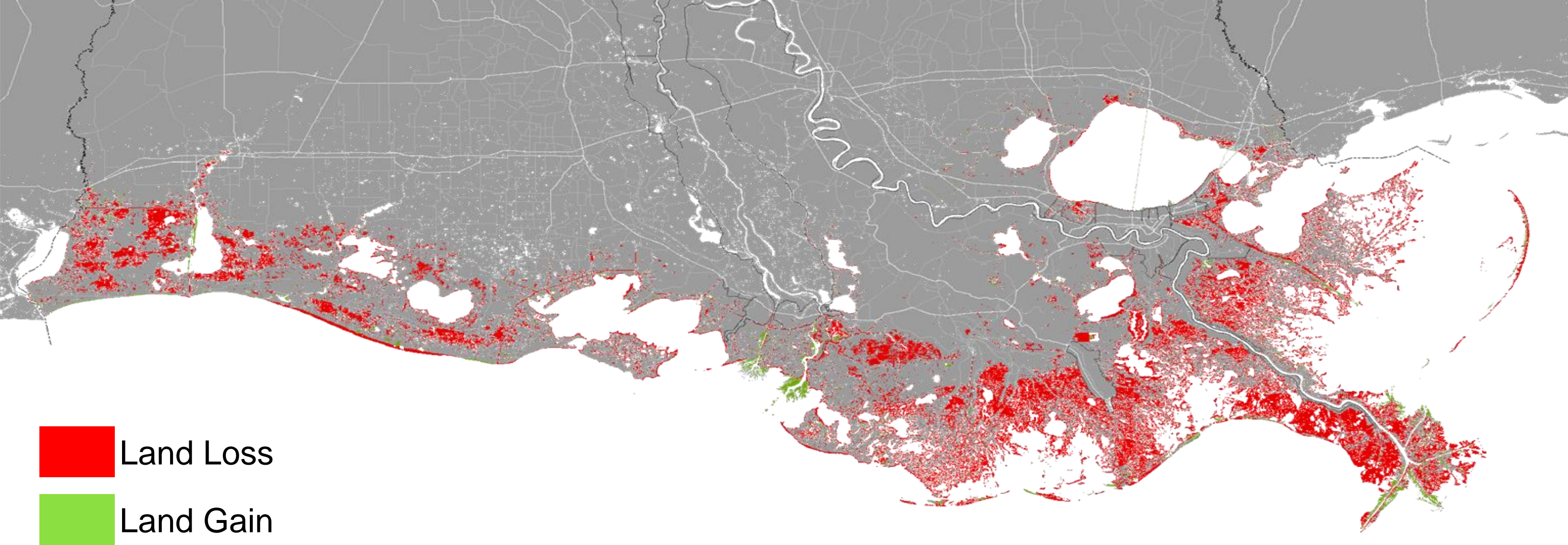
**SEPTEMBER 2022**

# OUTLINE

## LOUISIANA'S COASTAL MASTER PLAN 101

- Introduction
  - Louisiana's Coastal Crisis
  - What is the Master Plan?
- 2023 Coastal Master Plan Development
  - Process Overview
  - New Project Development
  - Predictive Models (landscape, storm surge, and risk)
  - Planning Tool Approach
- Upcoming Master Plan Outreach Activities
- Recent/Current Project Updates





Historic Land-Water Change from 1932-2016  
Approx. 2,000 sq. mi.  
Couvillion et al (USGS), 2017

# LOUISIANA'S COASTAL CRISIS

A HISTORICAL AND ONGOING CHALLENGE FOR THE STATE  
2023 COASTAL MASTER PLAN



# WHAT'S AT STAKE?



Photo courtesy of Louisiana Sea Grant



Photo courtesy of Louisiana Sea Grant



Photo courtesy of Lindsey Janies Photography



Photo courtesy of Louisiana Sea Grant



Photo courtesy of Louisiana Sea Grant





# WHAT'S AT STAKE?



Residents of Lake Charles, Louisiana carry relief supplies to family members after Hurricane Ike. Photo courtesy of Chuck Simmins.



Flooding in Crown Point, photo courtesy of Alysha Jordan



Flooding in Mandeville, photo courtesy of Louisiana Sea Grant



Flooding in New Orleans, photo courtesy of Jocelyn Augustino



Photo courtesy of Louisiana Sea Grant





**Established following the 2005 storm season, CPRA is the single state entity with authority to articulate a clear statement of priorities to achieve comprehensive coastal protection for Louisiana.**

**CPRA has a mandate to develop, implement, and enforce a comprehensive restoration and risk reduction Coastal Master Plan. In 2023, the 4th edition of the master plan will be released.**





# WHAT IS THE COASTAL MASTER PLAN?

SCIENCE-BASED, STAKEHOLDER-INFORMED

- Prioritization effort
  - How can the state spend its money most cost-effectively over the next 50 years to reduce storm surge-based flood risk and restore and maintain coastal wetlands?
- Developed through a process that ensures adaptive management
  - Required by law to be updated every 6 years
- Built on world class science and engineering
- Advances a comprehensive and integrated approach to restoration and risk reduction
- Incorporates extensive public input and review
- Illustrates how people and communities will experience a changing coast to allow preparation and adaptation into the future





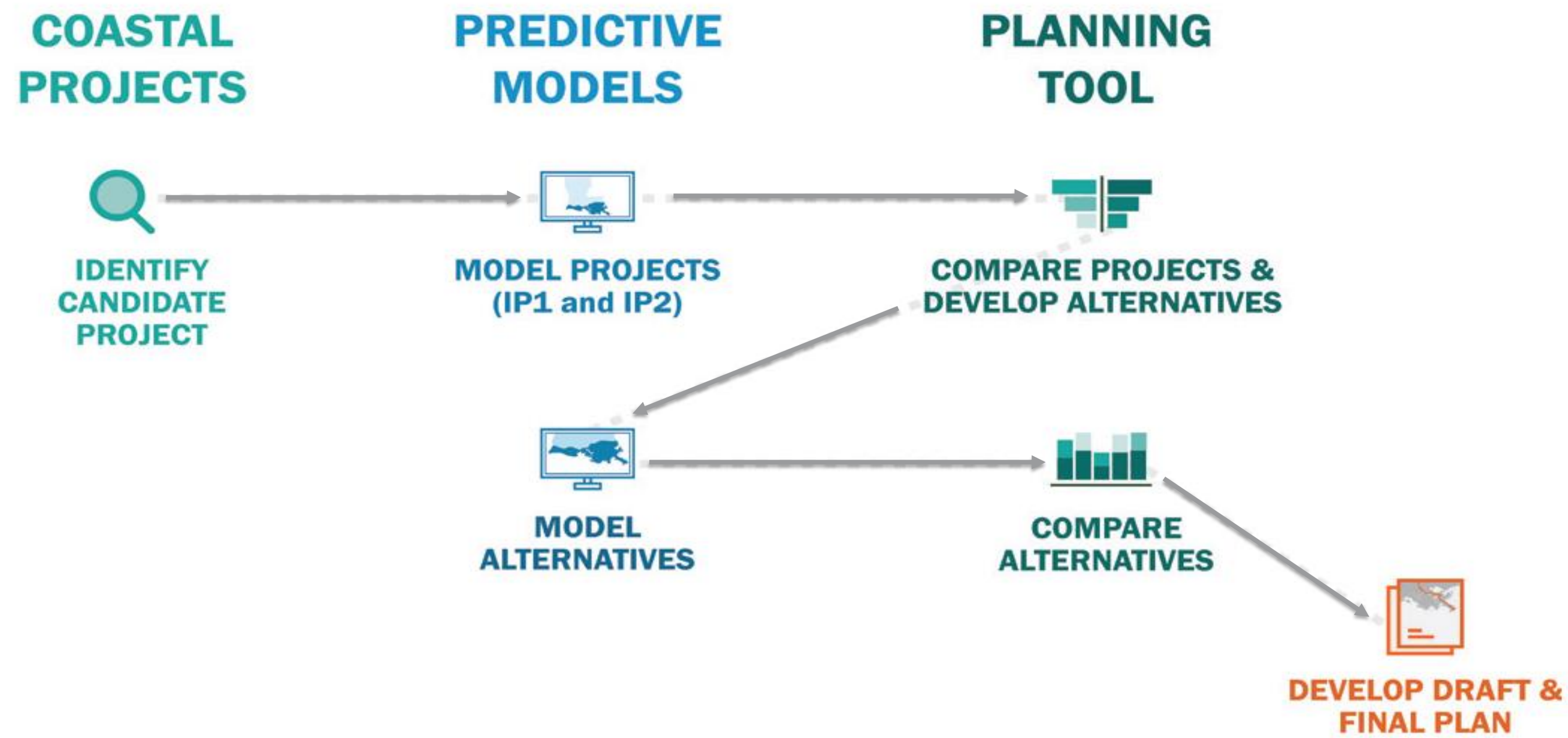
A scenic coastal landscape featuring a body of water in the foreground. On the right, a white boat with green accents and a metal frame is moving across the water, leaving a white wake. To the left of the boat, there is a large, dense clump of tall, dry, yellowish-brown reeds or marsh grasses. The background consists of a line of green trees under a bright blue sky with scattered white clouds. A dark green rectangular box is superimposed over the center of the image, containing white text.

# **2023 COASTAL MASTER PLAN DEVELOPMENT**



# 2023 COASTAL MASTER PLAN PROCESS

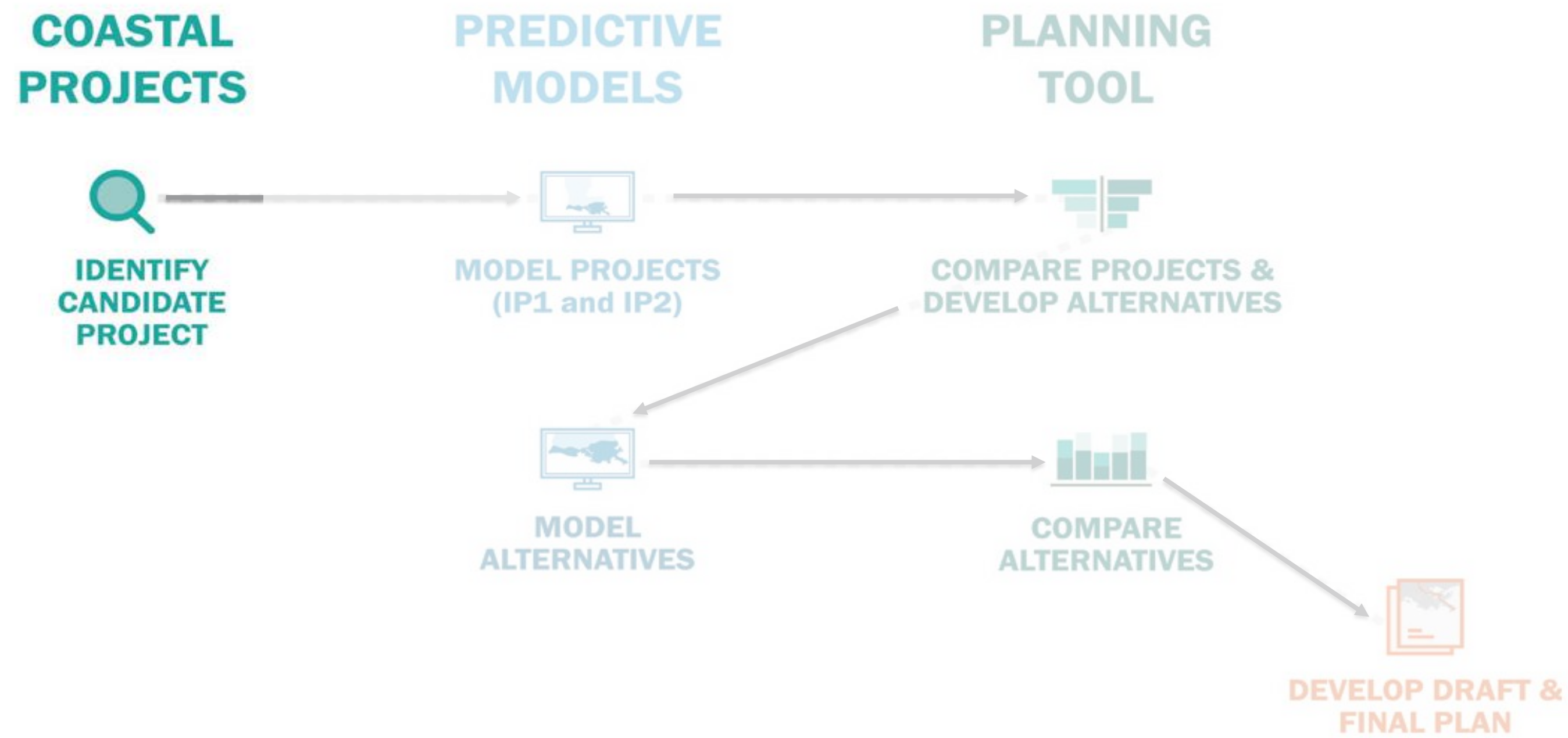
A MULTI-STEP PROJECT PRIORITIZATION EFFORT





# 2023 COASTAL MASTER PLAN PROCESS

A MULTI-STEP PROJECT PRIORITIZATION EFFORT





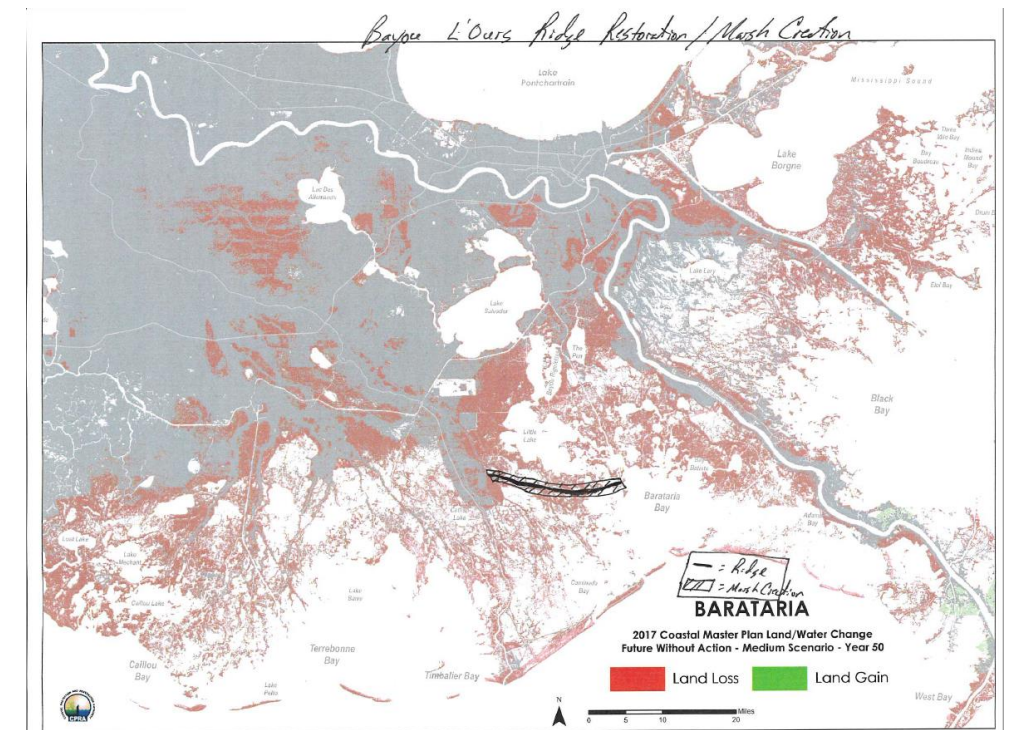
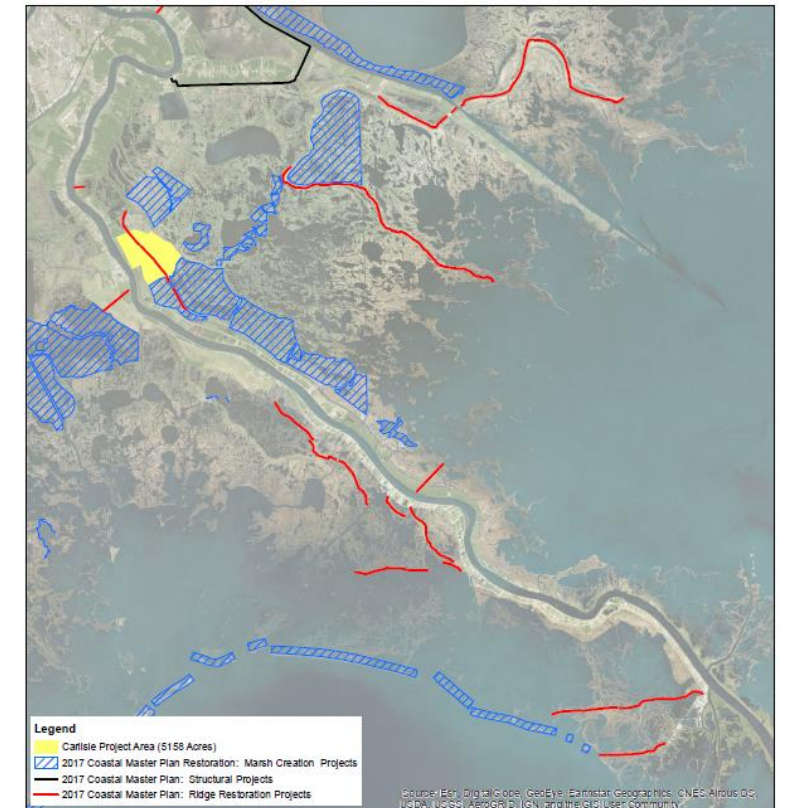
# NEW PROJECT DEVELOPMENT PROCESS

## SOLICITING PROJECT CONCEPTS FOR THE 2023 COASTAL MASTER PLAN

Purpose: prioritization effort to assess benefits of large-scale restoration and risk reduction project concepts over 50 year model window

Goal: facilitate an engaged process to improve master plan outcomes, particularly for areas where future conditions are stark

- 2 Public Solicitation Periods for new concepts
  - Oct 2018 – Mar 2019; Oct 2019 – Feb 2020
- Created 5 Regional Workgroups: 2018 – ongoing
  - Assist in development of new project concepts
  - Review preliminary model outputs and refine project concepts



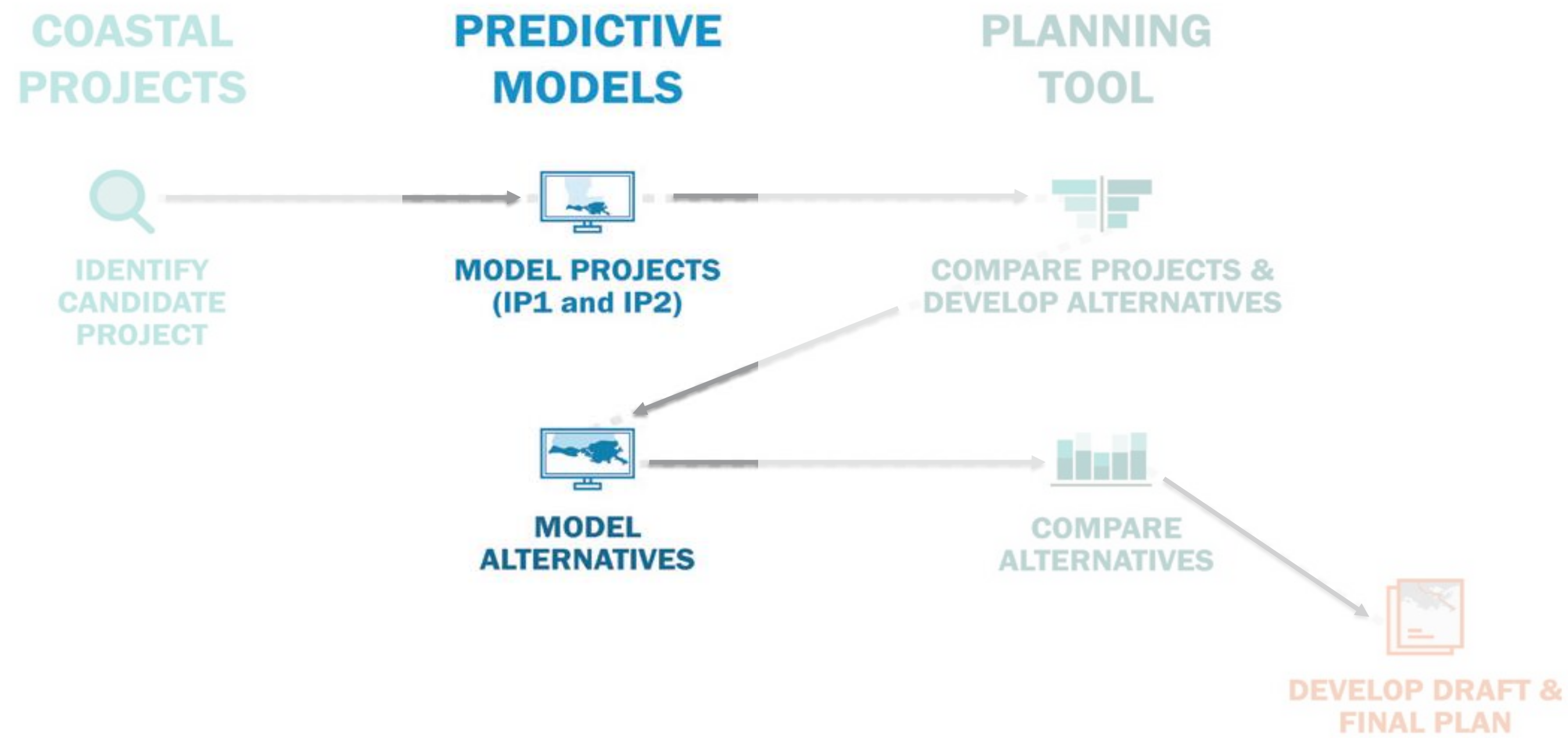






# 2023 COASTAL MASTER PLAN PROCESS

A MULTI-STEP PROJECT PRIORITIZATION EFFORT





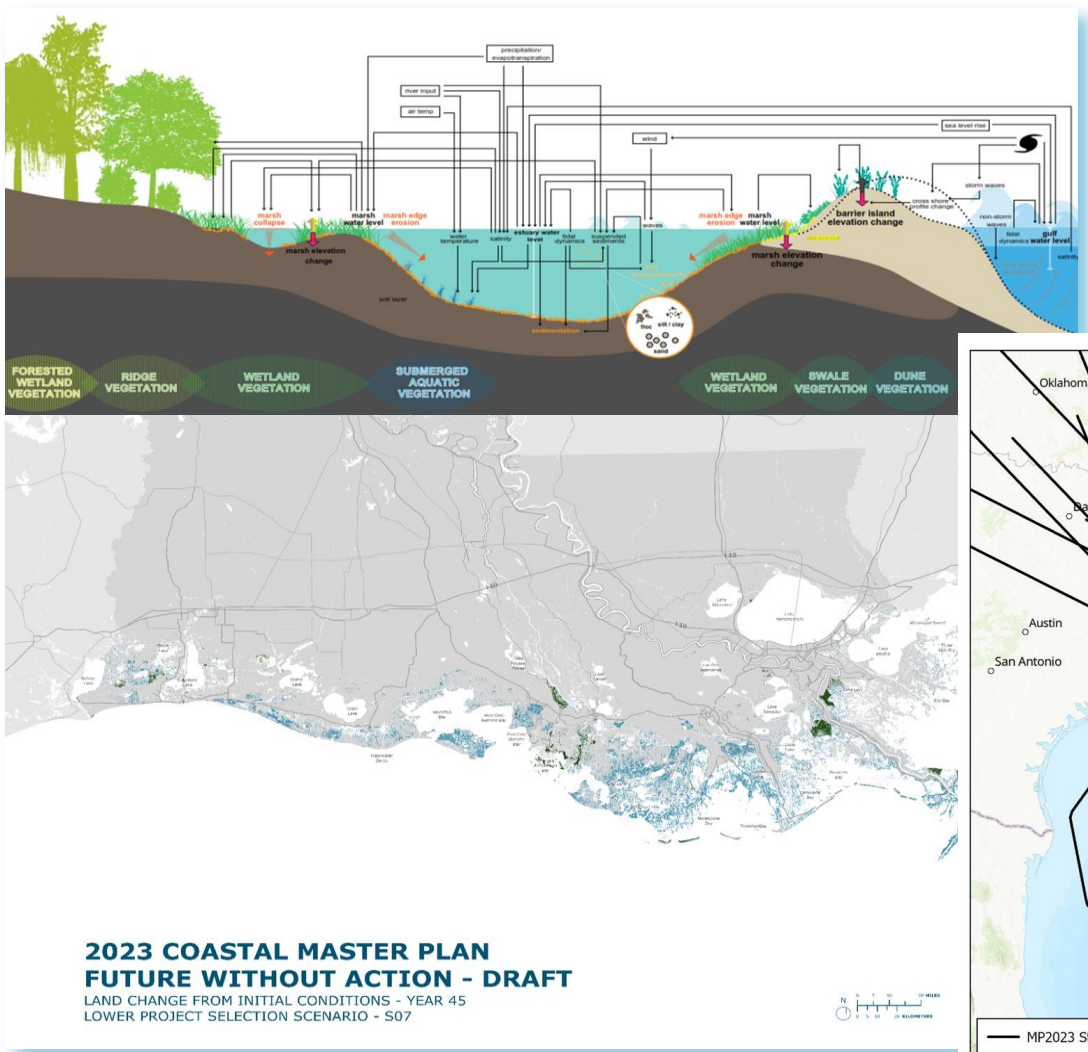
# 2023 COASTAL MASTER PLAN

## PREDICTIVE MODELS

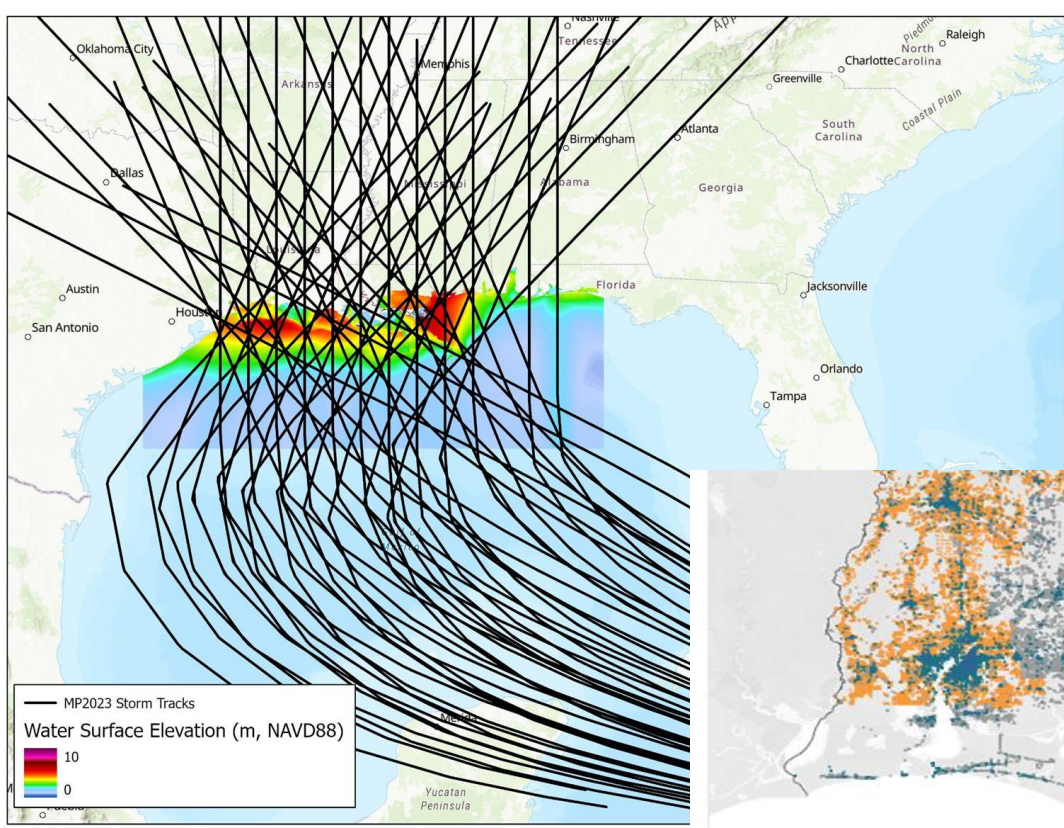
To evaluate the benefit of proposed projects, a ‘Future Without Action’ is modeled first to predict outcomes if no additional projects were pursued.

These results are compared to outcomes with additional projects (‘Future With Action’) and the difference between the two is the expected benefit of the master plan.

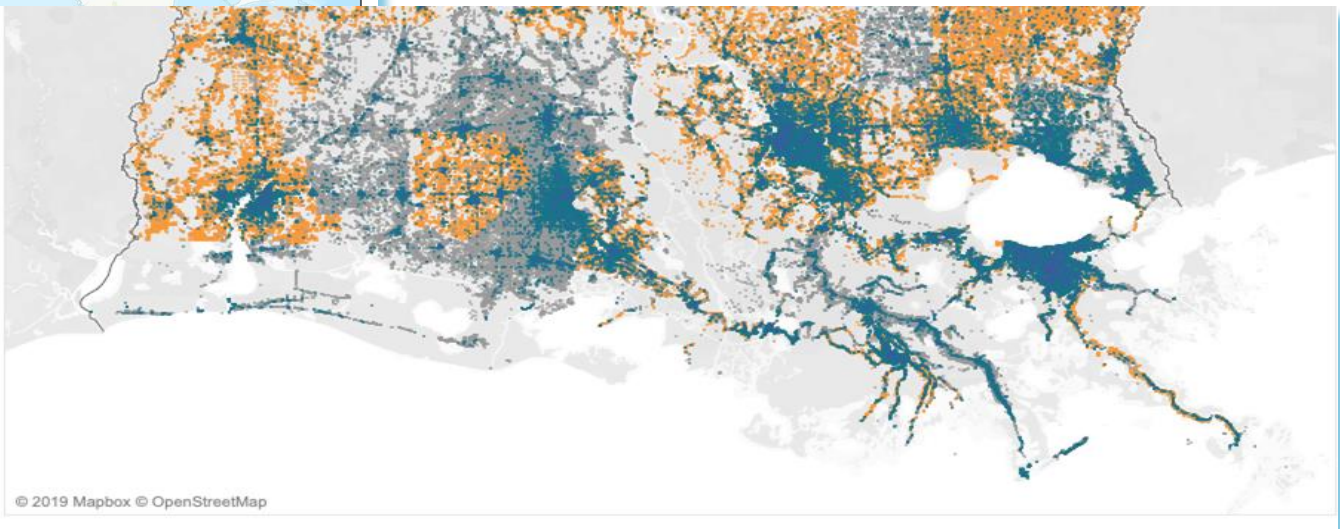
Landscape Model  
(Integrated Compartment Model)



Surge and Wave Models



Risk Model

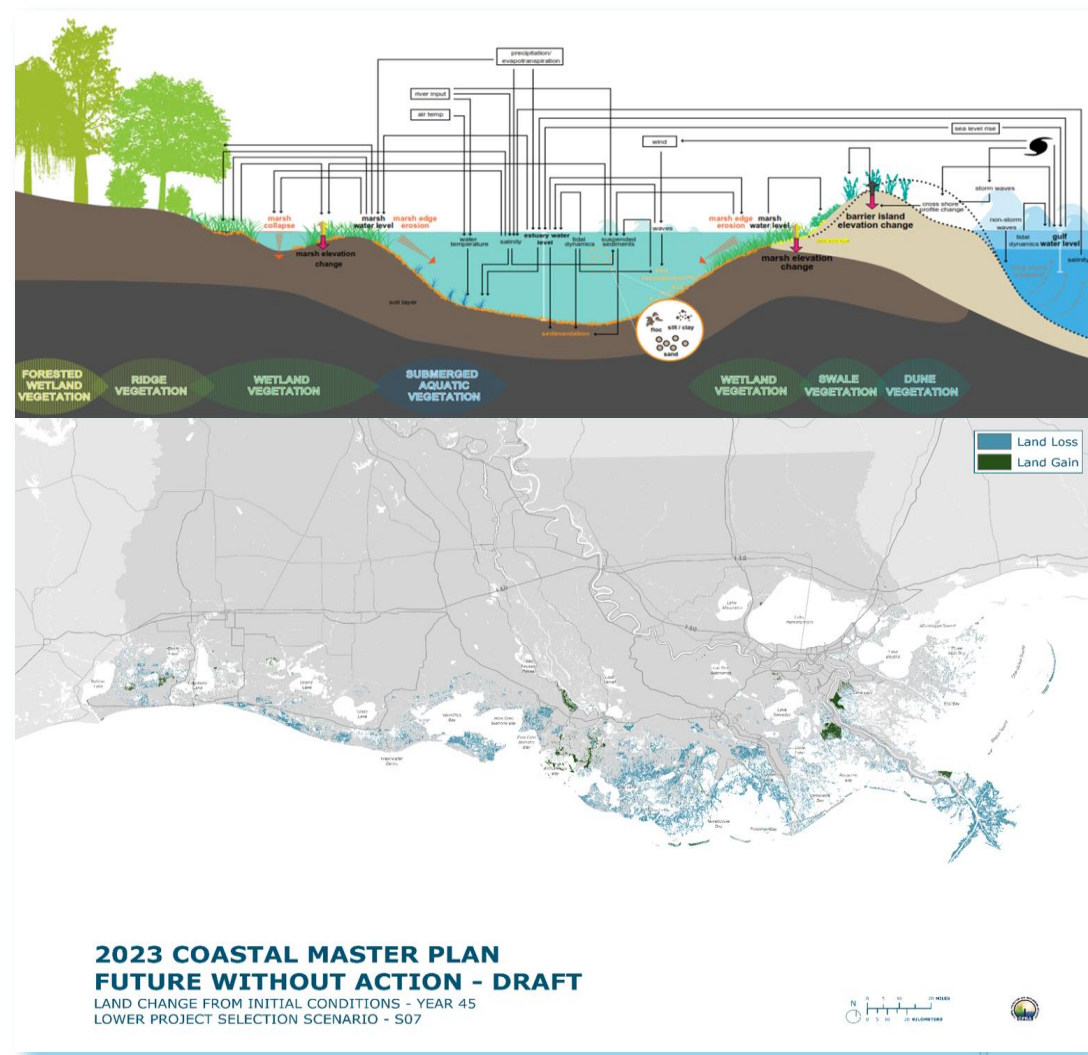




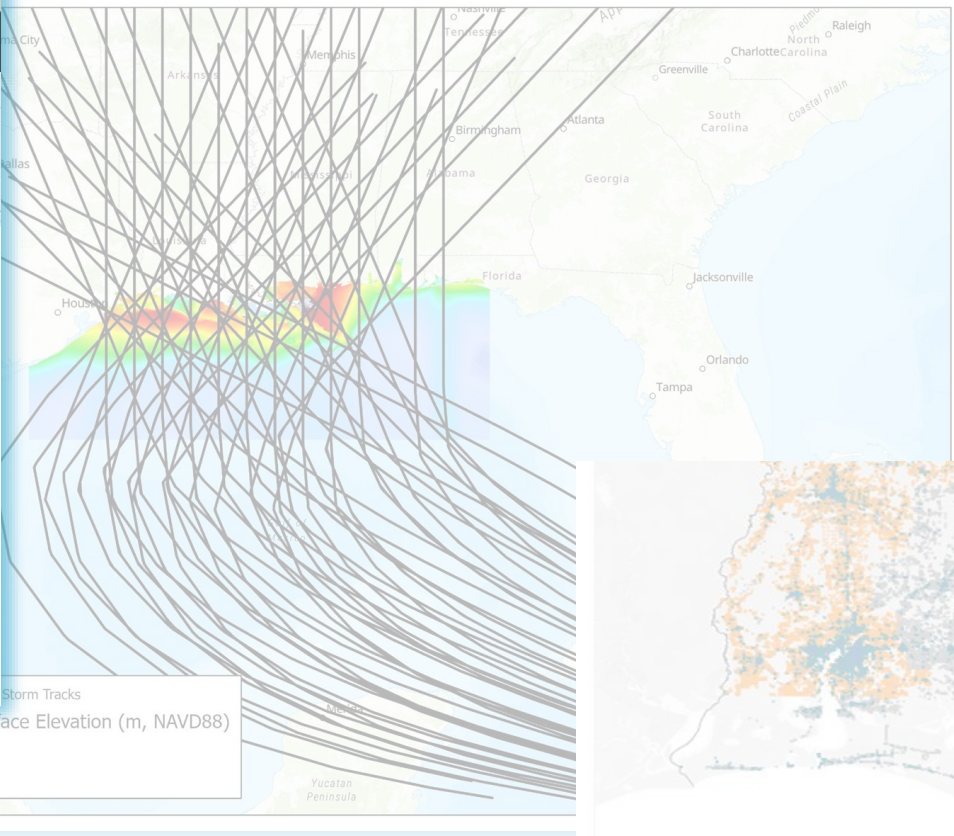
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## PREDICTIVE MODELS

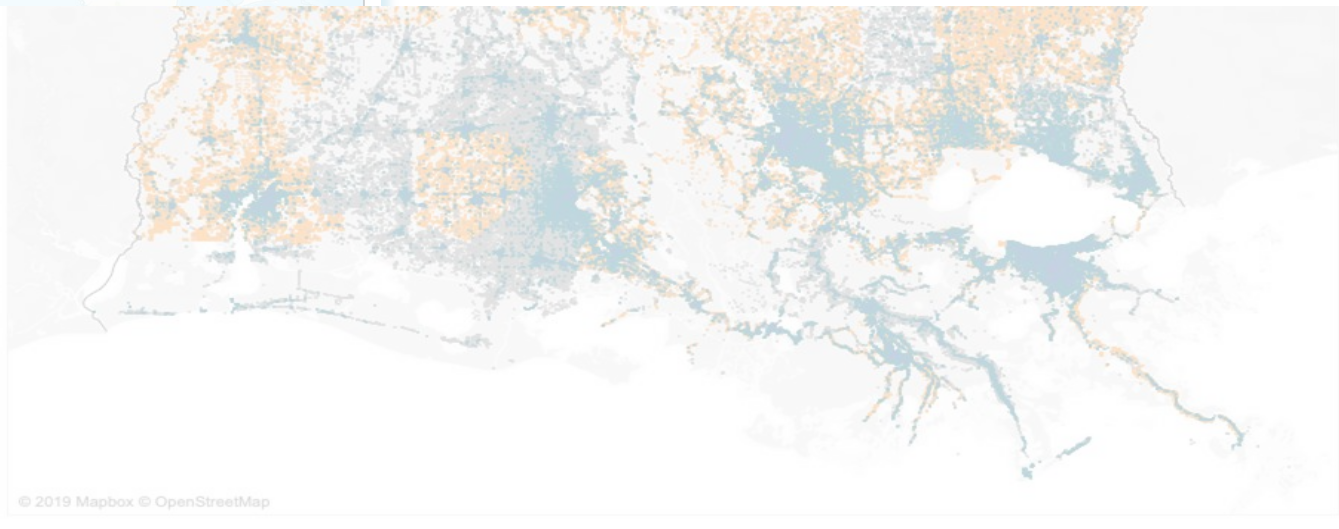
### Landscape Model (Integrated Compartment Model)



### Surge and Wave Models



### Risk Model

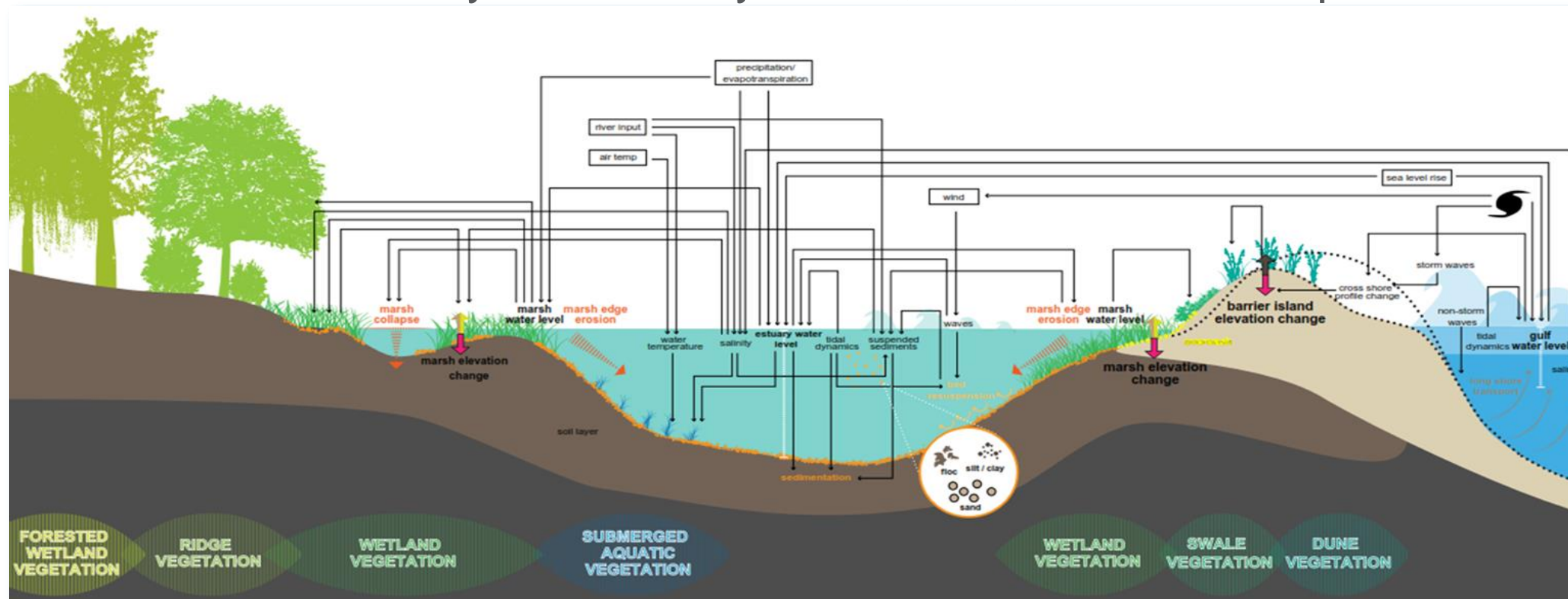




# OVERVIEW OF LANDSCAPE MODELING

MODEL SOURCE CODE AVAILABLE ONLINE: [WWW.GITHUB.COM/CPRA-MP](https://www.github.com/CPRA-MP)

- **Integrated Compartment Model (ICM)** is comprised of several routines that represent the key drivers behind wetland processes that affect land change in coastal Louisiana
  - **ICM-Hydro** - coastal hydrology (e.g., water levels, flow paths, salinity and sediment movement, etc)
  - **ICM-Morph** - sediment accretion, elevation change, and inundation
  - **ICM-LAVegMod** - vegetation distribution changes based on salinity and water level dynamics
  - **ICM-BIDEM** - barrier island migration & tidal inlet deformation inform tidal & storm surge signals
  - **ICM-HSI** - assess habitat suitability for a variety of fish, bird, and wildlife species

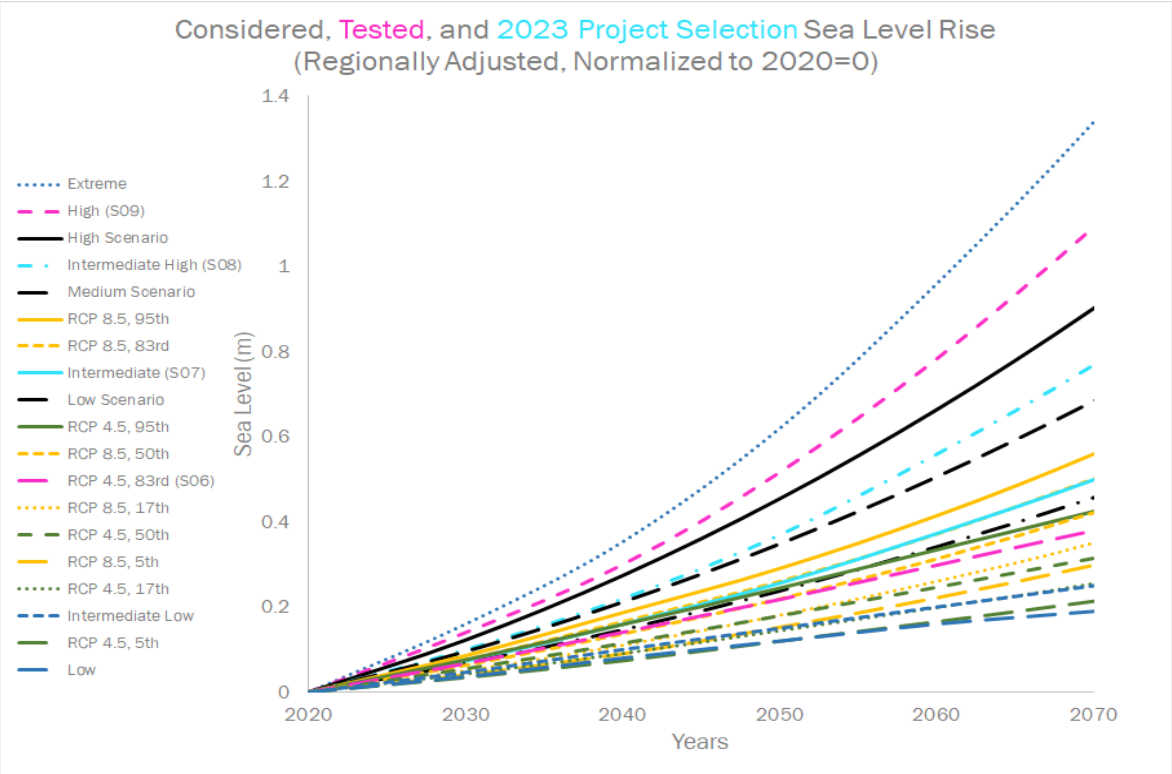




# SCENARIO APPROACH TO ADDRESS UNCERTAINTY

A RANGE OF PLAUSIBLE FUTURE CONDITIONS ARE CONSIDERED IN PROJECT SELECTION

- Scenarios are developed by varying values for environmental drivers in the ICM
  - 2 scenarios are used for project selection (lower and higher)
  - 24 scenarios are being tested through additional exploratory analyses



	Lower Scenario (S07)	Higher Scenario (S08)
Sea level rise (regionally adjusted)	NOAA <u>Intermediate</u> (~0.50 m by 2070; ~1.07 m by 2100)	NOAA <u>Intermediate High</u> (~0.77 m by 2070; ~1.75m by 2100)
Temperature, Precipitation, Tributary flows, and Evapotranspiration	change by co-varying with <u>moderate</u> sea level rise curve-related climate forcings	change by co-varying with <u>more significant</u> sea level rise curve-related climate forcings
Subsidence	<u>moderate</u> rates	<u>higher</u> rates
MR hydrograph	flow rate changes in line with moderate climate change scenario	flow rate changes in line with moderate climate change scenario
Storm Intensity	<u>+5%</u> over 50 years	<u>+10%</u> over 50 years

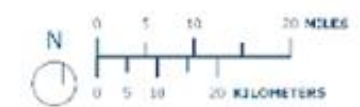








LAND CHANGE FROM INITIAL CONDITIONS - YEAR 20  
LOWER PROJECT SELECTION SCENARIO - S07







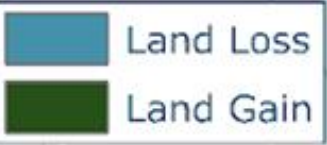
LAND CHANGE FROM INITIAL CONDITIONS - YEAR 30  
LOWER PROJECT SELECTION SCENARIO - S07











LAND CHANGE FROM INITIAL CONDITIONS - YEAR 50  
LOWER PROJECT SELECTION SCENARIO - S07







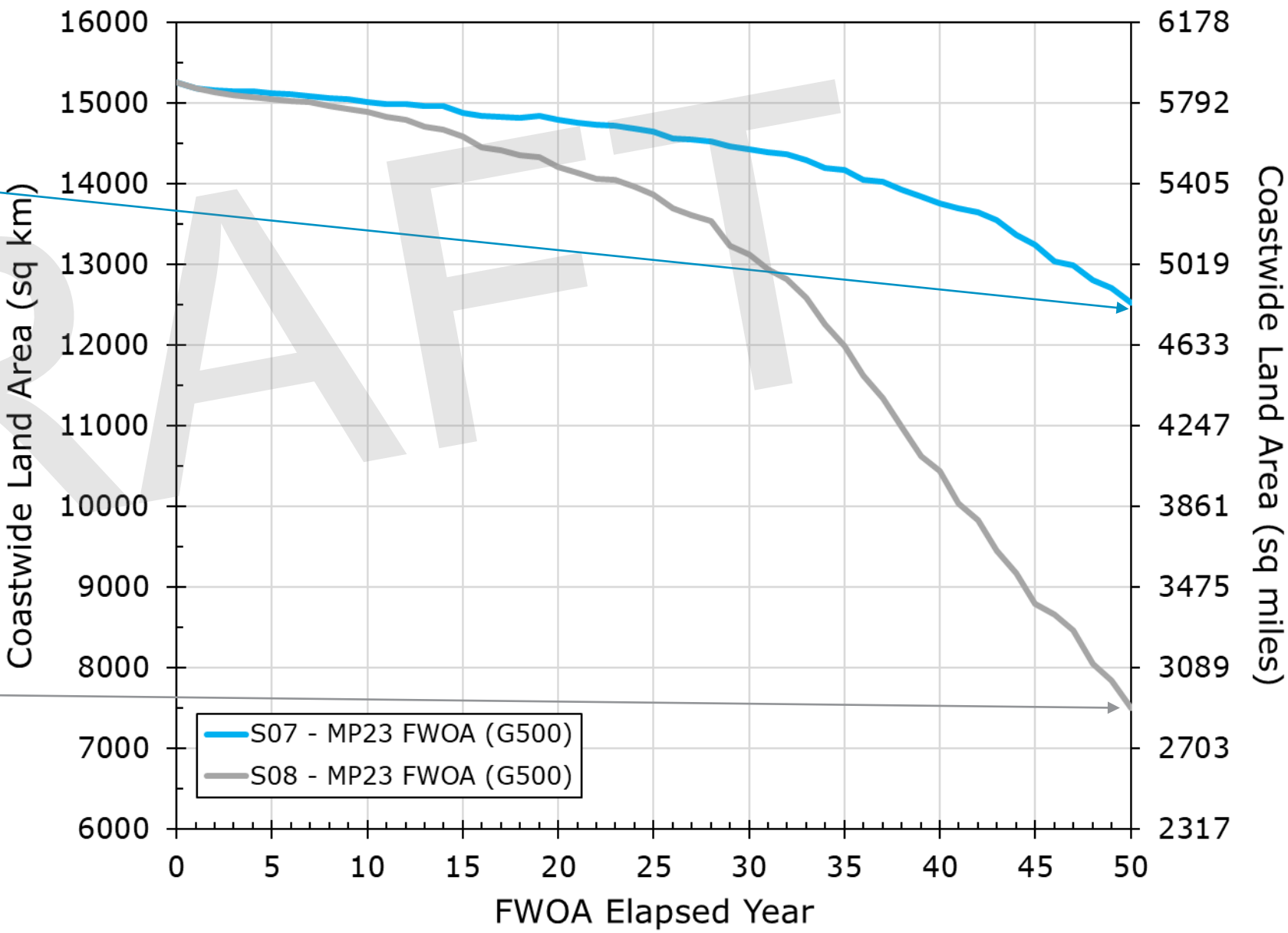
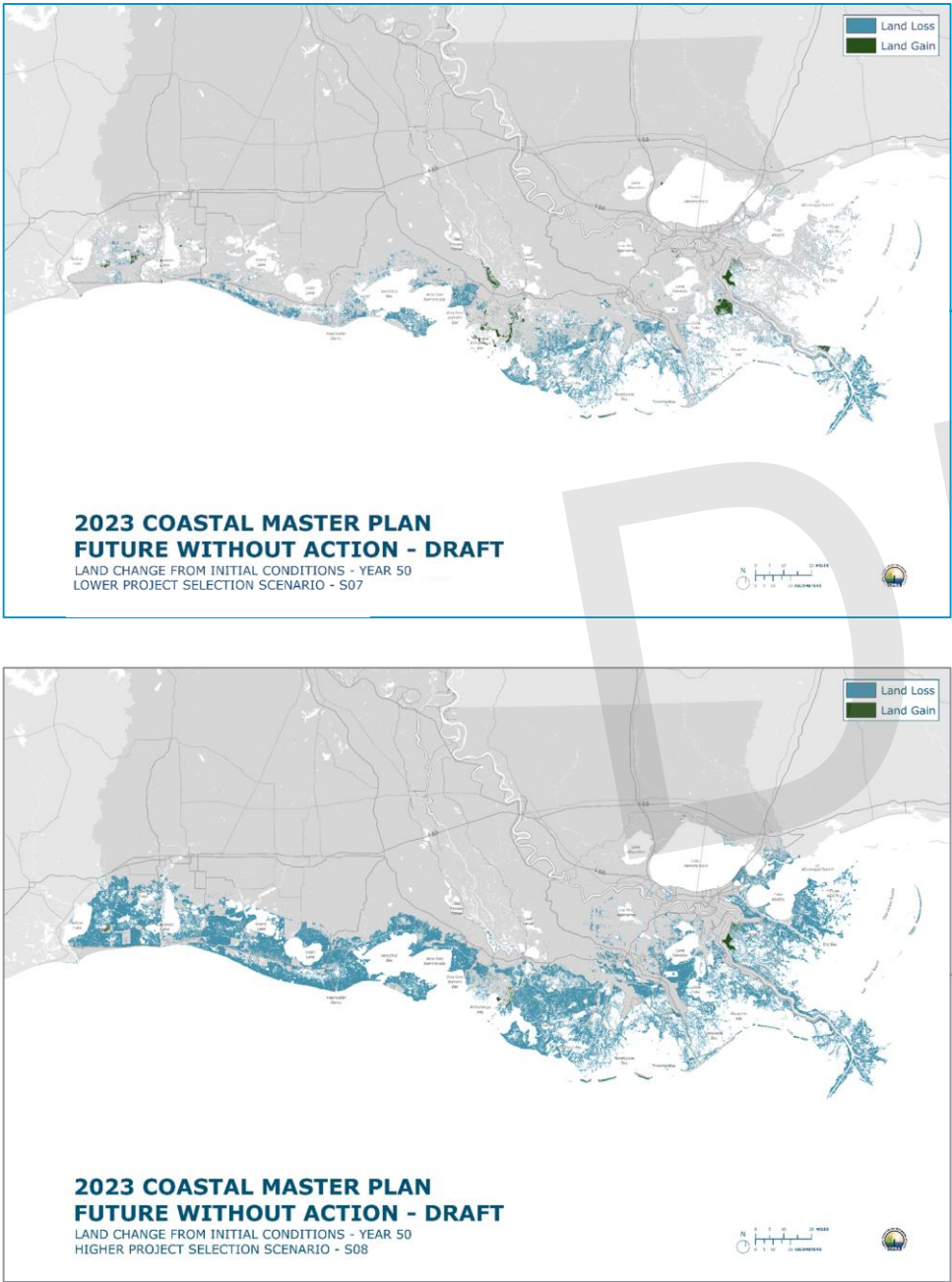
### LAND CHANGE FROM INITIAL CONDITIONS - YEAR 50 HIGHER PROJECT SELECTION SCENARIO - S08





# COASTAL LAND AREA OVER TIME

## FUTURE WITHOUT ACTION UNDER MULTIPLE FUTURE SCENARIOS



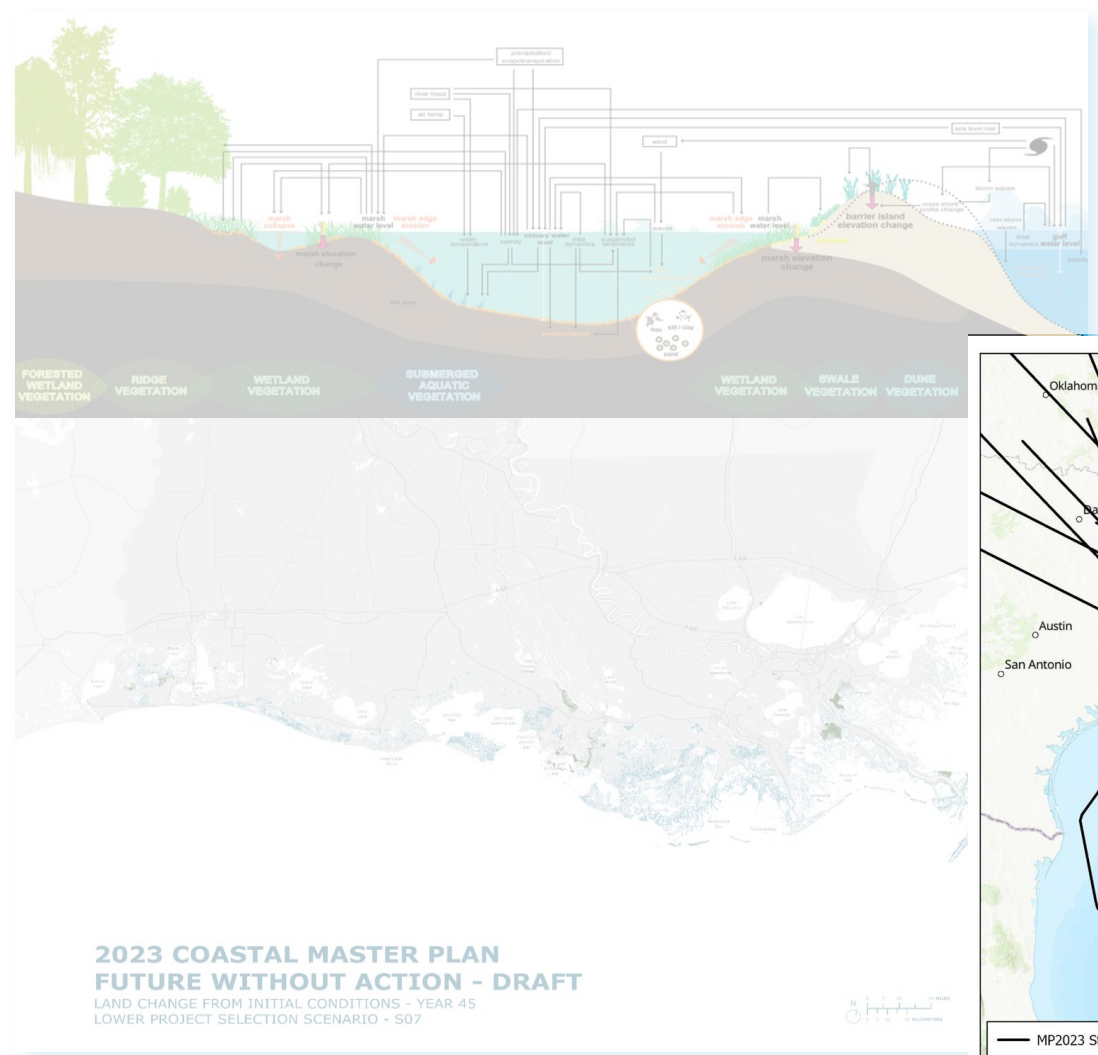
Predicted land area for a Future Without Action in Coastal Louisiana over time under the two future scenarios used for project selection.



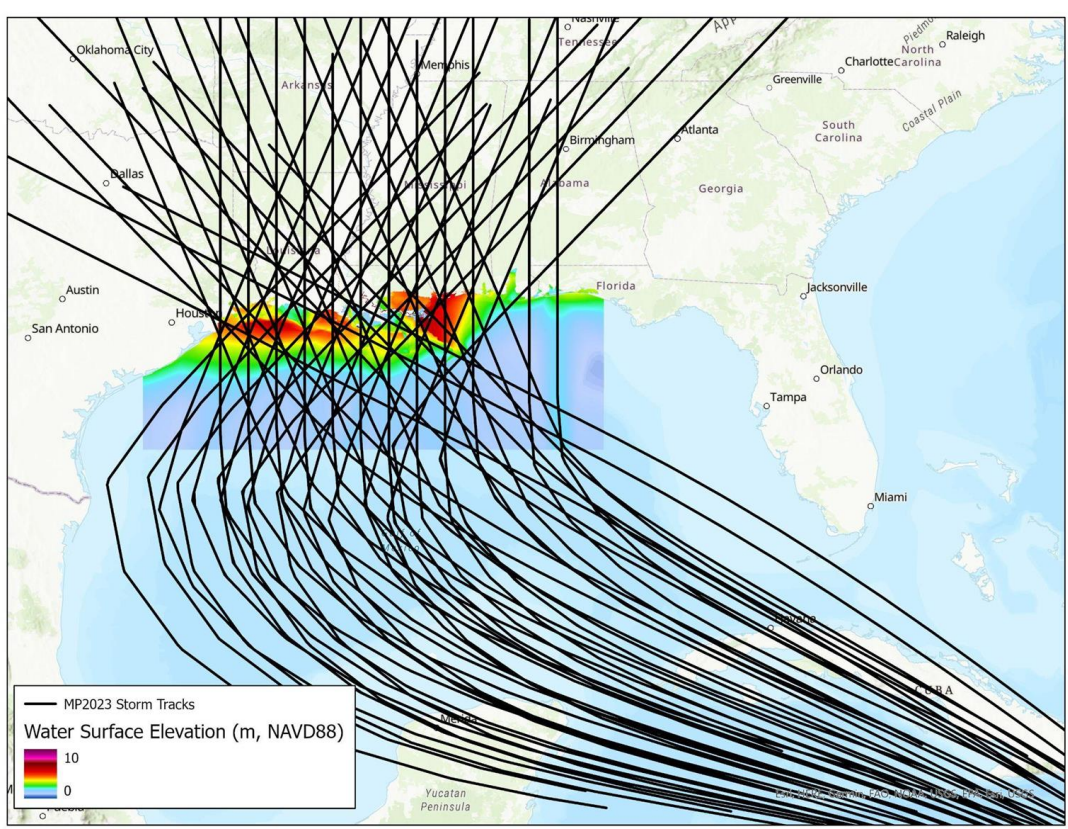
# 2023 COASTAL MASTER PLAN

## PREDICTIVE MODELS

Landscape Model  
(Integrated Compartment Model)



Surge and Wave Models



Risk Model



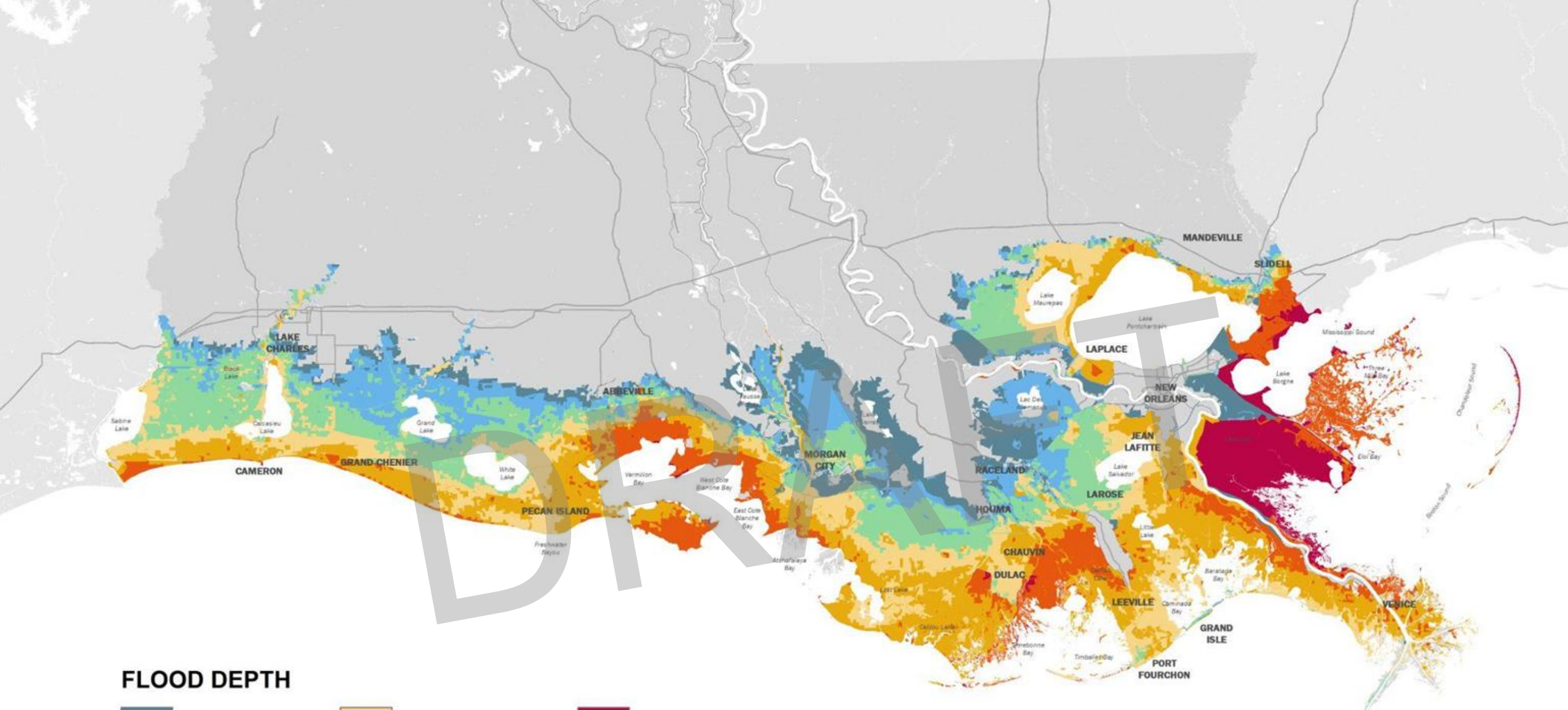


# OVERVIEW OF STORM SURGE AND WAVES MODELING

- Hurricanes and Tropical Storms of different sizes and intensities are modeled to understand the impacts and risks of storm surge on coastal communities
- Master plan models can provide information about potential flood depths during a variety of storms in both a Future Without Action and Future With Action condition







**FLOOD DEPTH**



**2023 COASTAL MASTER PLAN  
FUTURE WITHOUT ACTION**

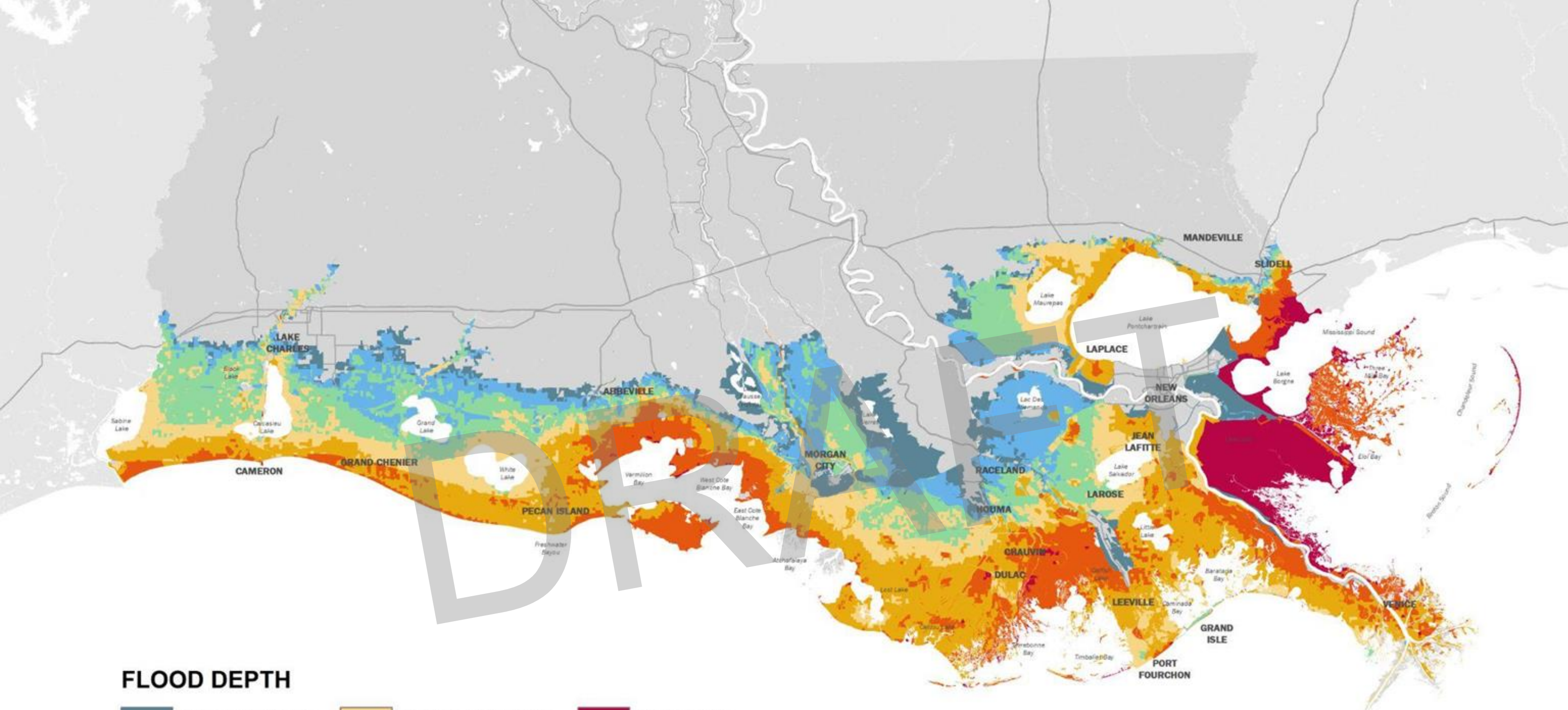
1% ANNUAL EXCEEDENCE PROBABILITY - INITIAL CONDITIONS  
LOWER PROJECT SELECTION SCENARIO - S07









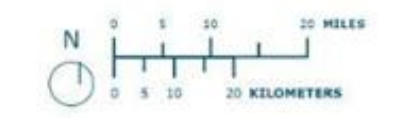


## FLOOD DEPTH



# 2023 COASTAL MASTER PLAN FUTURE WITHOUT ACTION

1% ANNUAL EXCEEDENCE PROBABILITY - YEAR 20  
LOWER PROJECT SELECTION SCENARIO - S07



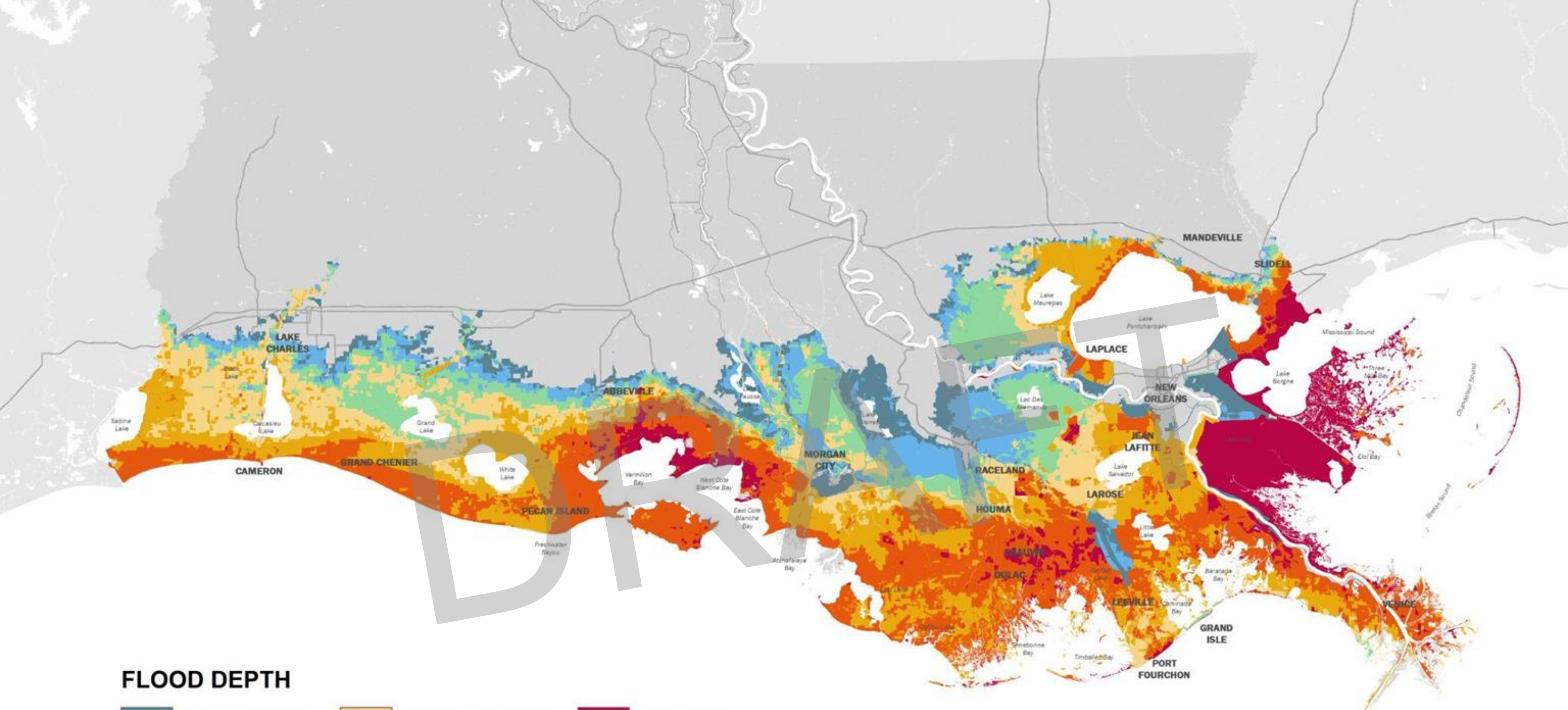




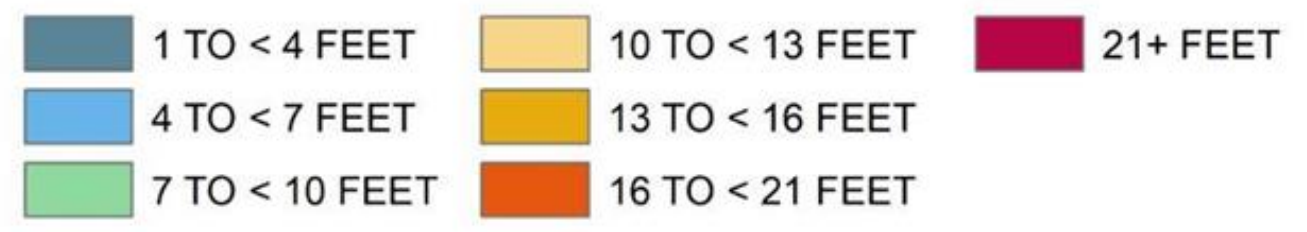






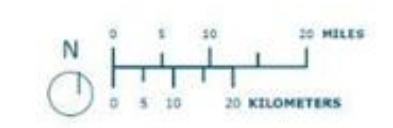


### FLOOD DEPTH



## 2023 COASTAL MASTER PLAN FUTURE WITHOUT ACTION

1% ANNUAL EXCEEDENCE PROBABILITY - YEAR 50  
LOWER PROJECT SELECTION SCENARIO - S07





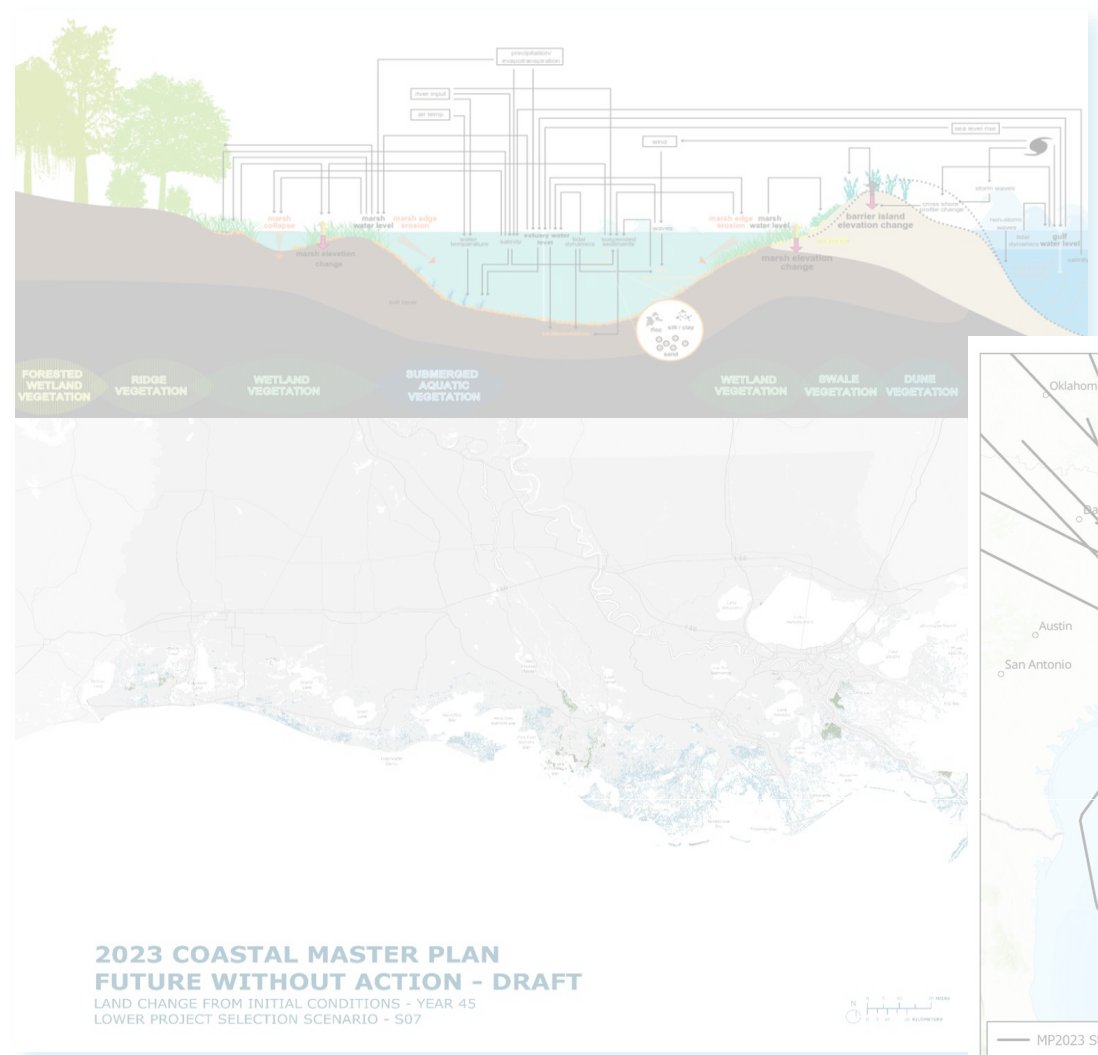




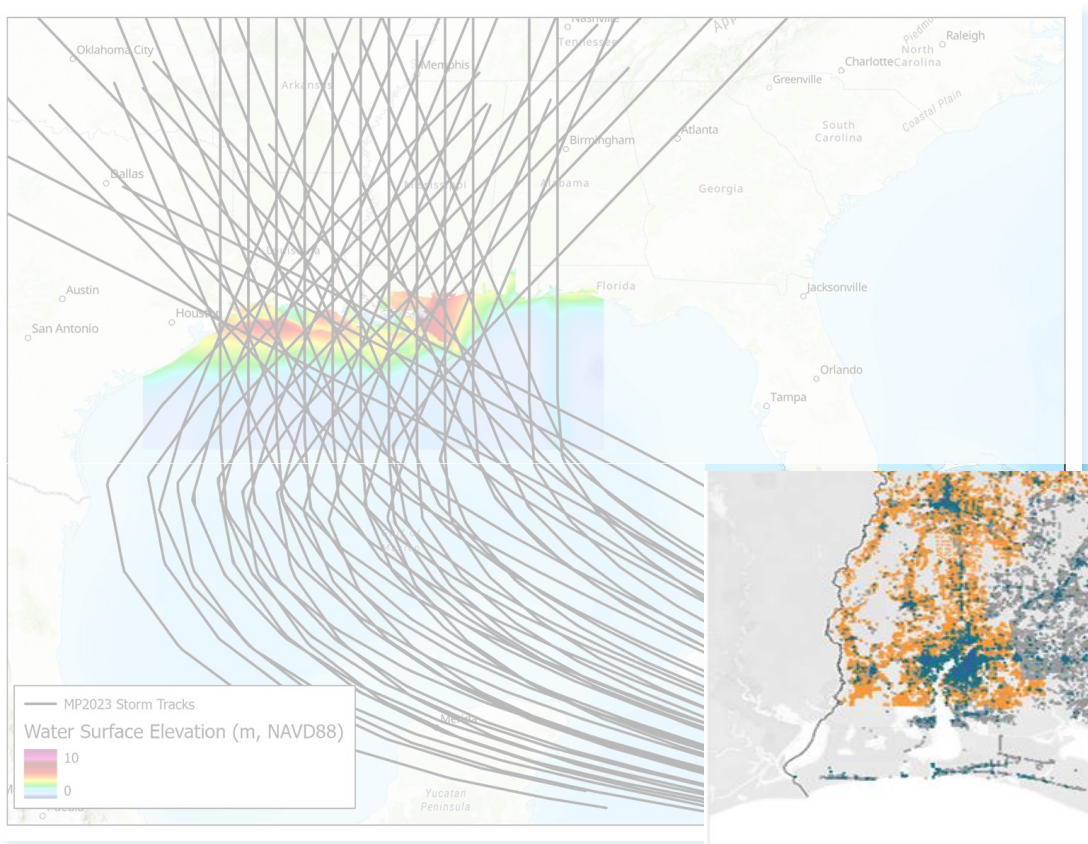
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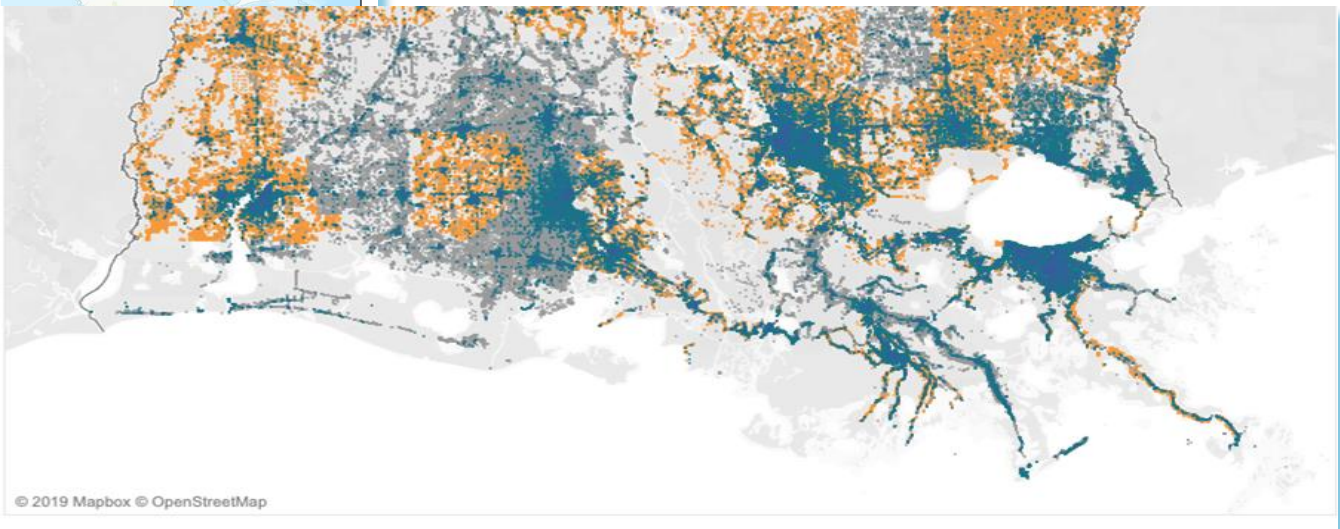
Landscape Model  
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Surge and Wave Models



Risk Model

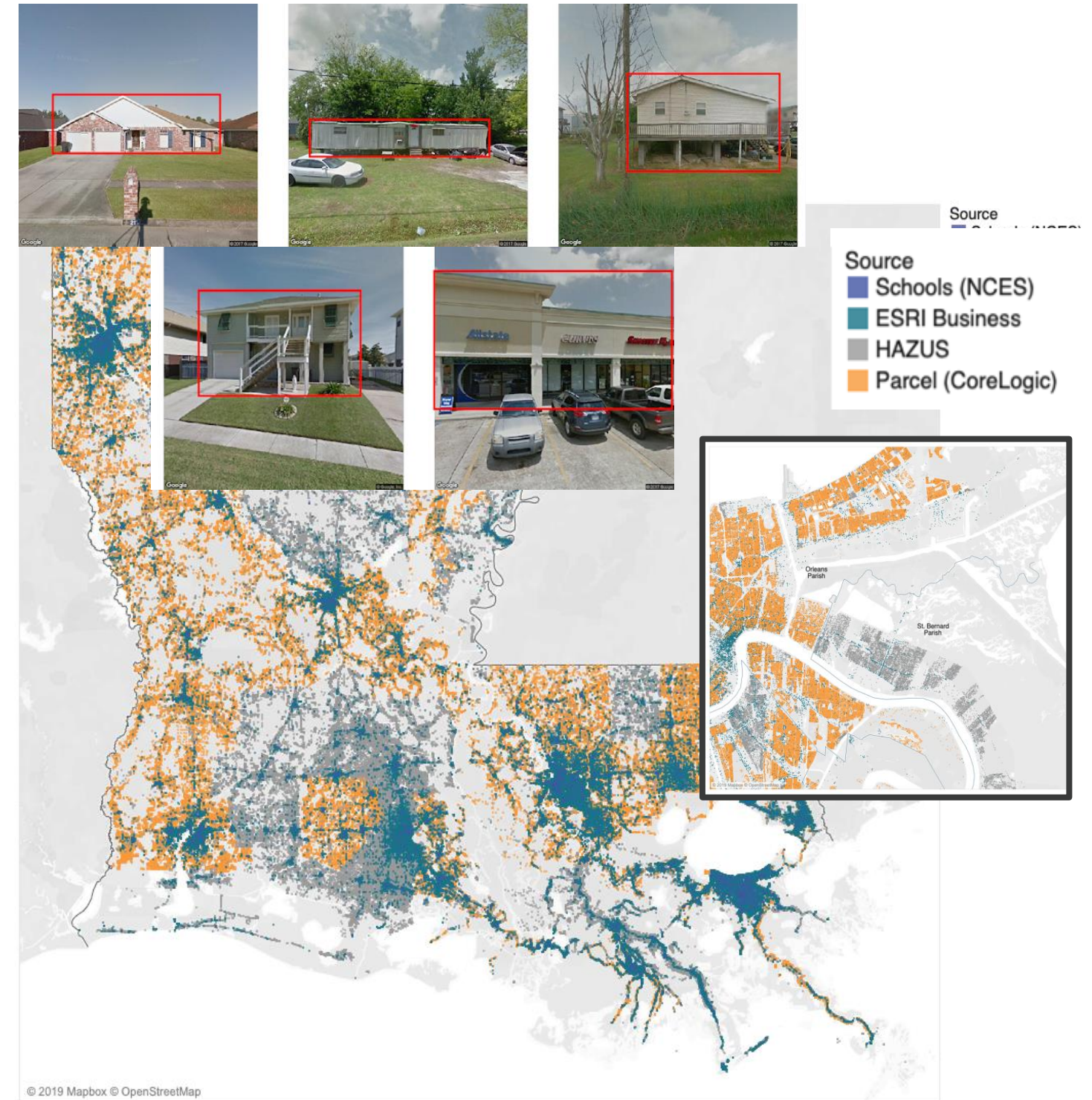




# RISK ASSESSMENT MODELING

The Coastal Louisiana Risk Assessment model (CLARA) helps to predict the amount of expected damages associated with storms.

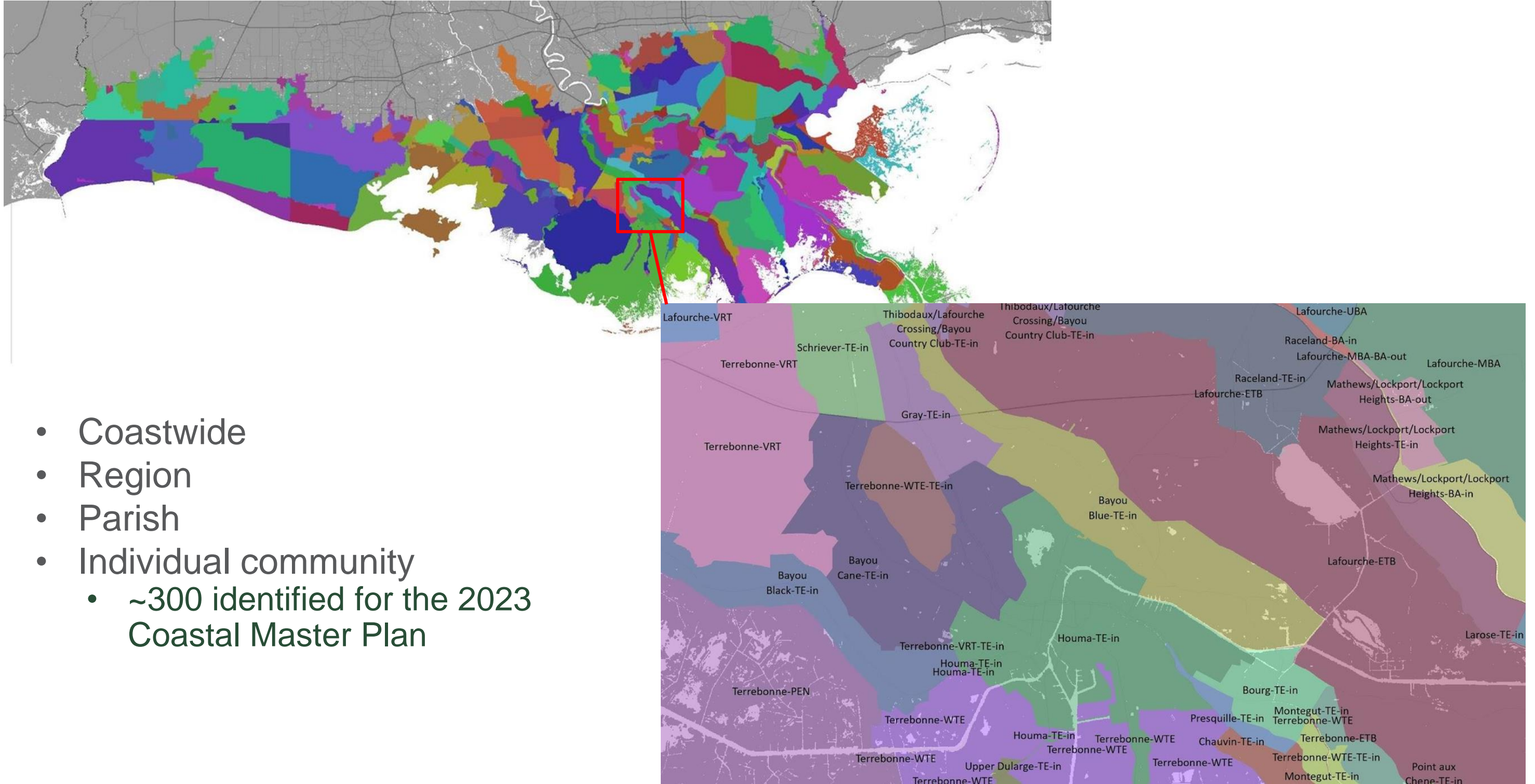
Just as with flood depths, damages are projected for both a 'Future Without Action' and 'Future With Action' condition to understand how the master plan impacts structures and assets across the coast.





# UNDERSTANDING COMMUNITIES

## RISK ASSESSMENT MODEL OUTPUTS AT VARIOUS SPATIAL SCALES



- Coastwide
- Region
- Parish
- Individual community
  - ~300 identified for the 2023 Coastal Master Plan



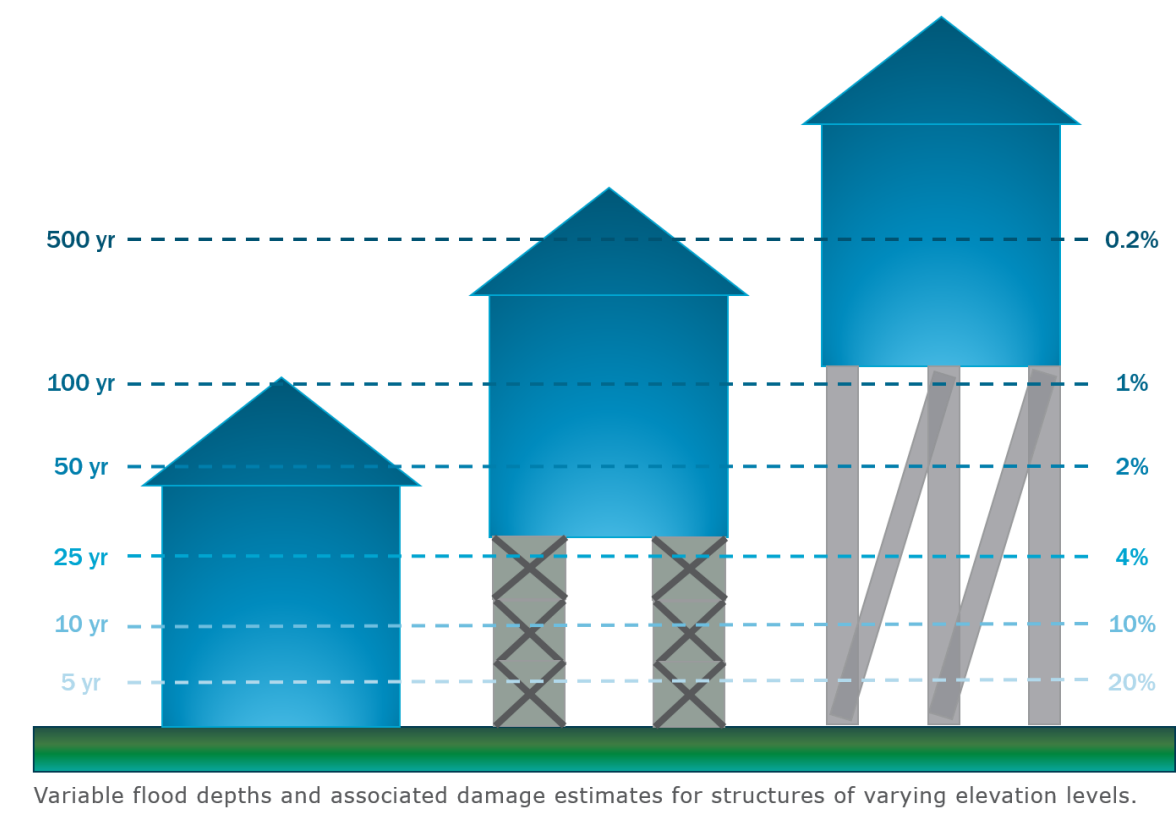
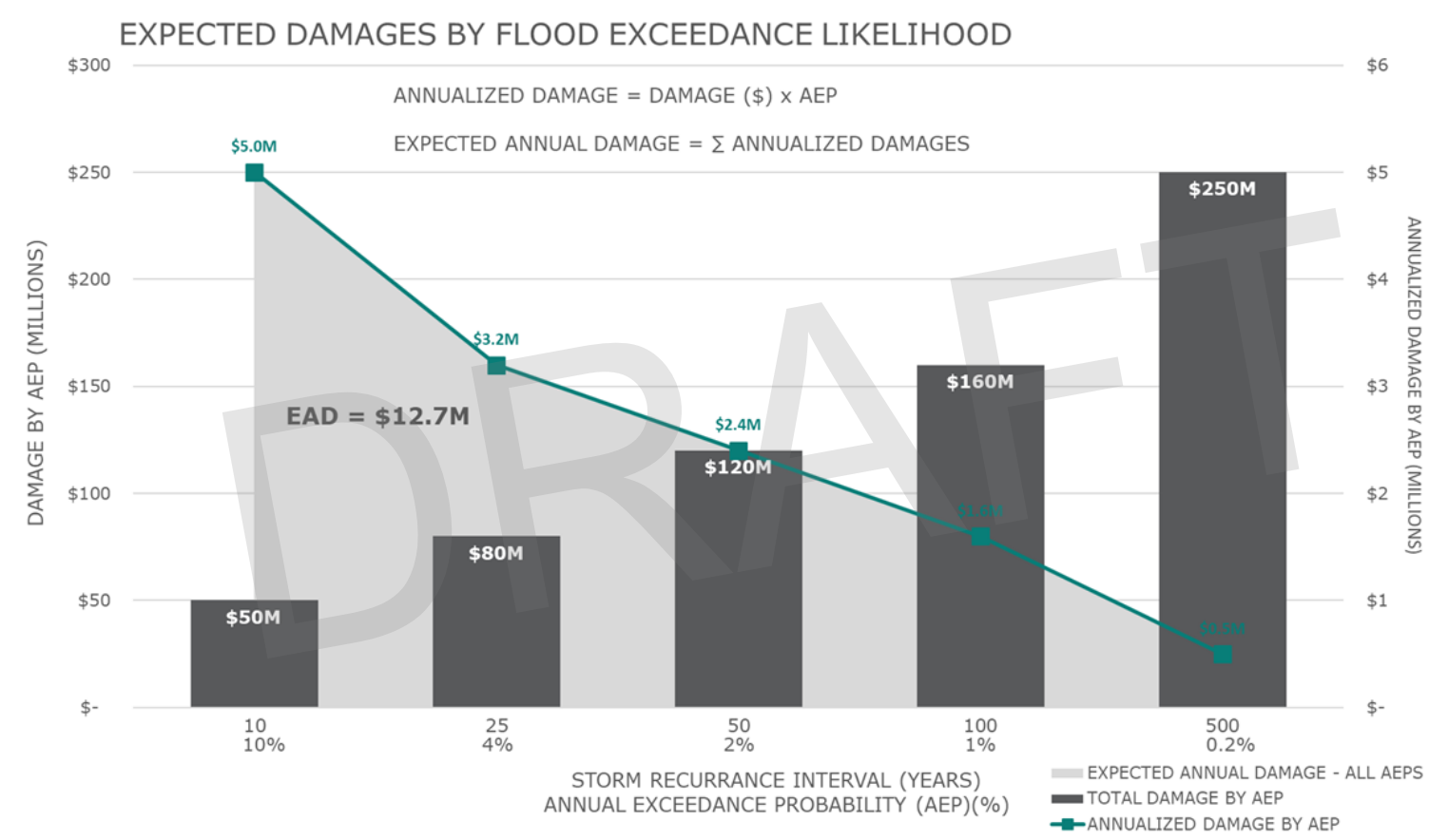
# RISK METRICS

- EADD - Expected Annual Damage Dollars

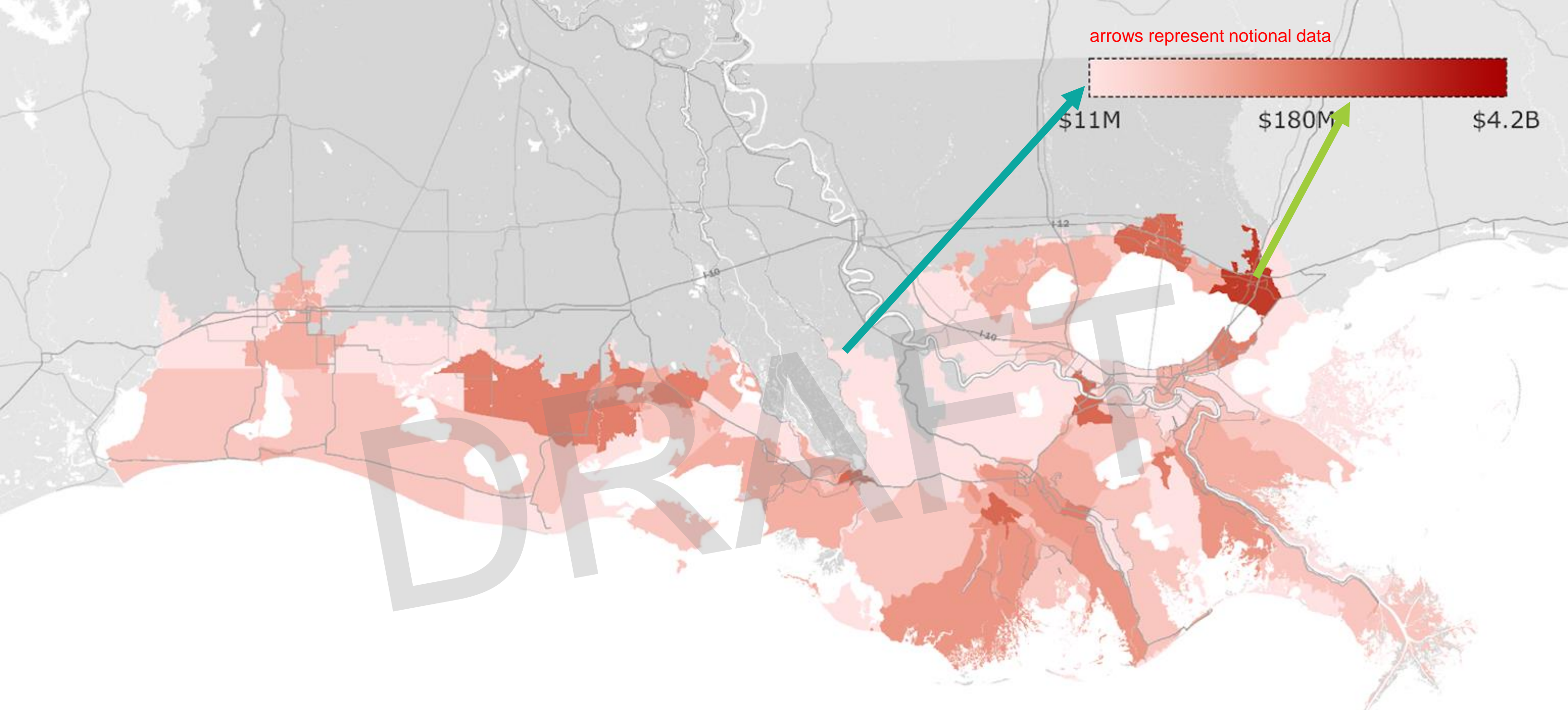
**EADD** = Annual probability of flood elevations \* Damage (% of Replacement cost) \* Asset Value

- EASD - Expected Annual Structure Damage

**EASD** = Annual probability of flood elevations \* Damage (% of Replacement cost) \* ~~Asset Value~~





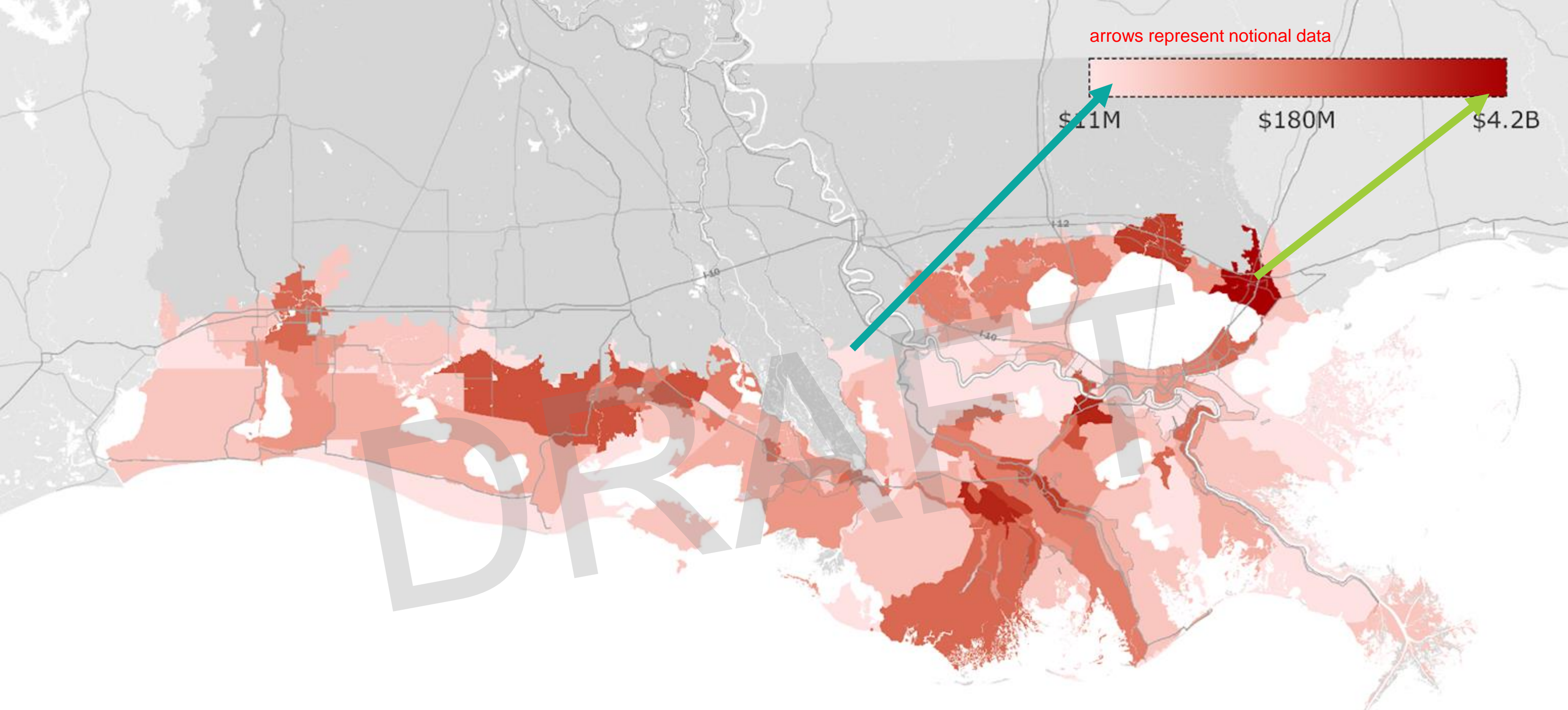


# 2023 COASTAL MASTER PLAN INITIAL CONDITIONS - DRAFT

RISK - EAD\$ - INITIAL CONDITIONS



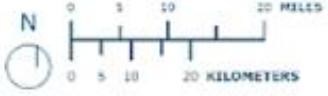




# 2023 COASTAL MASTER PLAN

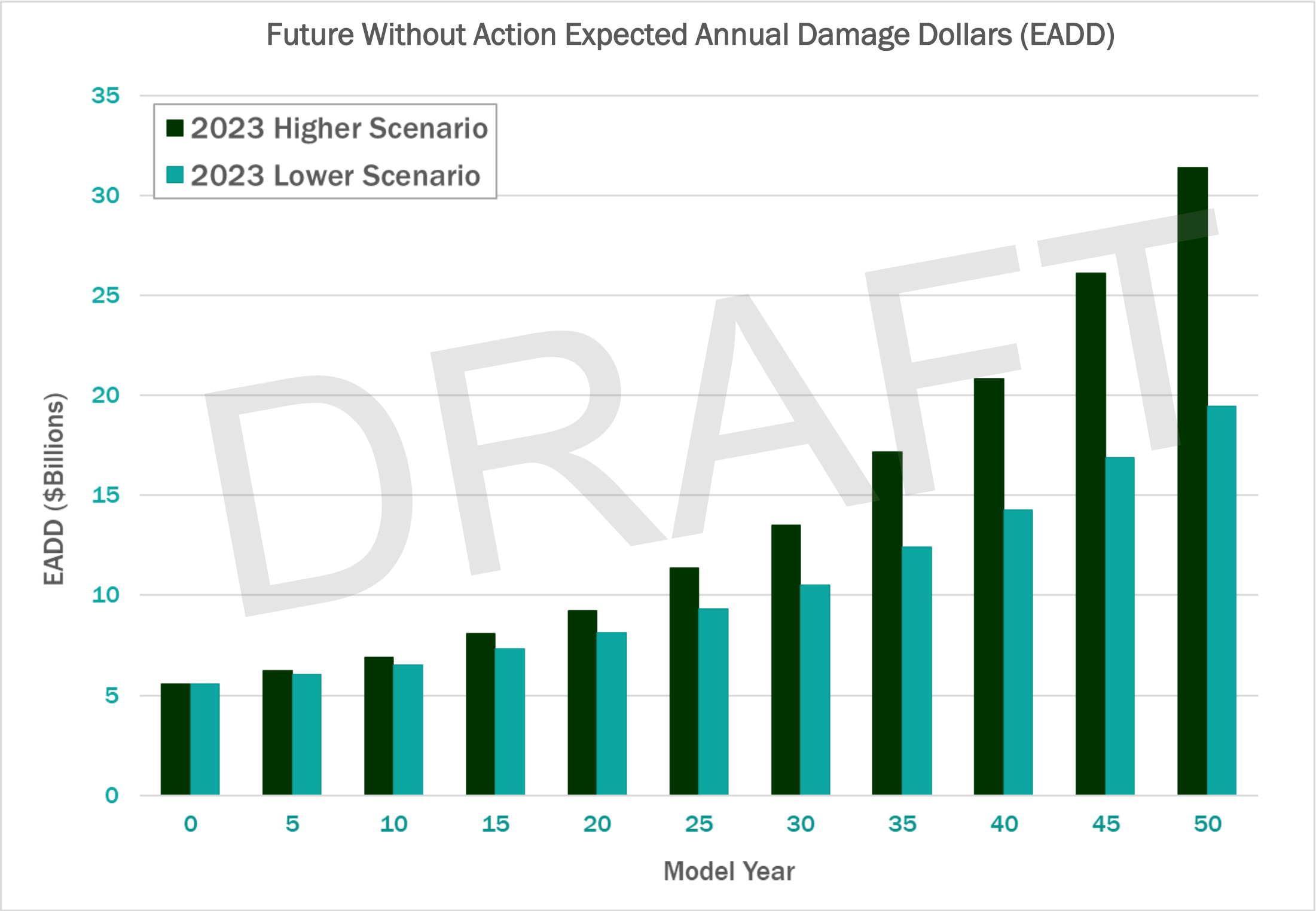
## FUTURE WITHOUT ACTION - DRAFT

RISK - EAD\$ - YEAR 50  
LOWER PROJECT SELECTION SCENARIO - S07





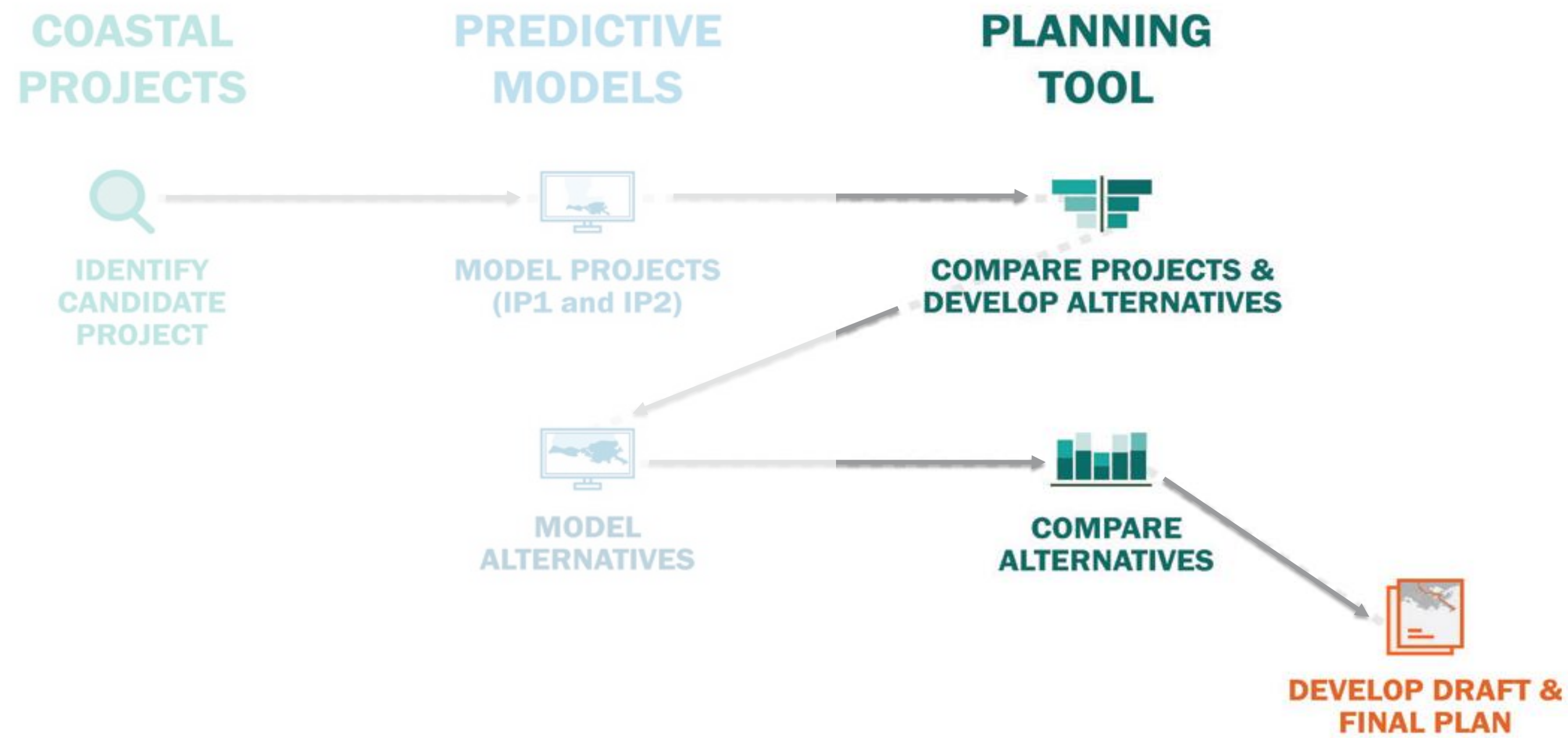
# PROJECTED FUTURE RISK WITHOUT ACTION





# 2023 COASTAL MASTER PLAN PROCESS

A MULTI-STEP PROJECT PRIORITIZATION EFFORT

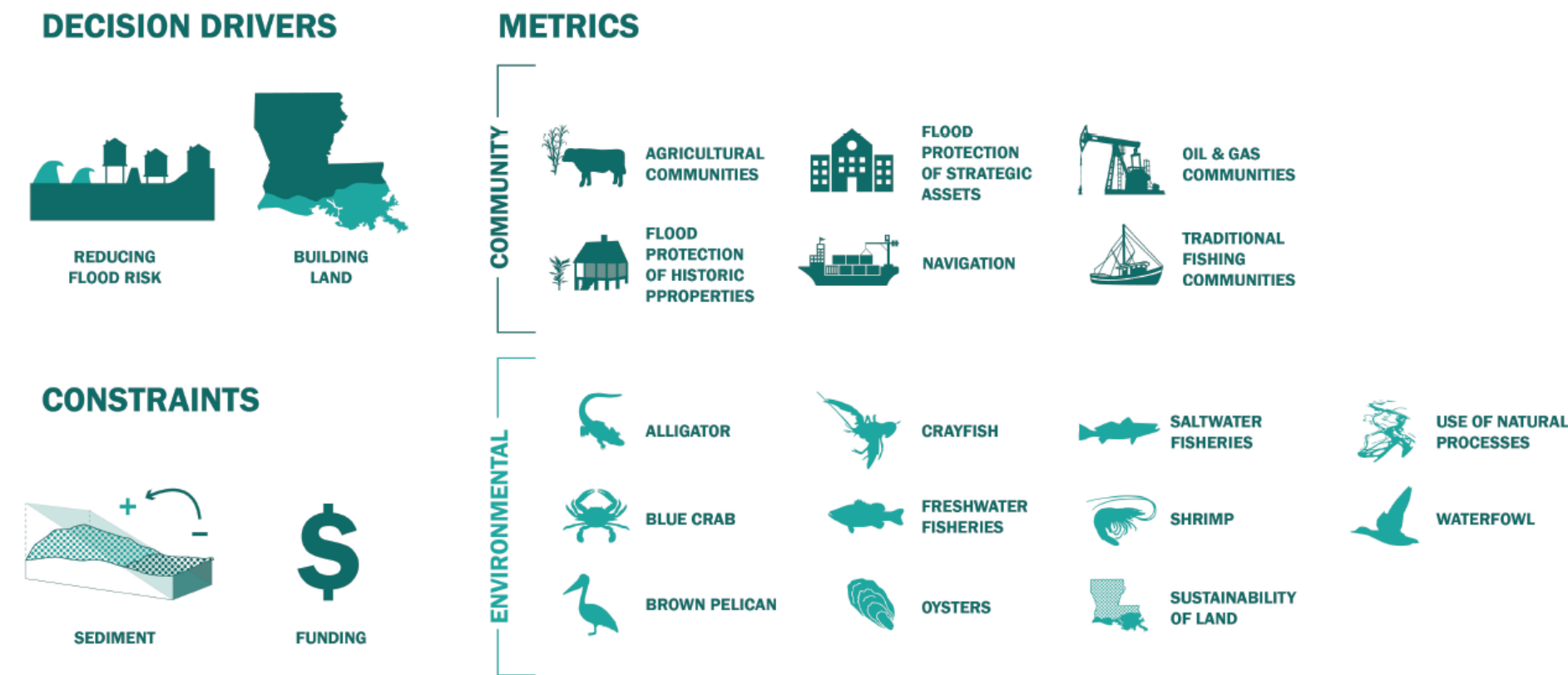




# PLANNING TOOL APPROACH

## DECISION DRIVERS, CONSTRAINTS, AND METRICS

- Decision drivers used to prioritize projects
  - Building and maintaining land
  - Reducing flood risk
    - Expected Annual Damage Dollars (EADD)
    - Expected Annual Structure Damage (EASD) by asset class
- Constraints represent limitations on what projects can be pursued
  - Sediment availability
  - Funding budget (\$50 billion/50 years)
- Metrics are used as checks on plan impacts and as potential constraints
  - Community metrics
  - Environmental metrics





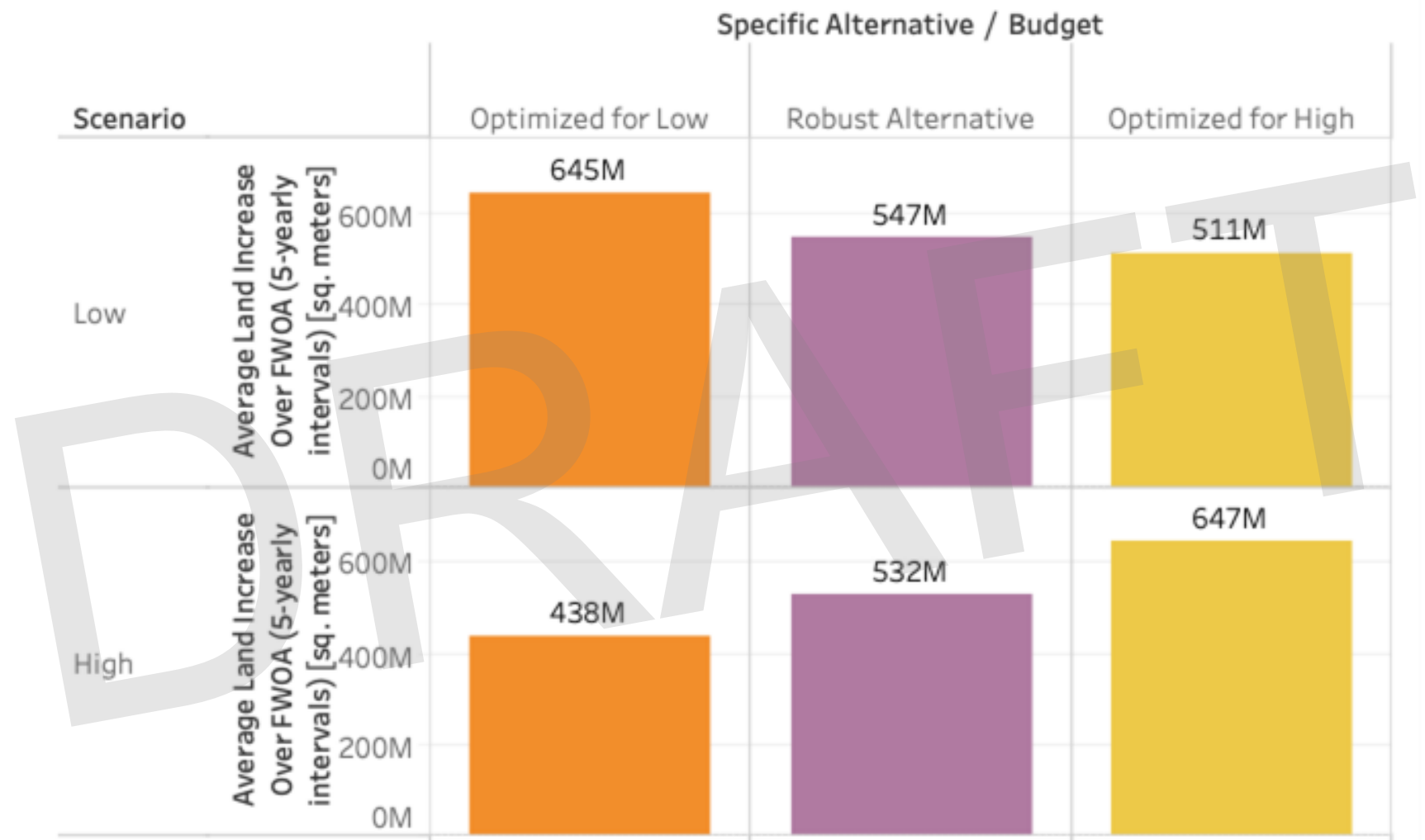
# PLANNING TOOL APPROACH

## SELECTING A ROBUST PROJECT LIST UNDER UNCERTAINTY

### Robust Project Selection

- Identify projects that perform well across a range of future environmental scenarios
  - *MP17 used a single scenario to select projects*
- Ensure selection of projects in later years accounts for coastal change and effects of earlier projects
  - *MP17 did not account for changes in later years*
- Limiting the ‘cost’ of planning for an uncertain future

Total Land Comparison (Optimal and Robust)





A scenic landscape featuring a body of water in the foreground with a small boat on the right. The middle ground is filled with tall reeds and a dense line of trees. The background shows a clear blue sky with scattered clouds. A dark green rectangular box is overlaid in the center, containing the text "BEYOND PROJECT SELECTION" in white, bold, sans-serif capital letters.

# BEYOND PROJECT SELECTION



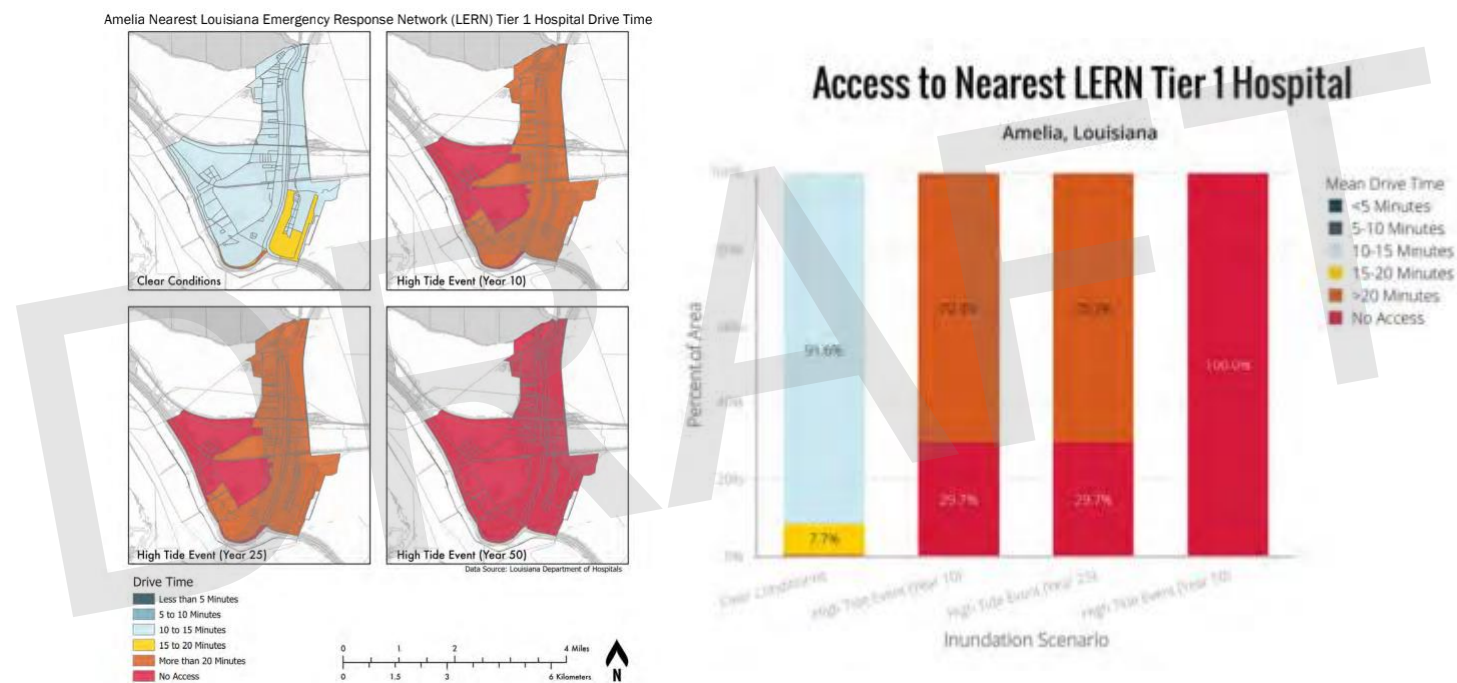
# BEYOND PROJECT SELECTION

ILLUSTRATING HOW COMMUNITIES WILL EXPERIENCE COASTAL CHANGE

- Exploration of model outputs to understand how climate change and adaptation efforts may impact communities, industries, etc.
- Additional analysis related to high tide flooding (e.g., drive time analysis) and regionally-specific concerns and responses to changing coastal conditions



Examples of community-based metrics

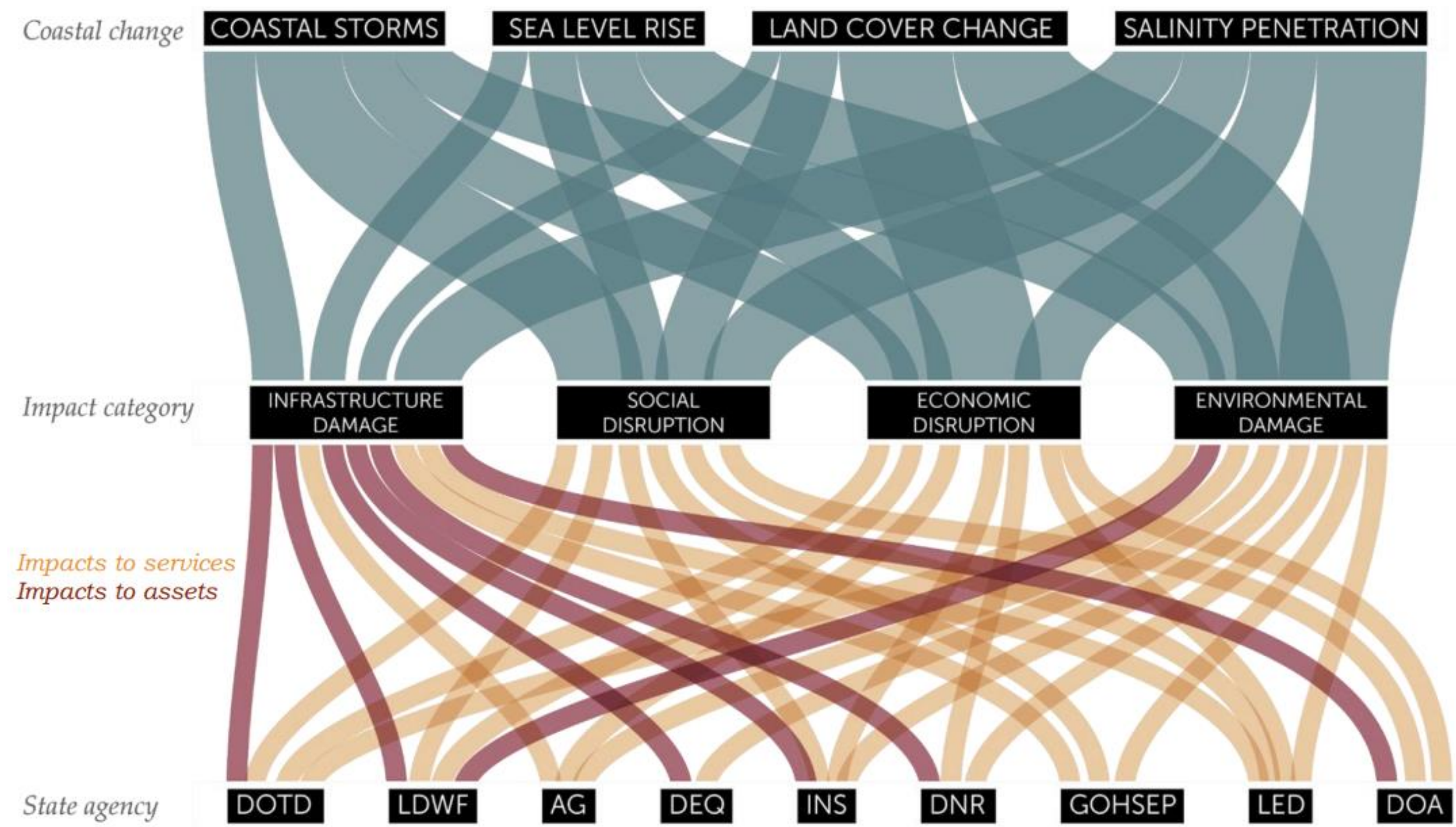


Example of high tide flooding drive time analysis conducted for the master plan



# BEYOND CPRA

LEVERAGING MASTER PLAN DATA TO INFORM OTHER STATEWIDE PLANNING EFFORTS





A scenic view of a coastal wetland. In the foreground, a white boat with a green stripe and an outboard motor is moving through blue water, leaving a white wake. To the left of the boat is a large clump of tall, dry, yellowish-brown reeds. The background features a line of green trees and a body of water under a blue sky with scattered white clouds.

# MASTER PLAN OUTREACH



# OUTREACH MEETINGS

# LOUISIANA'S 2023 COASTAL MASTER PLAN

**SEPTEMBER 14**

**LAKE CHARLES**

6:00 PM - 7:30 PM

**Lake Charles Civic Center**

**SEPTEMBER 19**

**GREATER NEW ORLEANS**

6:00 PM - 7:30 PM

**Jefferson Parish Council Chambers**

**SEPTEMBER 20**

**HOUMA**

6:00 PM - 7:30 PM

**Barry P. Bonvillain Civic Center**

**SEPTEMBER 22**

**zoom**

11:00 AM - 12:30 PM

[www.facebook.com/LouisianaCPRA](https://www.facebook.com/LouisianaCPRA) for details





# OUTREACH MEETINGS SERIES

2023 COASTAL MASTER PLAN







**THANK YOU!**

**[masterplan@la.gov](mailto:masterplan@la.gov)**