2023 COASTAL MASTER PLAN
COMMITTED TO OUR COAST

2023 COASTAL MASTER PLAN CPRA BOARD UPDATE

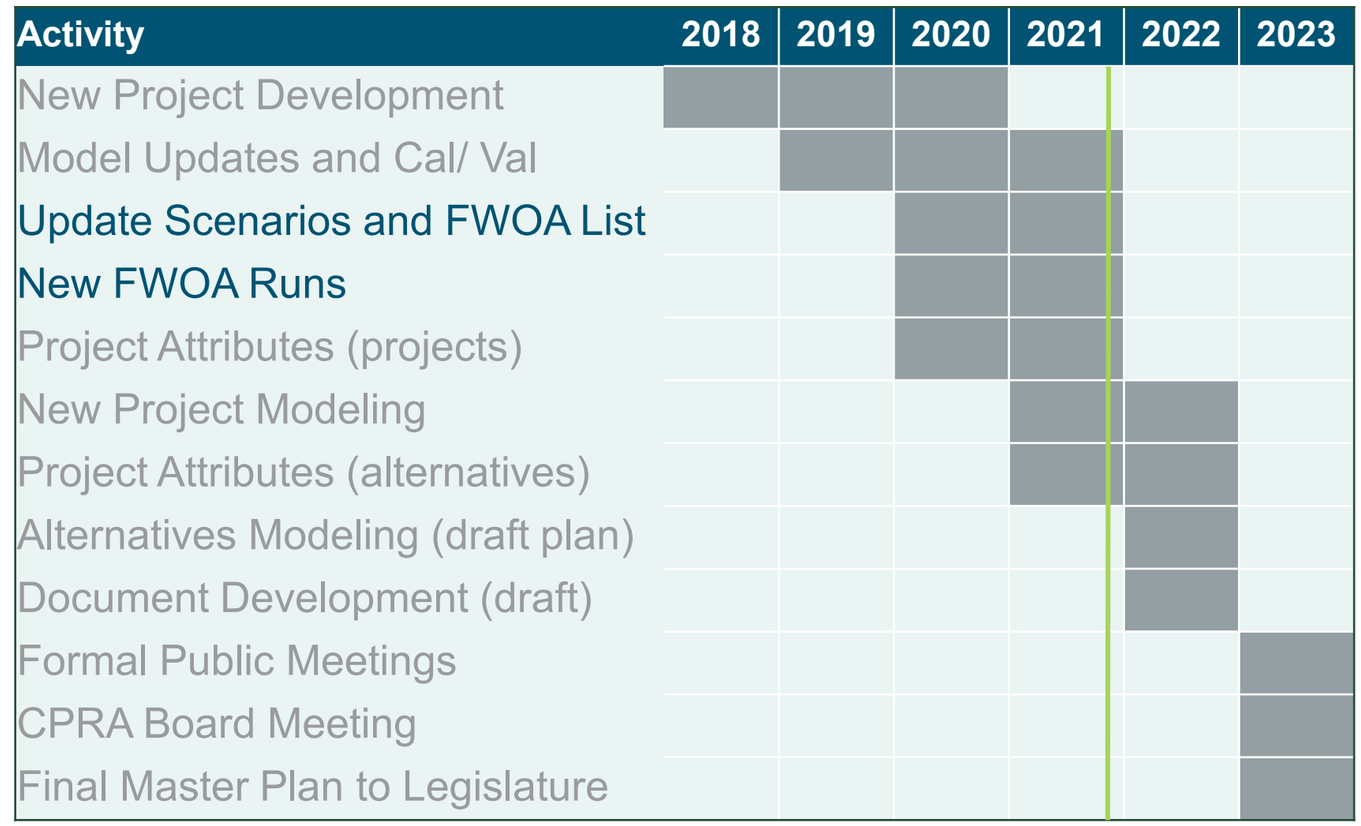
STUART BROWN

NOVEMBER 17, 2021

2023 COASTAL MASTER PLAN UPDATE

Initial Future Without Action (FWOA) outputs

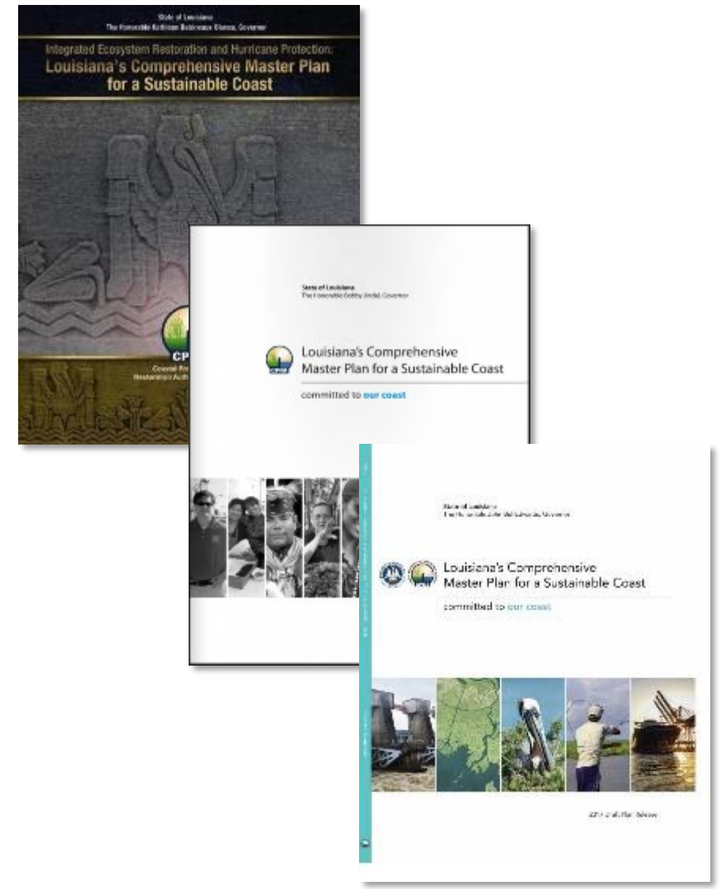
- Overview
  - Scenario Updates
  - Model Improvements
  - FWOA Projects
- Future Landscape Projections



MASTER PLAN OVERVIEW

CPRA BOARD UPDATE

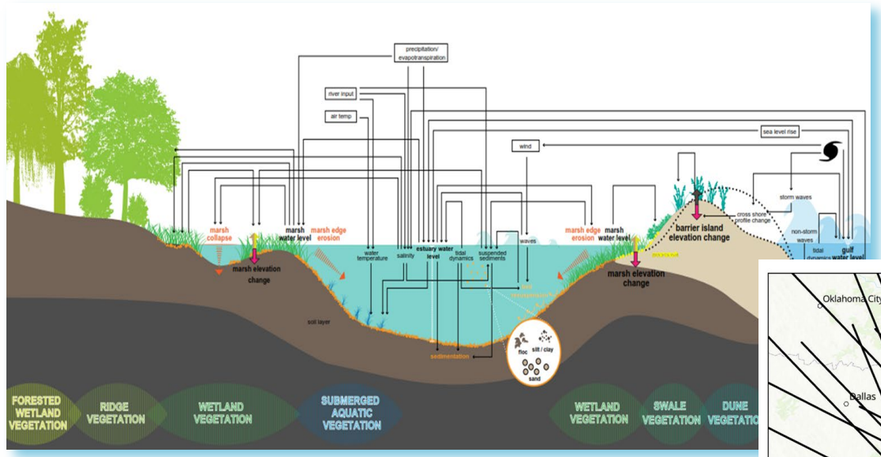
- Prioritization effort. How can the state spend its money most cost-effectively over the next 50 years to reduce storm surge based flood risk and restore and maintain coastal wetlands
- Built on world class science and engineering
- Illustrates how the coast is going to change
- Required by law to be updated every six years
- Incorporates extensive public input and review
- Advances a comprehensive and integrated approach to protection and restoration
- Identifies investments that will pay off, not just for us, but for our children and grandchildren



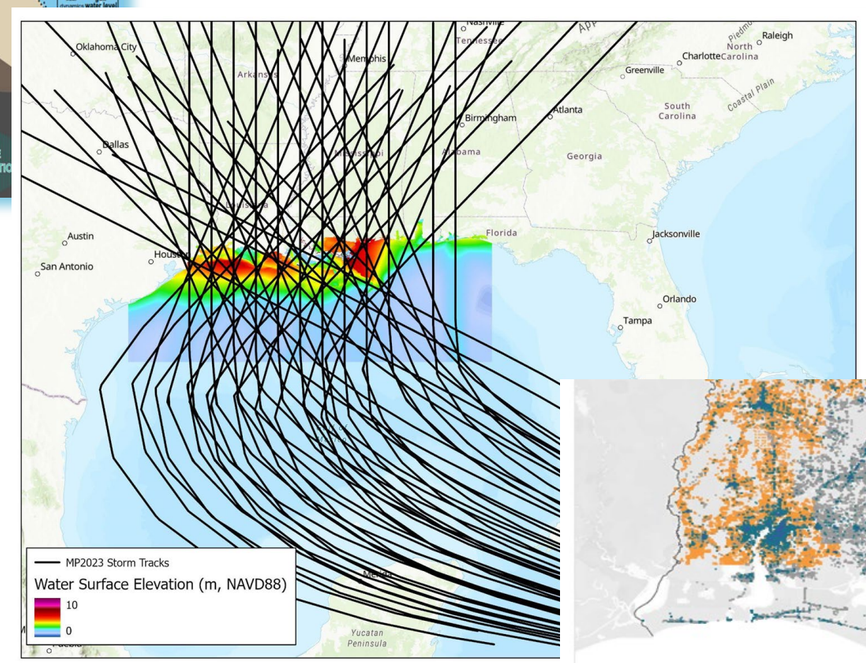
LOUISIANA COASTAL MASTER PLAN

PREDICTIVE MODELS

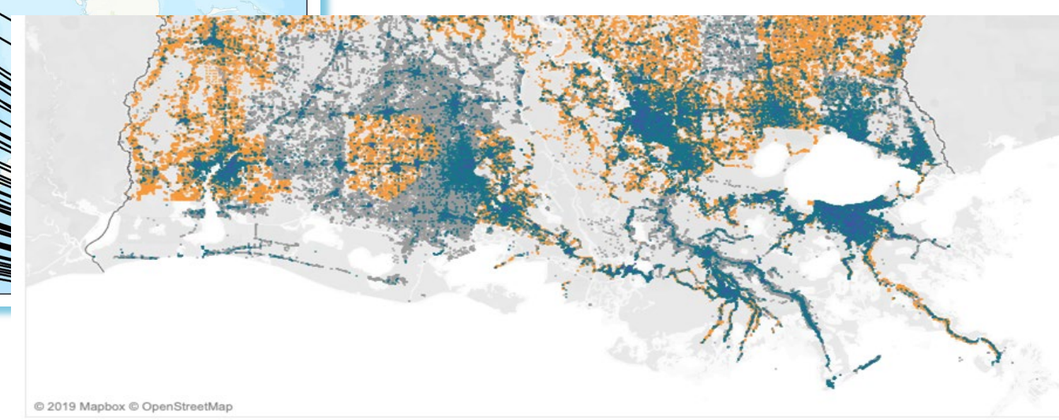
Landscape Model (ICM)



Surge and Wave Models



Risk Model



LOUISIANA COASTAL MASTER PLAN

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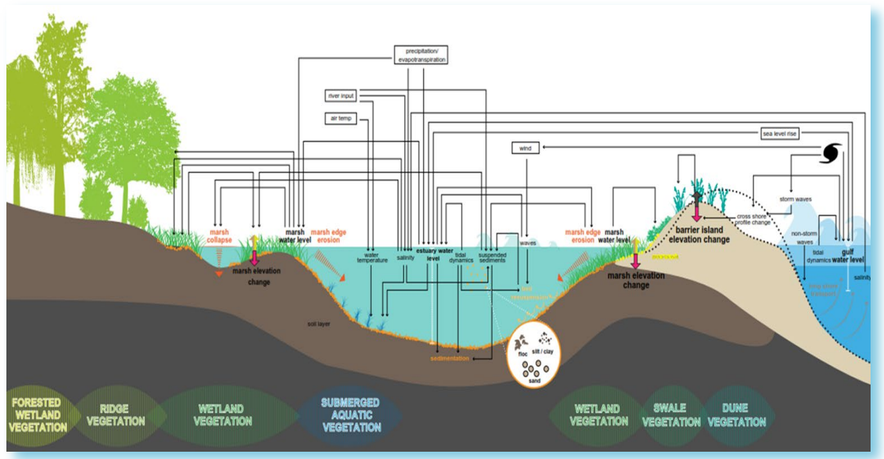
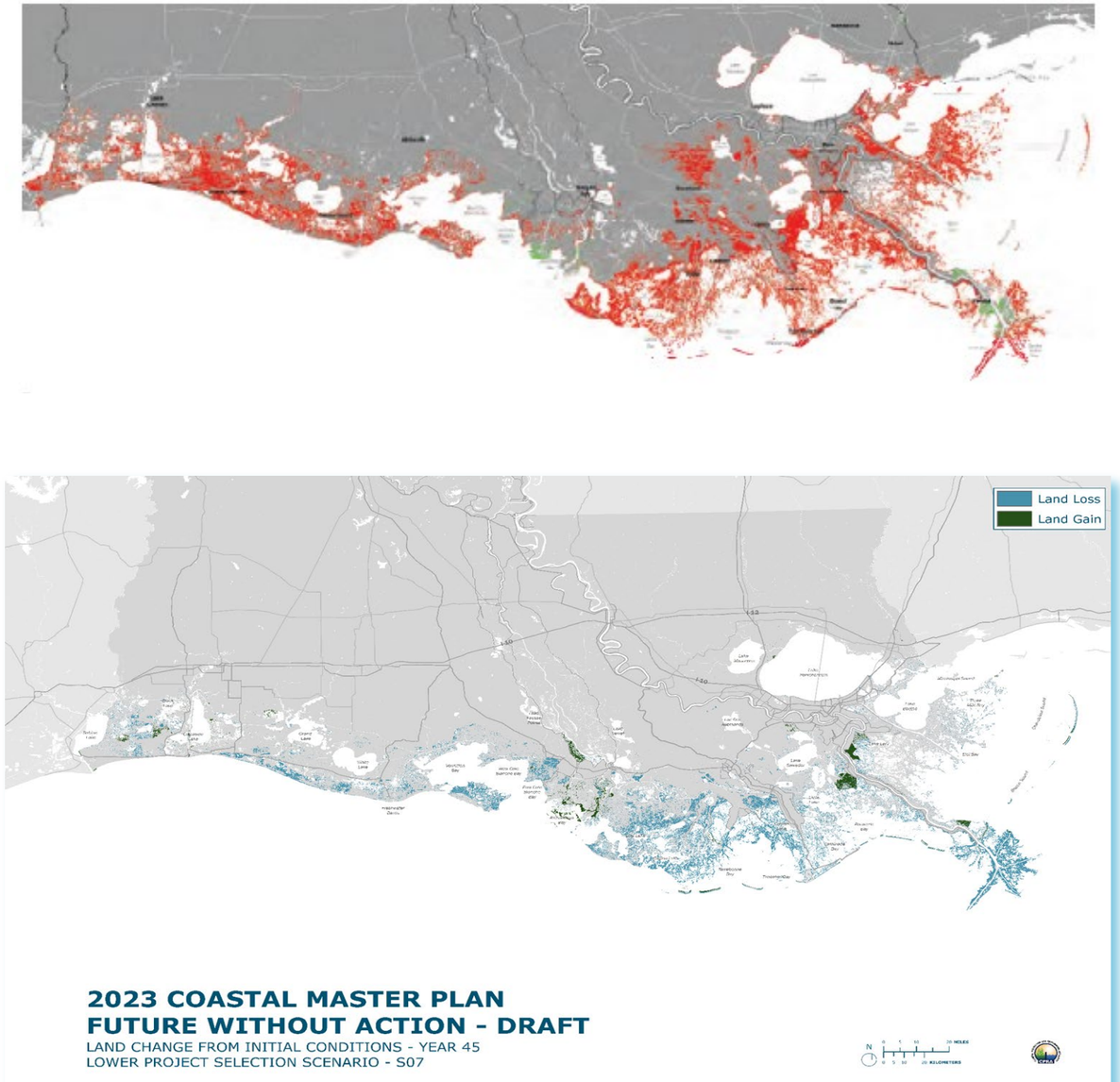


MEDIUM SCENARIO (2017)



ENVIRONMENTAL SCENARIOS

ENVIRONMENTAL SCENARIOS FOR PROJECT SELECTION

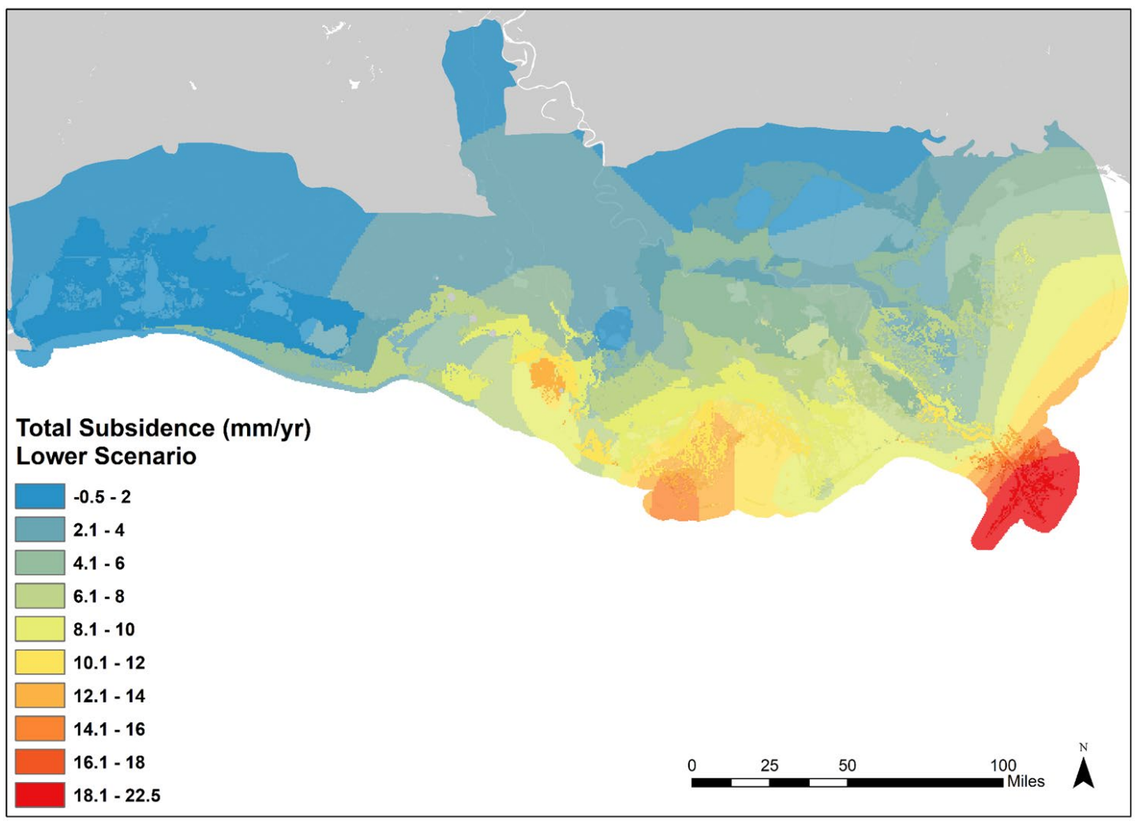
ENVIRONMENTAL SCENARIO APPROACH

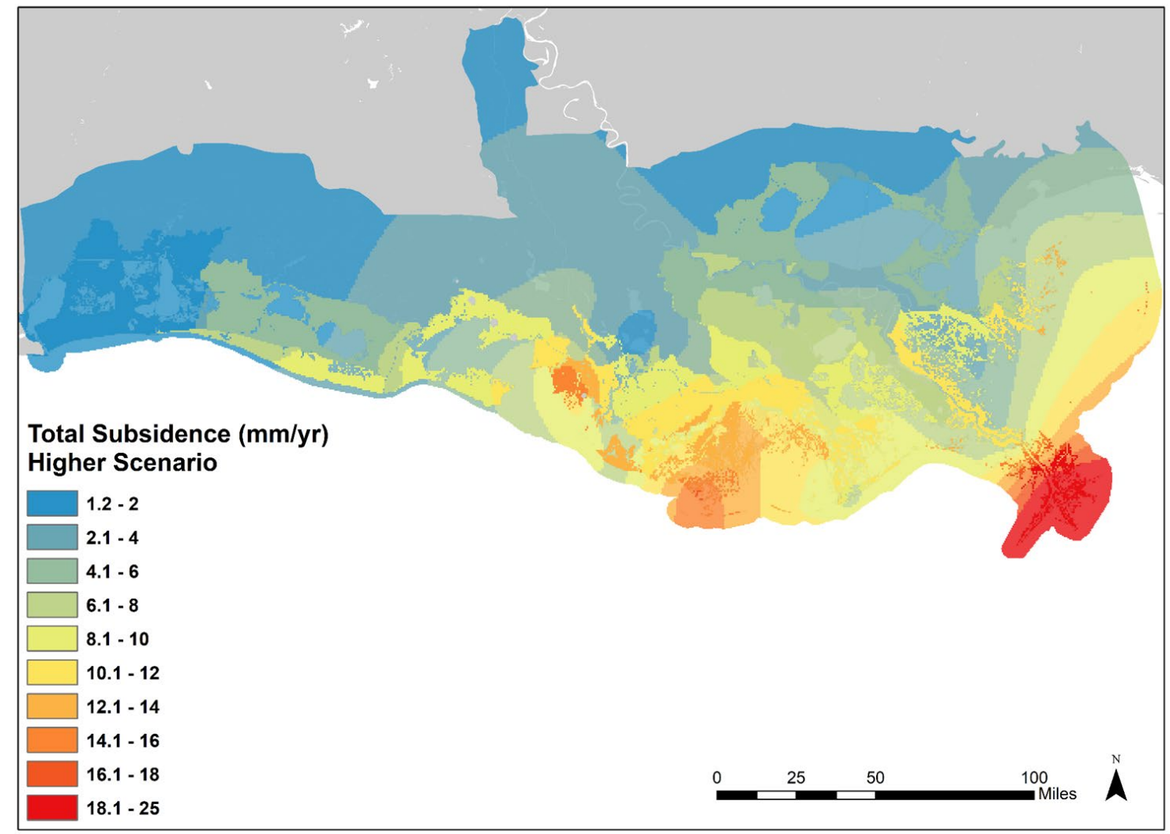
- Scenarios used to address some of the uncertainty inherent in predictive models by varying values for key environmental drivers in the ICM
  - **subsidence**
  - **sea level rise**
  - temperature
  - evapotranspiration
  - precipitation
  - tributary hydrographs
- Climate-driven variables co-vary based on a lower (RCP 4.5) or higher (RCP 8.5) radiative forcing condition to develop 2 project selection scenarios
  - 4 sea level rise curves were tested to identify 2 for project selection
- A wider range of conditions will be tested through additional exploratory scenario runs

ENVIRONMENTAL SCENARIOS FOR PROJECT SELECTION

SUBSIDENCE

2 subsidence scenarios have been developed with differences in the contribution of shallow processes

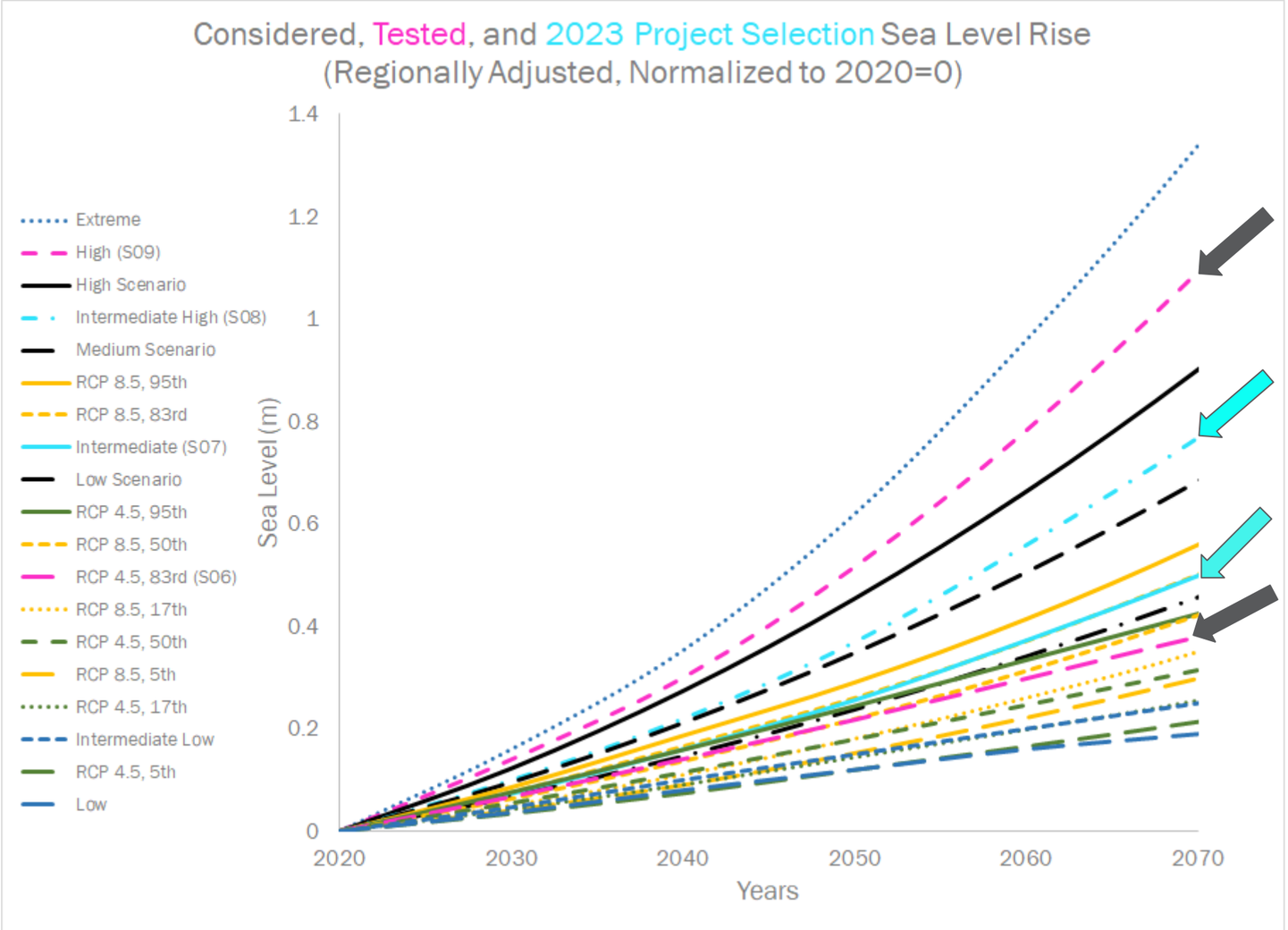




ENVIRONMENTAL SCENARIOS FOR PROJECT SELECTION

SEA LEVEL RISE CURVES SELECTION PROCESS

- Identified 19 curves from
  - NOAA guidance
  - SROCC - 2019
  - 2017 Coastal Master Plan
- 4 curves were tested with the FWOA landscape
- 2 curves were selected as sea level scenario values for upcoming project selection ICM runs
- Additional curves will be used for other analyses, including testing landscape response to other sea level scenario values through additional exploratory scenario runs



ENVIRONMENTAL SCENARIOS FOR PROJECT SELECTION

ENVIRONMENTAL SCENARIOS RUN ON FWOA LANDSCAPE

- 1 lower (S07) and 1 higher (S08) scenario will be used for project selection runs

	S06	S07 ✓	S08 ✓	S09
Sea level rise (regionally adjusted)	RCP 4.5/83rd percentile (~0.38 m by 2070; ~0.75 m by 2100)	**NOAA Intermediate (~0.50 m by 2070; ~1.07 m by 2100)**	**NOAA Intermediate High (~0.77 m by 2070; ~1.75m by 2100)**	NOAA High (~1.09 m by 2070; ~2m by 2100)
Temperature and Evapotranspiration	following RCP 4.5 50th percentile	**following RCP 4.5 50th percentile**	**following RCP 8.5 50th percentile**	following RCP 8.5 50th percentile
Precipitation and Tributary flows	following RCP 4.5 50th percentile	**following RCP 4.5 50th percentile**	**following RCP 8.5 50th percentile**	following RCP 8.5 50th percentile
Subsidence	low: deep subsidence + 1st quartile shallow subsidence by ecoregion	**low: deep subsidence + 1st quartile shallow subsidence by ecoregion**	**high: deep subsidence + median shallow subsidence by ecoregion**	high: deep subsidence + median shallow subsidence by ecoregion
MR hydrograph (does not vary)	projections based on RCP 4.5	**projections based on RCP 4.5**	**projections based on RCP 4.5**	projections based on RCP 4.5
Storm Intensity	+5% over 50 years	**+5% over 50 years**	**+10% over 50 years**	+10% over 50 years

ICM FWOA RESULTS

OVERVIEW OF ICM IMPROVEMENTS

SUMMARY OF KEY MODEL CHANGES

- Updates to ICM-Hydro compartment delineation/coastal hydrology
- Improvements to tidal range/water level variability
- New dispersal rules for vegetation species
- No longer “collapse” vegetated marsh directly to open water due to acute salinity stress
  - Now allow for vegetation to re-establish in later years if conditions (or dispersal rules) allow
  - If no vegetation establishes on bareground, then it will gradually decrease in elevation
- Inundation stress is now function of both persistent inundation depth *and* mean salinity
  - Inundation land does not decrease in elevation
- Updates to accretion algorithms (and input data)

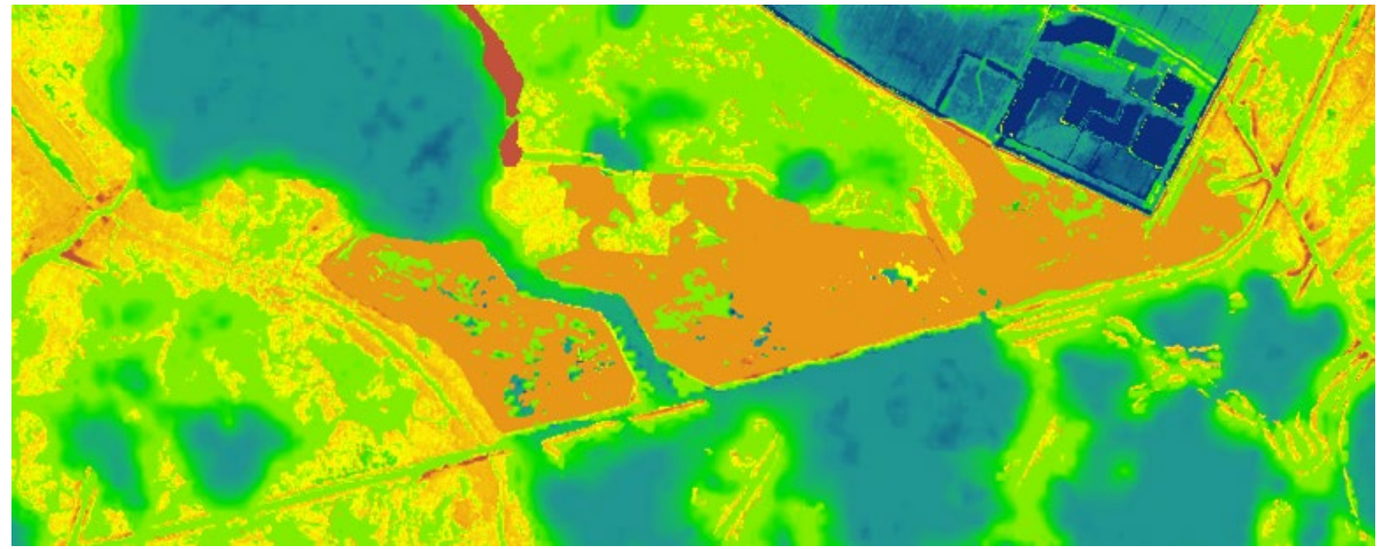
OVERVIEW OF PROJECTS INCLUDED IN FWOA

SUMMARY OF KEY MODEL CHANGES

- Recently constructed projects
  - Lake Hermitage MC, Rabit Island, Rockefeller Shoreline Protection, etc.

- Under Construction
  - Spanish Pass, Cameron Meadows MC, Bayou DeCade Ridge and Marsh, etc.

- Funded for construction
  - Mid Diversions, River Reintroduction into Maurepas Swamp, Golden Triangle MC, Terrebonne Basin Ridge and Marsh Creation, etc.

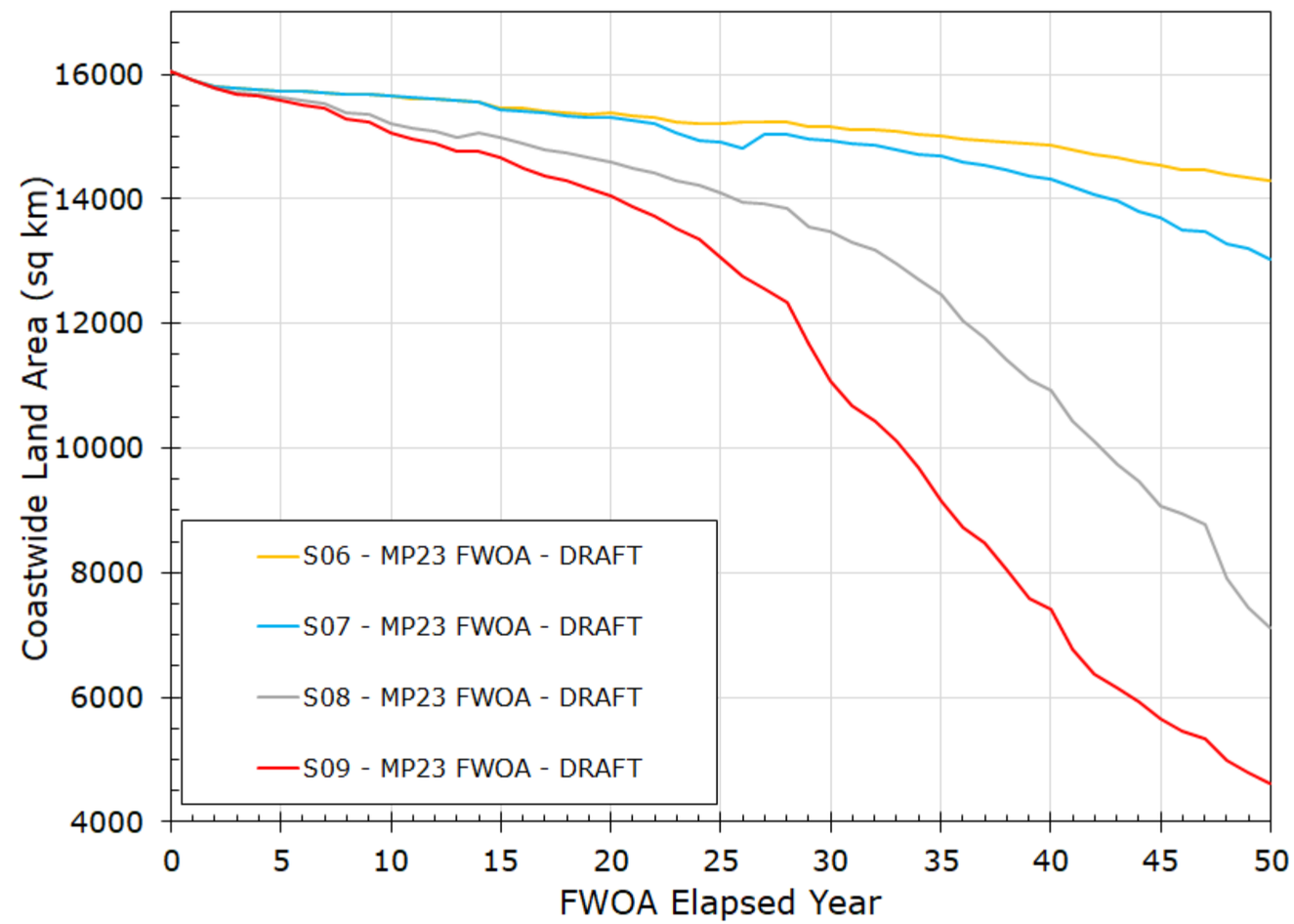


ICM OUTPUTS

LAND AREA OVER TIME - COASTWIDE

Preliminary land area change in coastal Louisiana from 2023 FWOA simulations.

These outputs are still undergoing QA/QC by the modeling team and are still considered draft.



Coastal land area over time from the 2023 FWOA ICM simulations.

ICM OUTPUTS

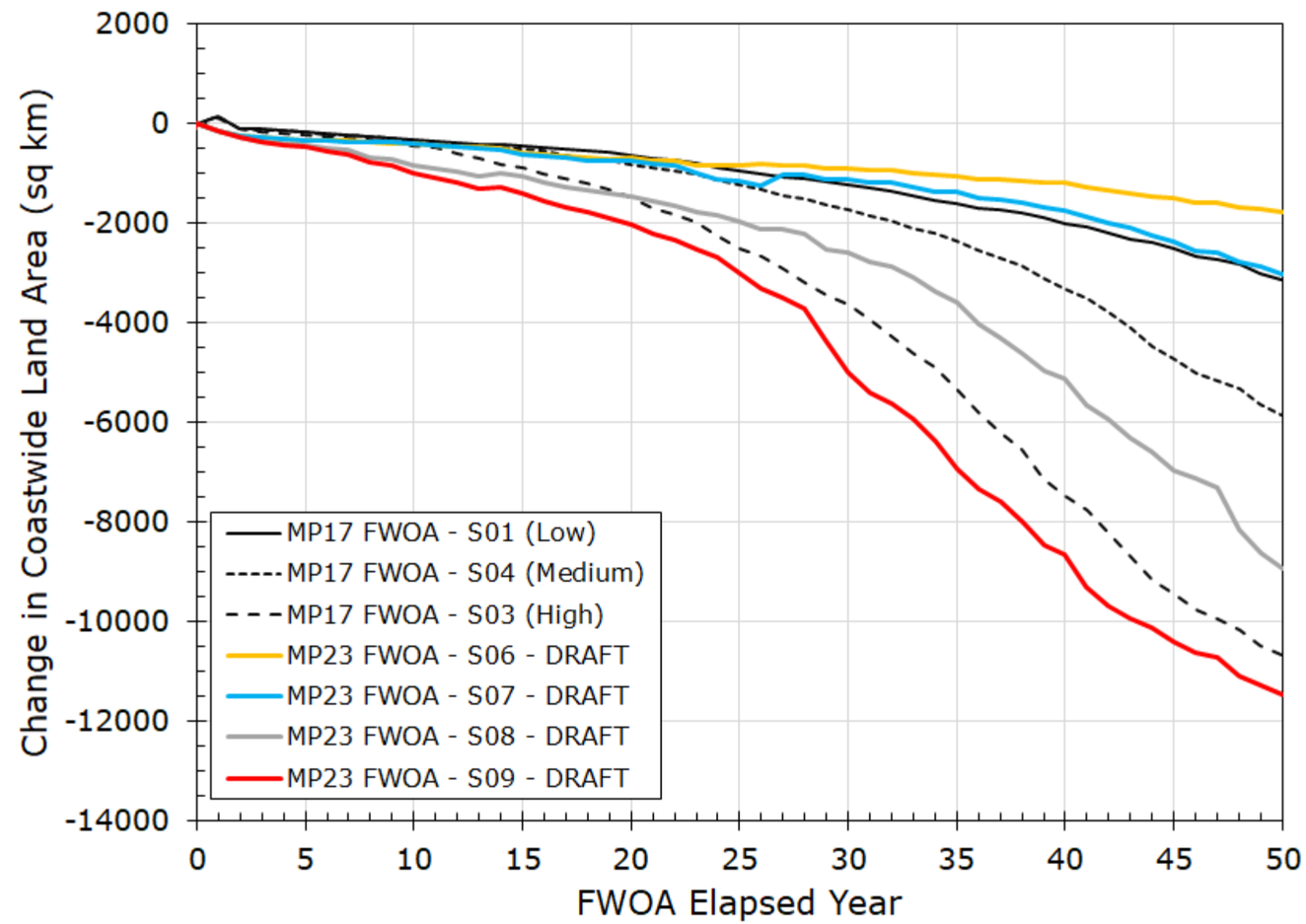
LAND AREA OVER TIME - COASTWIDE

Land area change comparisons to 2017 scenarios:

- Recall that the 2023 FWOA includes several project updates that were not in 2017 FWOA
- ESLR scenarios:

  S06 < S01 < S07 < S04 <

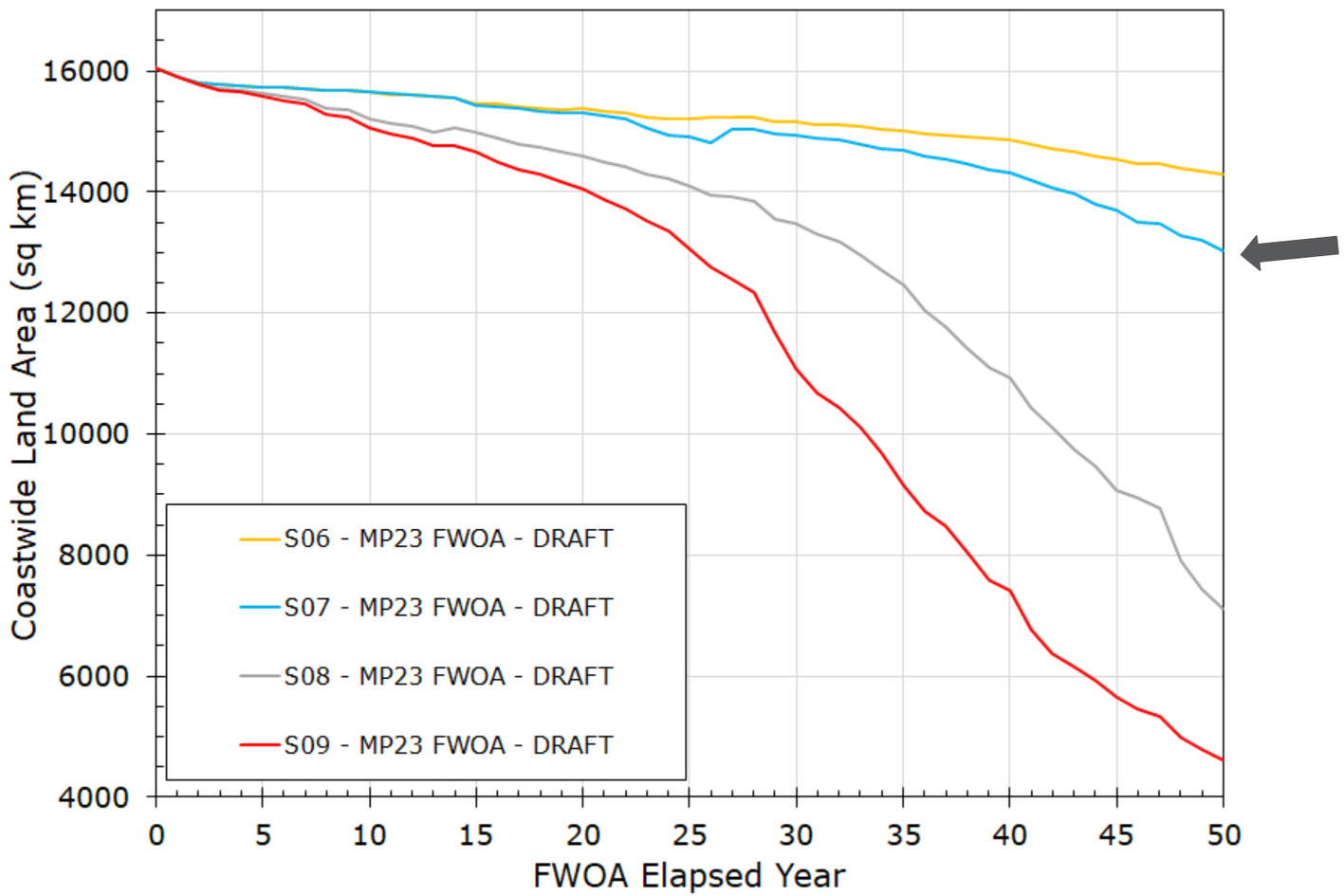
  S08 < S03 < S09
- A variety of model updates were also made in addition to the projects and environmental scenarios



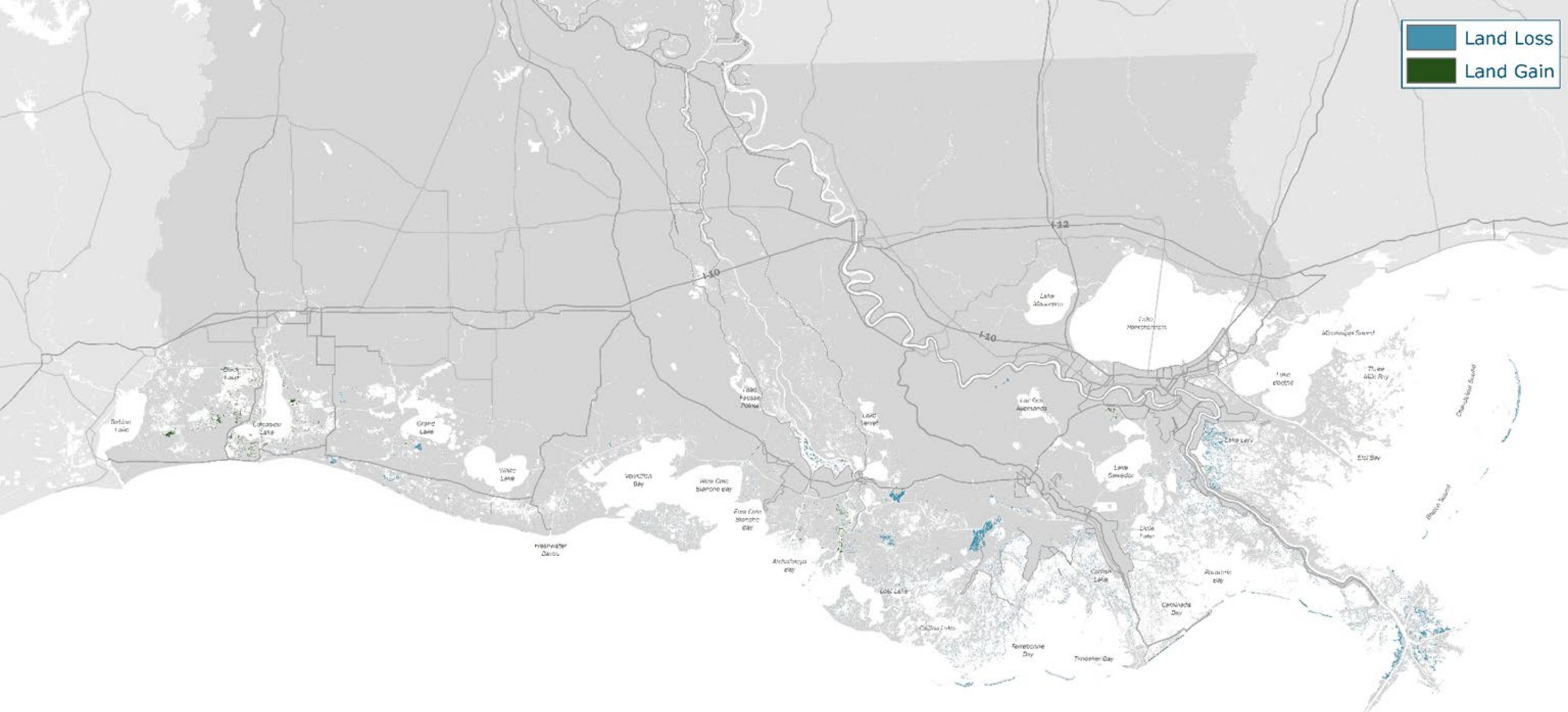
Change in coastal land area from initial conditions from the 2017 and 2023 FWOA ICM simulations. Note that there are changes to both the model *and* the projects assumed to be implemented in the FWOA.

ICM OUTPUTS:
LOWER SCENARIO LAND/WATER

LAND AREA OVER TIME - COASTWIDE



Coastal land area over time from the 2023 FWOA ICM simulations.



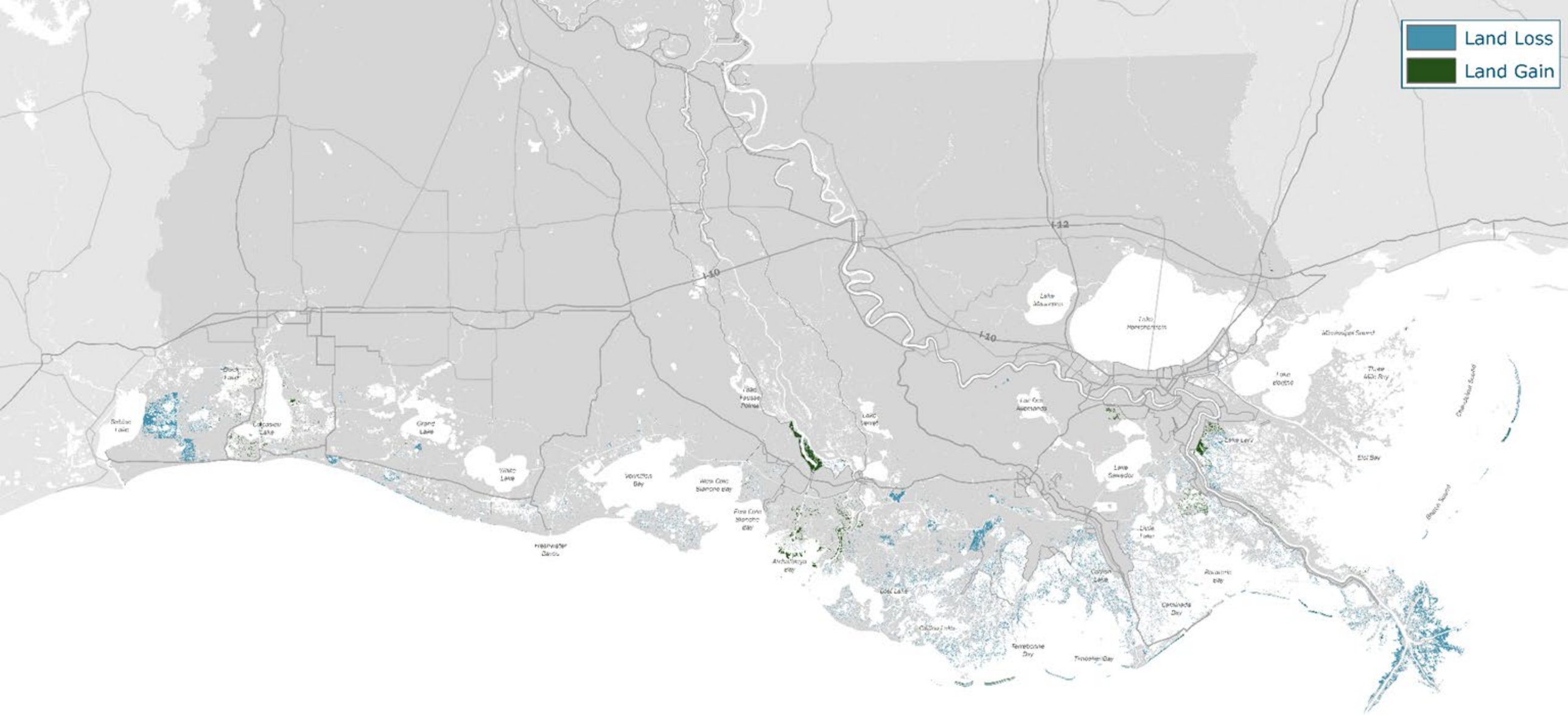
2023 COASTAL MASTER PLAN
FUTURE WITHOUT ACTION - DRAFT

LAND CHANGE FROM INITIAL CONDITIONS - YEAR 10
LOWER PROJECT SELECTION SCENARIO - S07

N

0 5 10 20 MILES

0 5 10 20 KILOMETERS



2023 COASTAL MASTER PLAN
FUTURE WITHOUT ACTION - DRAFT

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

N

0 5 10 20 MILES

0 5 10 20 KILOMETERS

2023 COASTAL MASTER PLAN
FUTURE WITHOUT ACTION - DRAFT

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

N

0 5 10 20 MILES

0 5 10 20 KILOMETERS

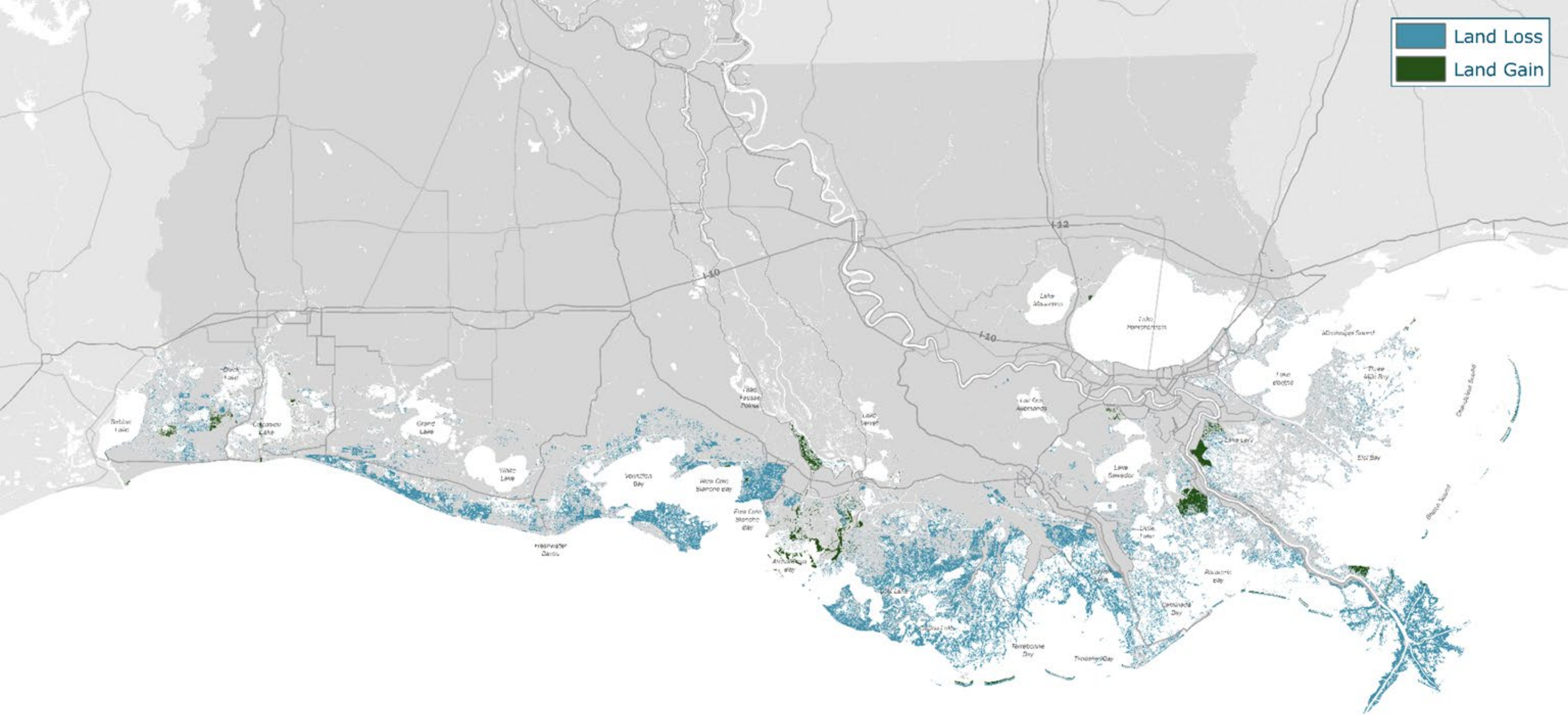
2023 COASTAL MASTER PLAN
FUTURE WITHOUT ACTION - DRAFT

LAND CHANGE FROM INITIAL CONDITIONS - YEAR 40
LOWER PROJECT SELECTION SCENARIO - S07

N

0 5 10 20 MILES

0 5 10 20 KILOMETERS



2023 COASTAL MASTER PLAN
FUTURE WITHOUT ACTION - DRAFT

LAND CHANGE FROM INITIAL CONDITIONS - YEAR 50 - S07

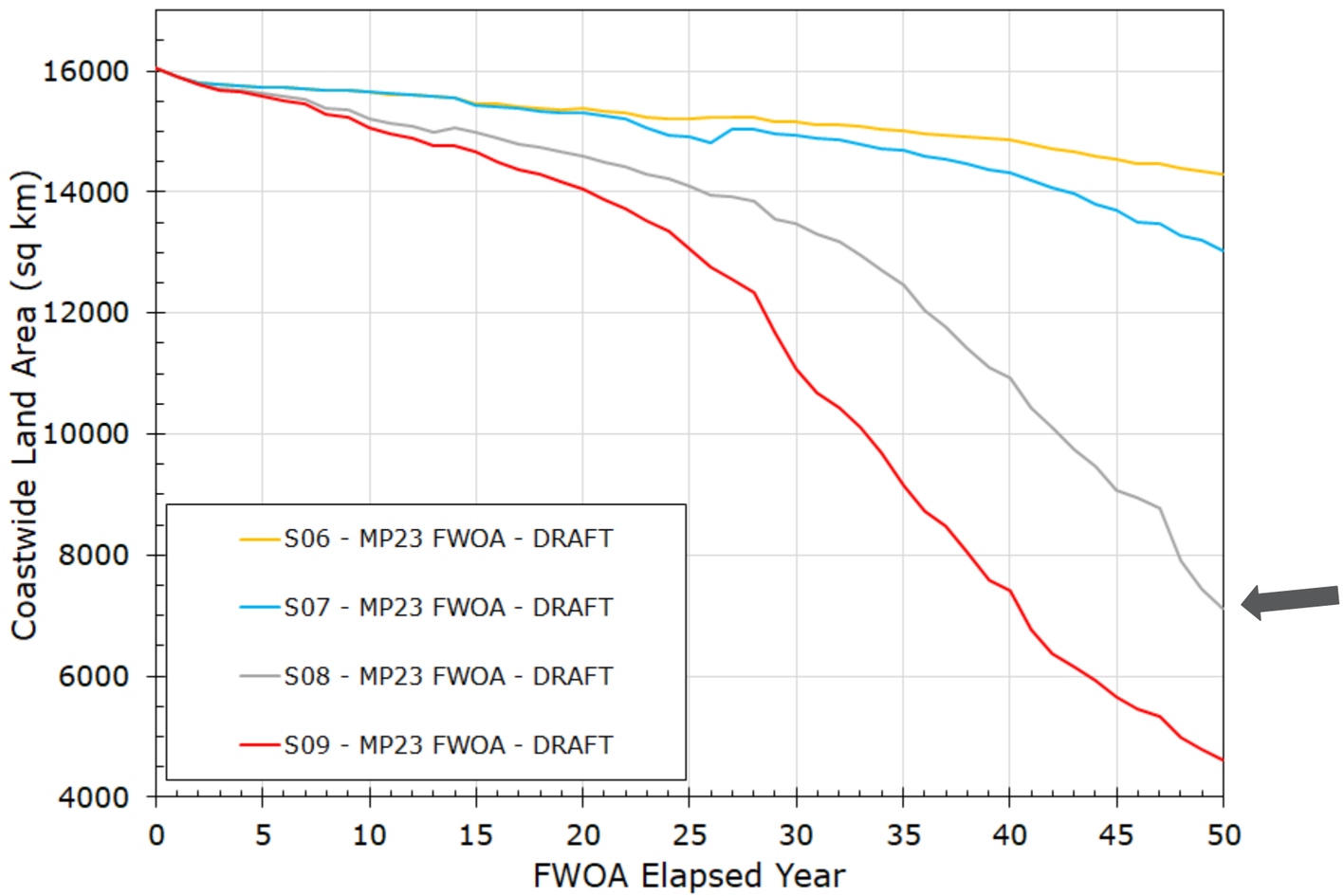
N

0 5 10 20 MILES

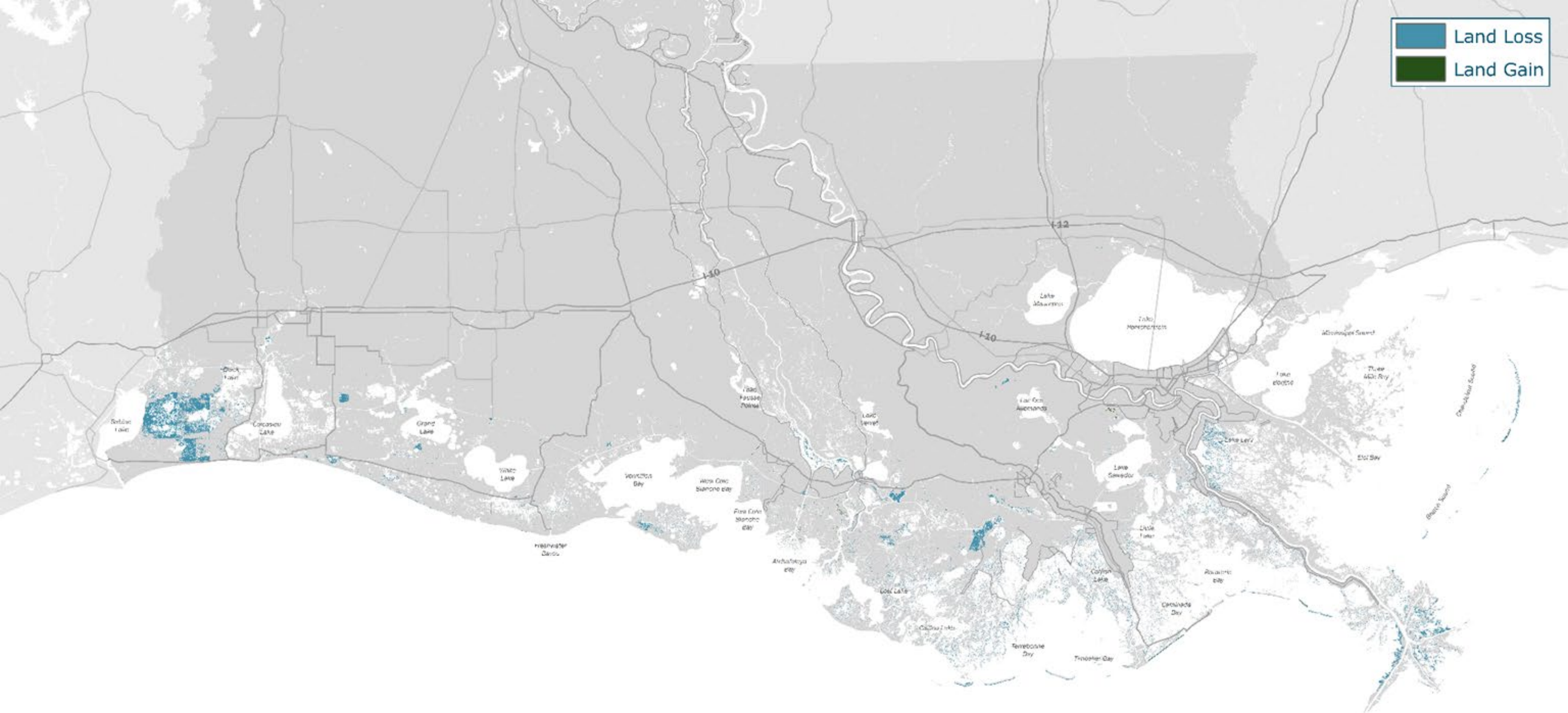
0 5 10 20 KILOMETERS

ICM OUTPUTS:
HIGHER SCENARIO LAND/WATER

LAND AREA OVER TIME - COASTWIDE



Coastal land area over time from the 2023 FWOA ICM simulations.



2023 COASTAL MASTER PLAN
FUTURE WITHOUT ACTION - DRAFT

LAND CHANGE FROM INITIAL CONDITIONS - YEAR 10
HIGHER PROJECT SELECTION SCENARIO - S08

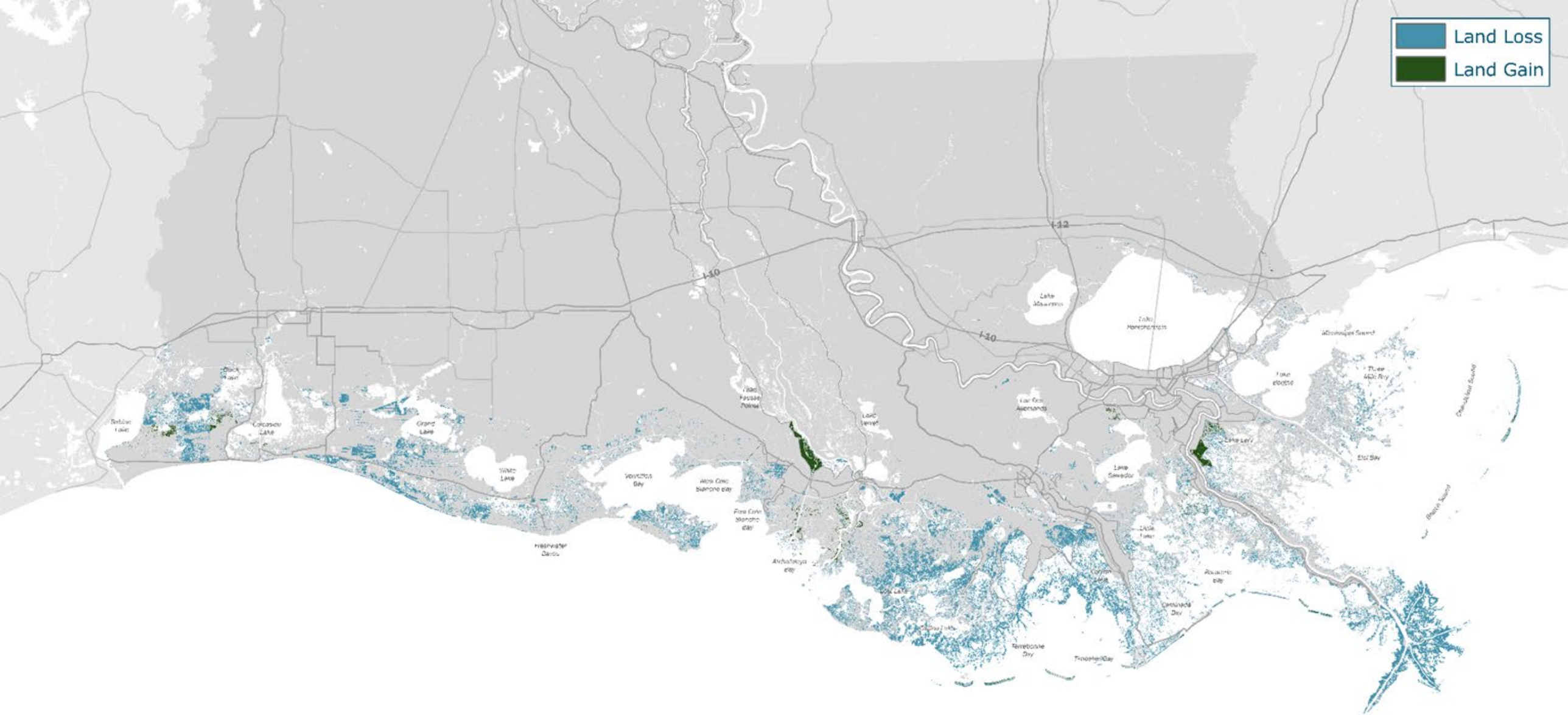
2023 COASTAL MASTER PLAN
FUTURE WITHOUT ACTION - DRAFT

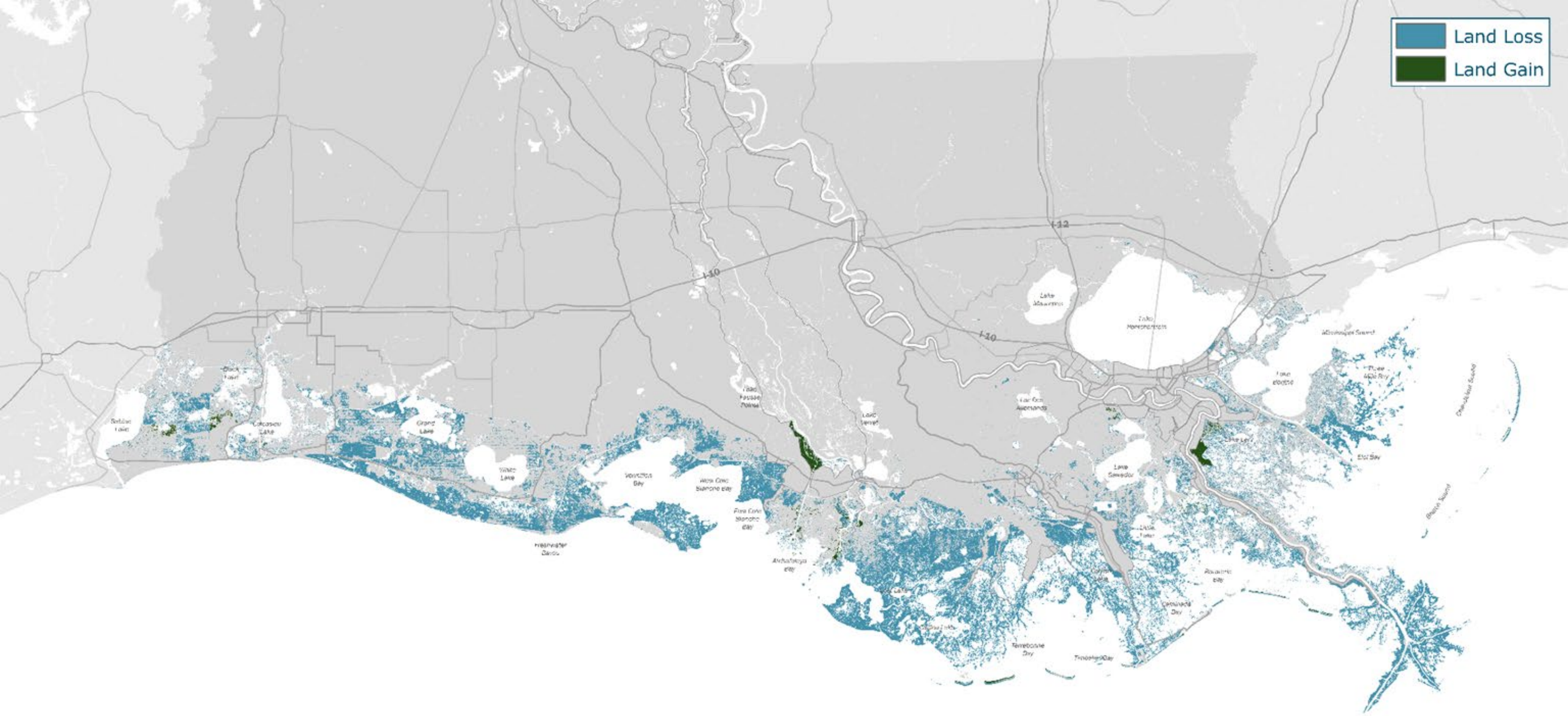
LAND CHANGE FROM INITIAL CONDITIONS - YEAR 20
HIGHER PROJECT SELECTION SCENARIO - S08

N

0 5 10 20 MILES

0 5 10 20 KILOMETERS


Land Loss
Land Gain
I-12
I-10
I-20
Lake Maurepas
Lake Pontchartrain
Lake Borgne
Lake Ponchartrain
Lake Cataouatche
Lake Salvador
Lake Cataouatche
Lake Verret
Lake Boeuf
Lake Lery
Lake Pelto
Lake Decade
Lake Lafitte
Lake Grand Ecaille
Lake Pelto
Lake Lafitte
Lake Felicity
Lake Pelto
Lake Pelto
Lake Pelto



2023 COASTAL MASTER PLAN
FUTURE WITHOUT ACTION - DRAFT

LAND CHANGE FROM INITIAL CONDITIONS - YEAR 40
HIGHER PROJECT SELECTION SCENARIO - S08

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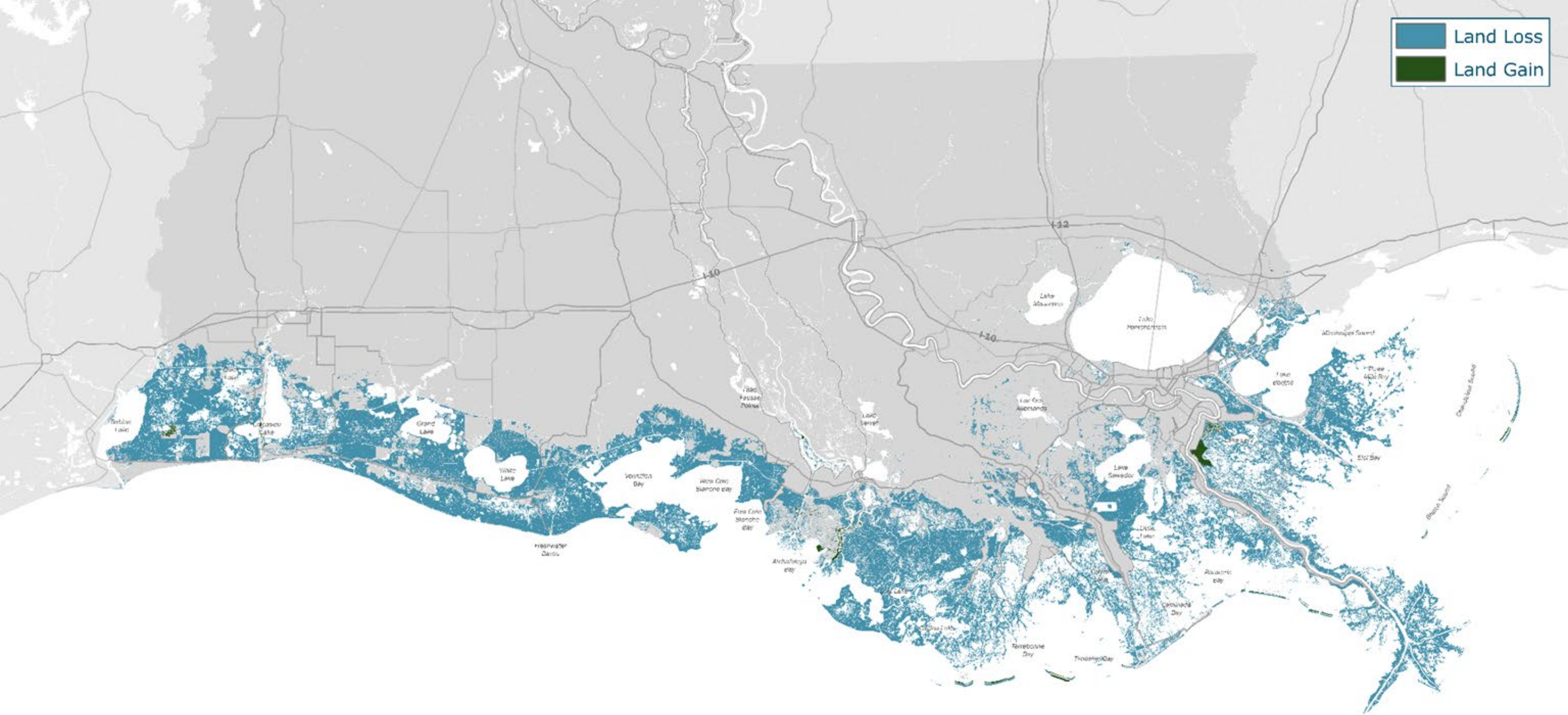


2023 COASTAL MASTER PLAN
FUTURE WITHOUT ACTION - DRAFT

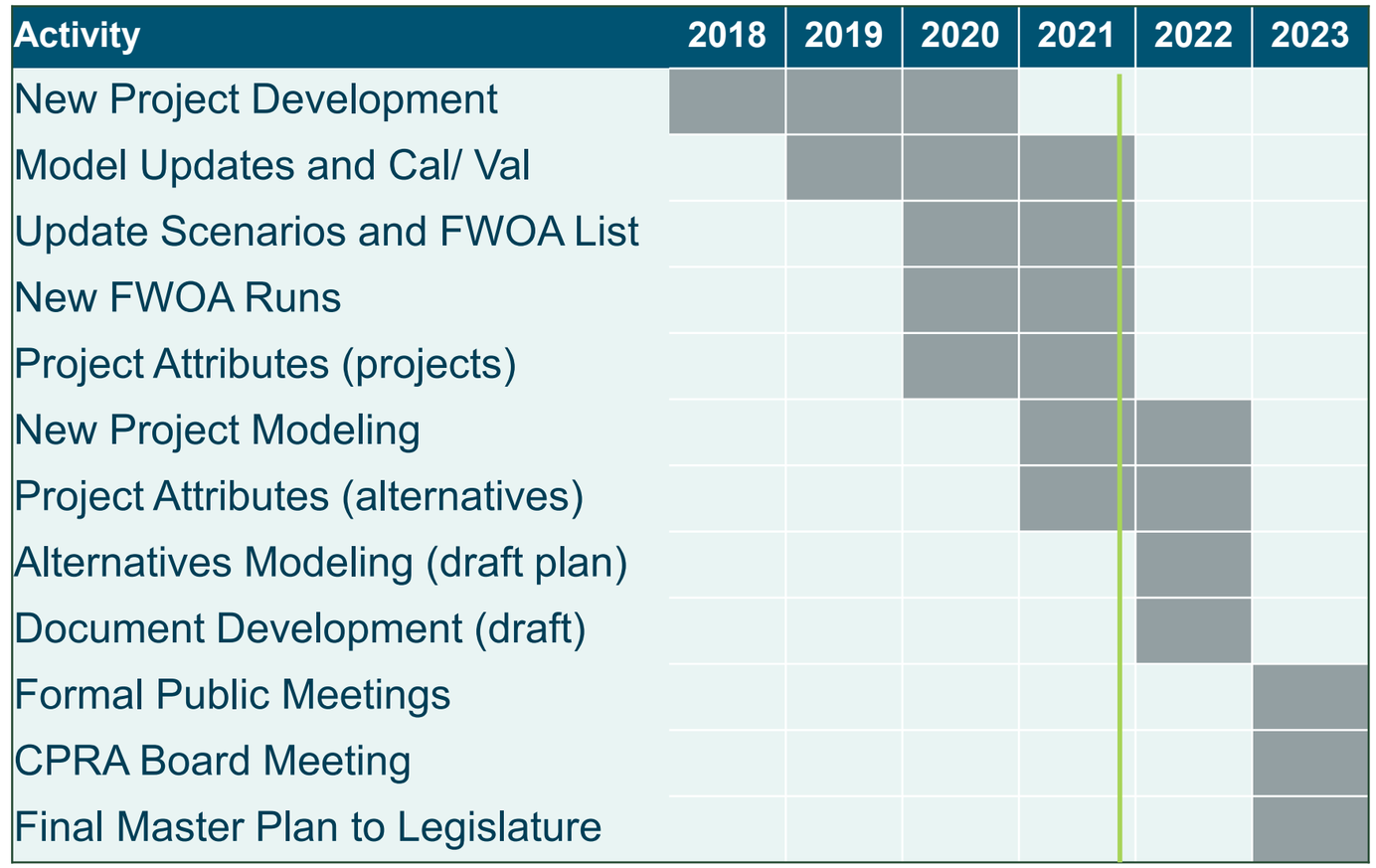
LAND CHANGE FROM INITIAL CONDITIONS - YEAR 50
HIGHER PROJECT SELECTION SCENARIO - S08

N
0 5 10 20 MILES
0 5 10 20 KILOMETERS

2023 COASTAL MASTER PLAN UPDATE

CLOSING AND NEXT STEPS

- Future without action risk projections
- Project and alternative (Future with action) modeling
- Future Landscape Projections



THANK YOU