

The logo for the University of Florida, consisting of the letters 'UF' in white on an orange square background.

UF

The logo for the UF GeoPlan Center, featuring the letters 'UF' in blue, a vertical orange line, and the words 'GEOPLAN CENTER' in blue. A globe icon is integrated into the 'O' of 'GEOPLAN'. The background of the slide features a faint, light blue molecular or network structure pattern.

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UF GeoPlan Center Resilience Tools & Resources

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Model Task Force Meeting
November 8, 2023

University of Florida GeoPlan Center

- Geospatial research and teaching center in the School of Landscape Architecture & Planning
- We support land use, transportation, and environmental planning in Florida with our geospatial expertise.
- We build data and tools to inform planning decisions.



Agenda

- Impacts of a Changing Climate
- Sea Level Scenario Sketch Planning Tool
- Demo: Sketch Tool & Resilience Report
- Other Resilience Resources

IMPACTS OF A CHANGING CLIMATE



Climate Stressors

Heat - Increased Temperatures

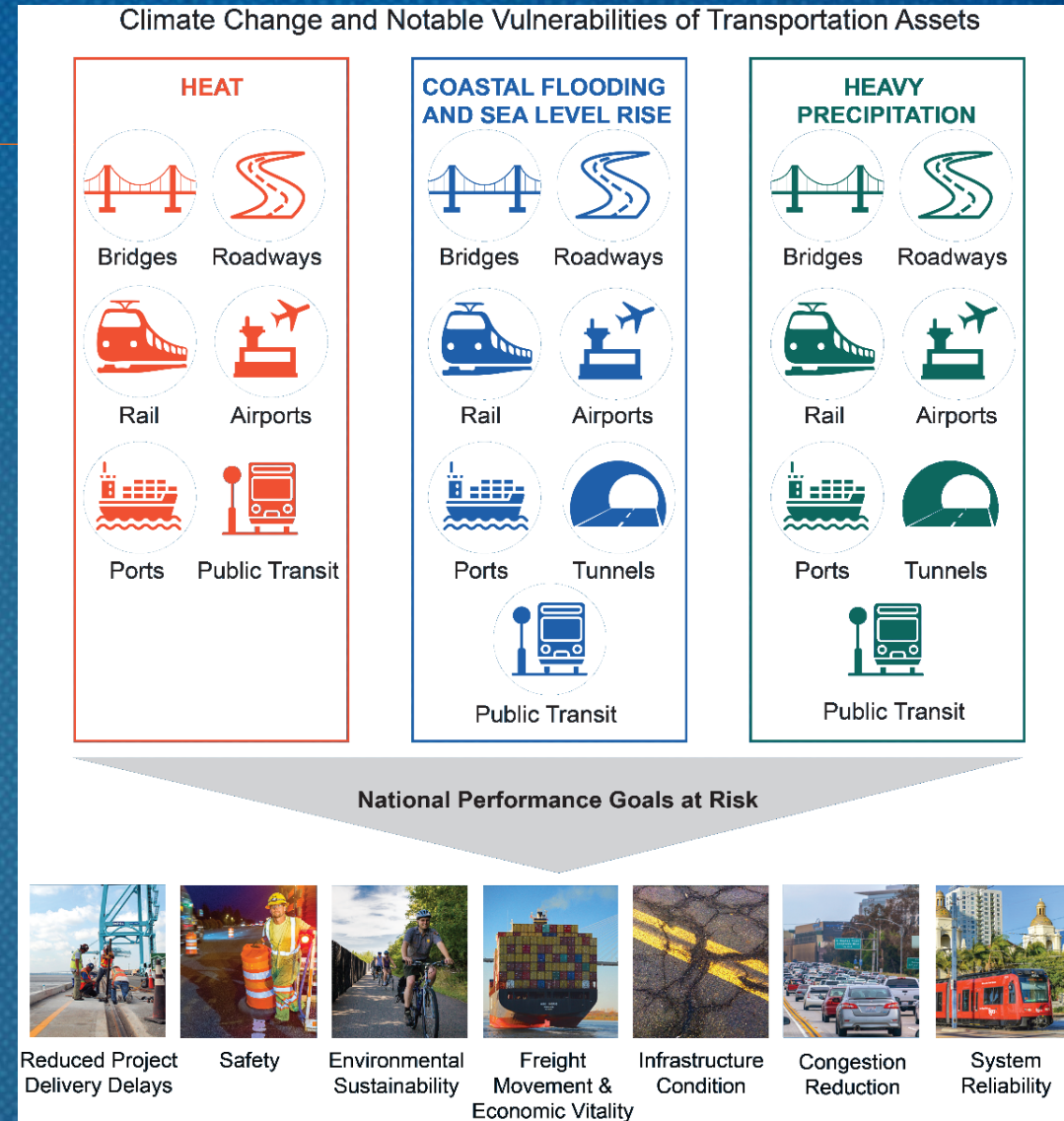
- Damage to facilities
- Health risks to outdoor workers and public

Coastal Flooding & Sea Level Rise

- More frequent high-tide flooding and more intense tropical storms
- Direct and indirect economic damages

Increased Precipitation and Inland Flooding

- Heavier rain events > increased runoff, erosion, risk of washout
- Increased riverine flooding - damage roads and increased bridge scour



What does sea level rise look like?

SLR is the driver of many impacts:

- High tide flooding
- Reduced stormwater drainage
- Higher storm surges
- Increased erosion
- Loss of coastal habitats and natural protection
- Saltwater intrusion



Sea Level Rise Over Next 30 Years

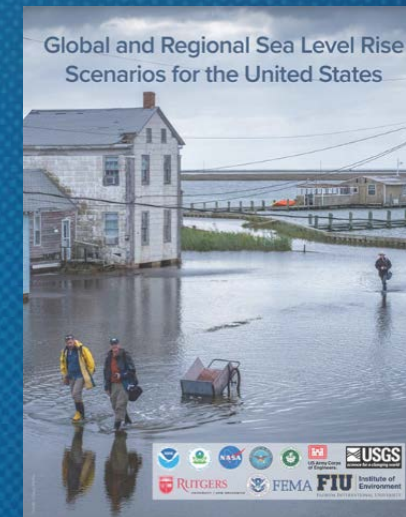
Q: What is the average projected rise along U.S. coast over next 30 years (2020- 2050)?

A: **10 - 12 inches (0.25 - 0.30 meters)**

For context: the rise over the next 30 years is as much as the rise over the last 100 years!

Rise varies regionally due to changes in land and ocean height:

- East coast: 10 - 14 inches (0.25 - 0.35 m)
- Gulf coast: 14 - 18 inches (0.35 - 0.45 m)

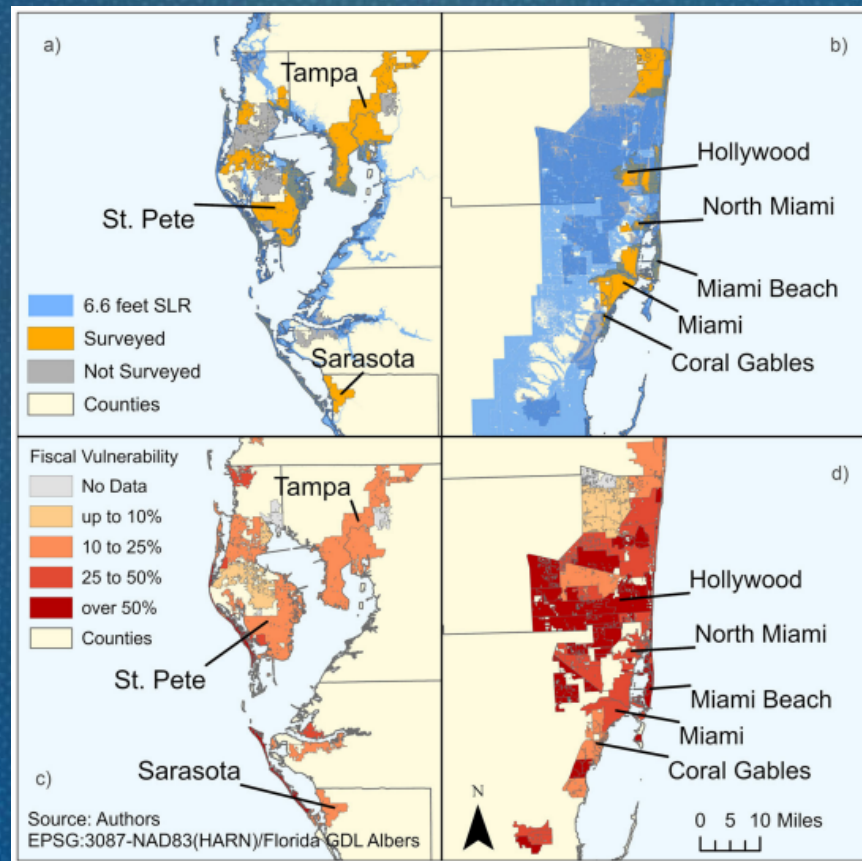


Global and Regional Sea Level Rise Scenarios for the United States: Updated Mean Projections and Extreme Water Level Probabilities Along U.S. Coastlines ("NOAA 2022 Technical Report", Sweet et al., 2022).

<https://oceanservice.noaa.gov/hazards/sealevelrise/sealevelrise-tech-report.html>

Economic Impacts of SLR

Fiscal Vulnerability of Florida Cities under 6.6 ft SLR (Shi et al., 2023)



51% of cities

Affected by 6.6ft SLR

5 million people

In cities where >10% revenues at risk

\$619 billion

Impacts to assessed property values

- Tipping point between 4 and 6.6ftSLR
- Vulnerability concentrated in smaller, dense, wealthier, and Whiter cities

Maps: Shi et al., 2023

What does this mean for transportation?

Short-to-mid term

Episodic flooding increasing

- Facilities: flooded, damaged, inaccessible
- Increased costs maintenance/repair
- Safety issues
- Mobility & economic disruptions
- Reduction of tax base and services



Mid-to-long term

Episodic + Permanent flooding

- Permanent inundation in some areas
- Changes in where people live and work
- Need to increase resilience of transportation systems

SEA LEVEL SCENARIO SKETCH PLANNING TOOL



Sea Level Scenario Sketch Planning Tool

- Launched in 2013, updated in 2017, 2020, 2022
- Planning-level screening tool
- View multiple SLR scenarios per decade (2040-2100)
- Evaluate SLR impacts to transportation assets
- NOAA 2017 & USACE 2013 SLR projections

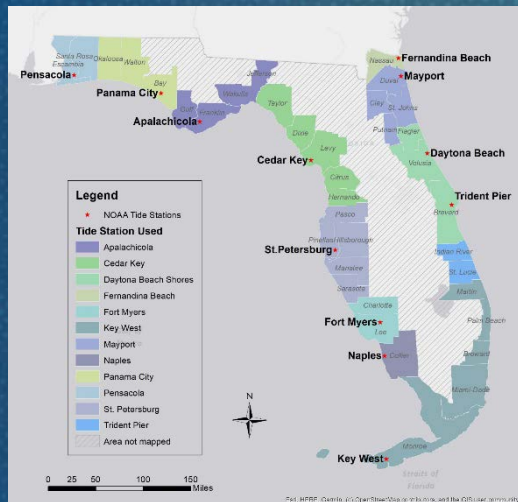
Mapping Local SLR Scenarios

Assign tide station by county

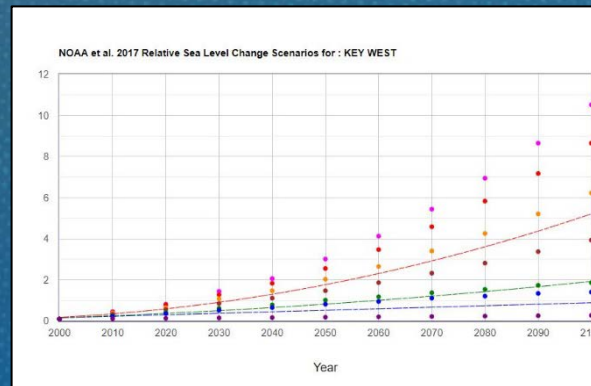
USACE Calculator
(Generate SLR values by decade)

Add SLR to MHHW (tidal surface)

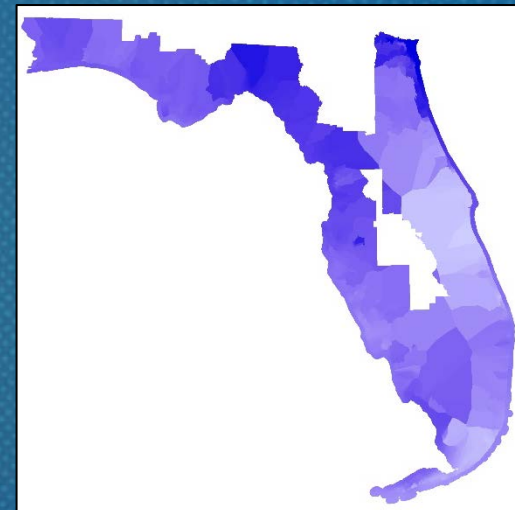
Find low-lying elevations, evaluate hydro connectivity & correct for bridges



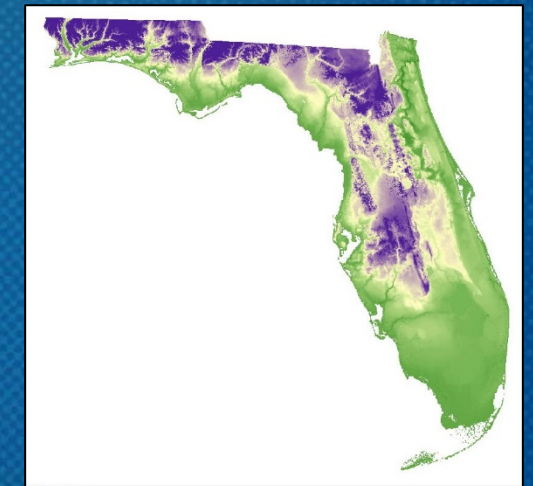
Local sea level trends



Local SLR projections

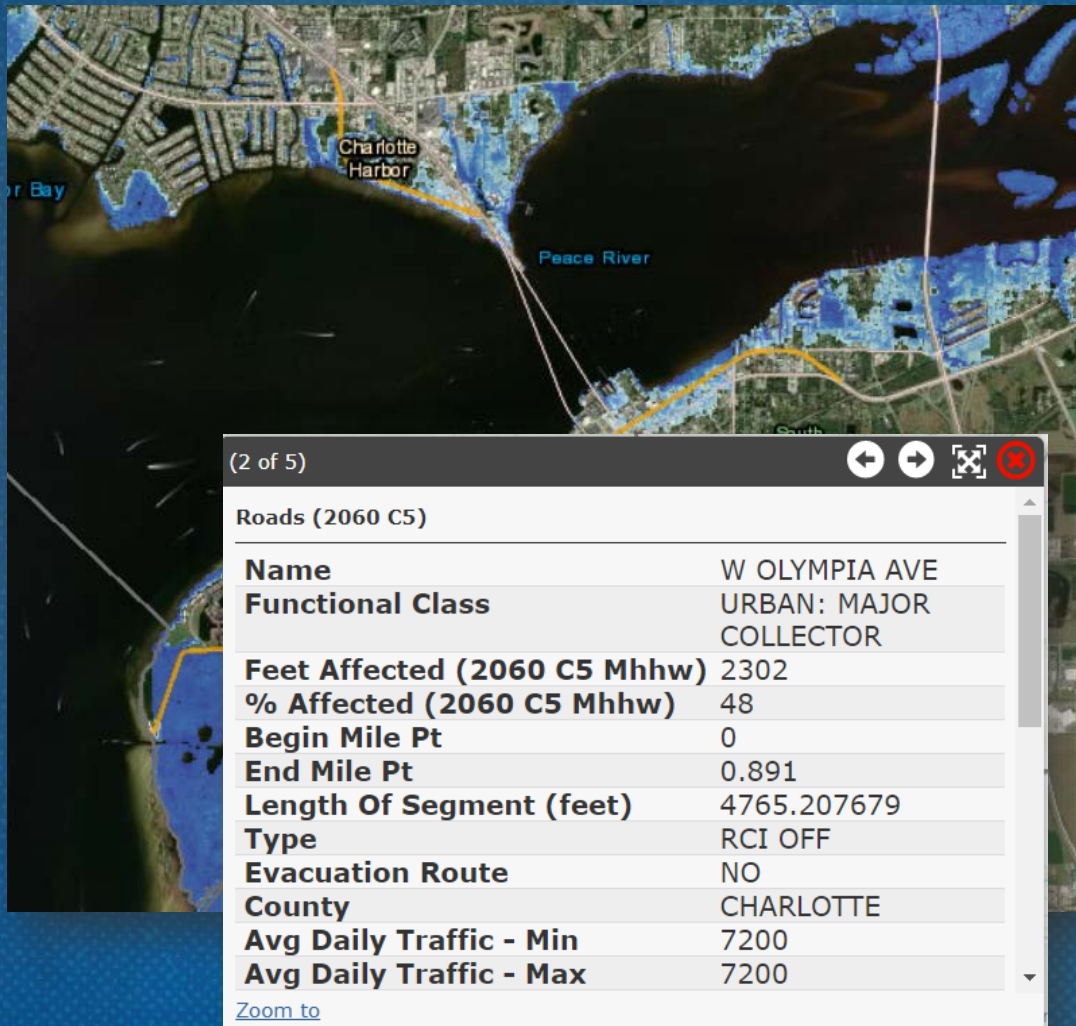


Map SLR on top of local high tide conditions



Lidar & high resolution elevation data (2020)

Transportation Exposure Analysis



Transportation assets analyzed:

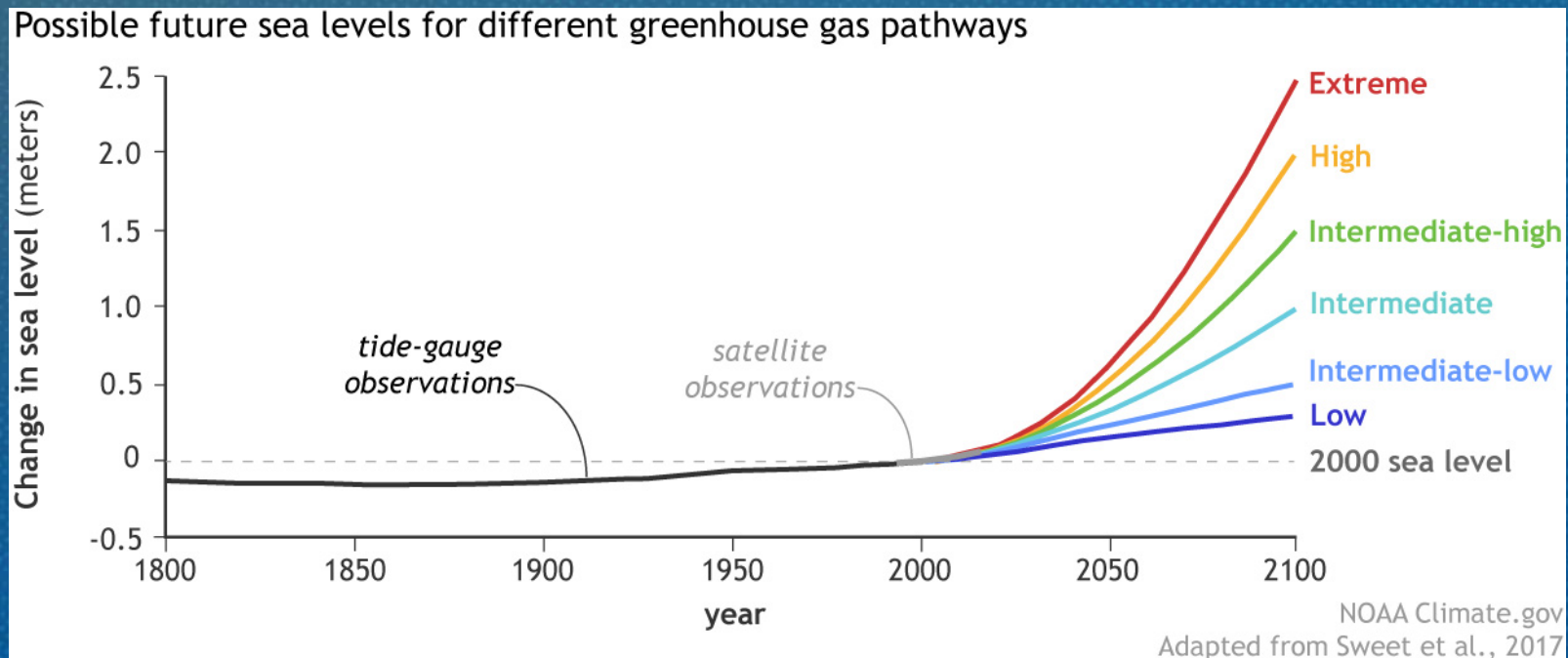
- Roadways (RCI and Tiger)
- Airports, seaports, freight terminals, rails
- SIS designations

Segment and asset-level analysis:

- Future flood risk: USACE & NOAA SLR scenarios over 7 decades
- Current flood risk: 100-year & 500-year floodplains, storm surge zones

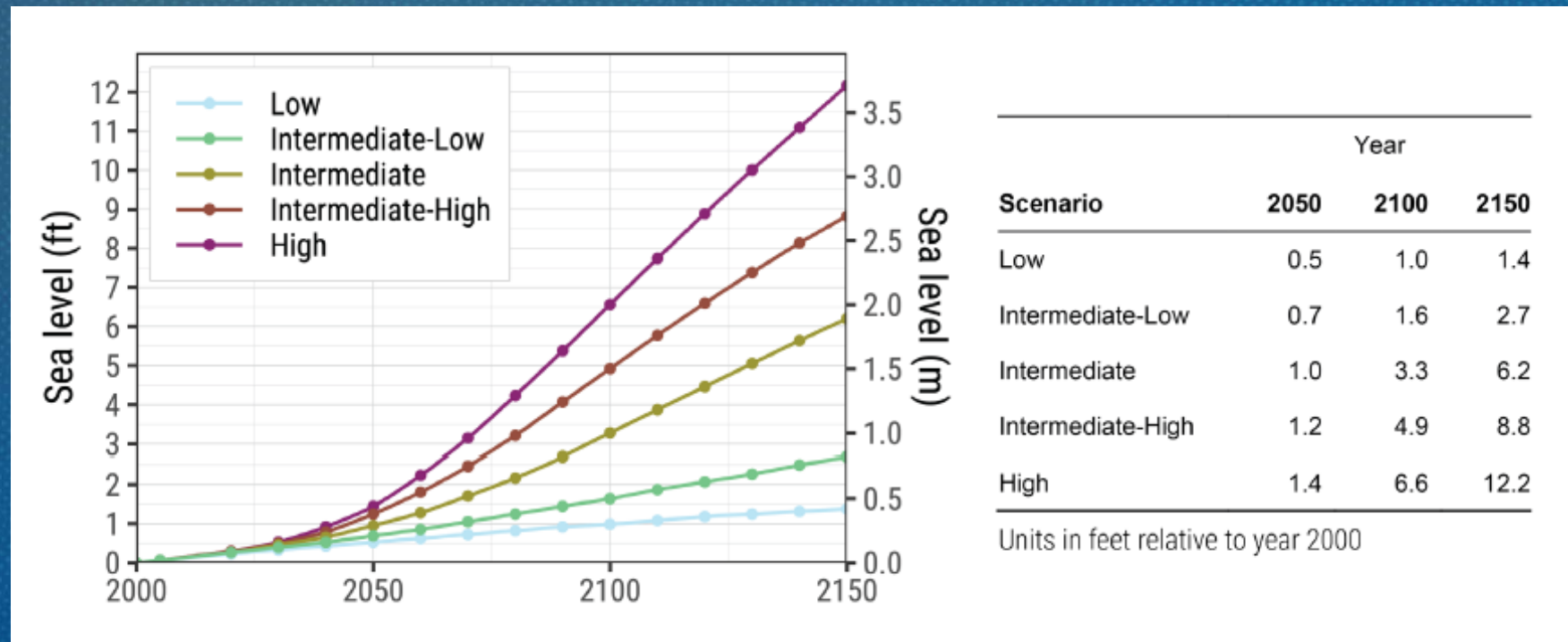
NOAA 2017: Sea Level Rise Scenarios

- Federal Task Force (Sweet et al., 2017) and key input for NCA4
- Included **six scenarios of sea level change through 2100** (0.3m - 2.5m)
- Extreme scenario was consistent with 2017 climate science showing potential for continued acceleration of ice mass loss (Antarctica)



NOAA 2022: Sea Level Rise Scenarios

- Federal Task Force (Sweet et al., 2022) and key input for NCA5
- Updated SLR Scenarios, Five scenarios of SLR through 2150 (0.4m – 3.7m) through 2100 (0.3m – 2.0m)
- Reflects greater certainty and narrower range of SLR through 2050



NOAA Application Guide (Collini et al., 2022)

TOOL DEMO



DATA & RESOURCES



Data & Resources

- UF GeoPlan Resilience Tools: <https://sls.geoplan.ufl.edu>
- Sketch Planning Tool Viewer: <https://sls.geoplan.ufl.edu/viewer/>
- Sketch Tool Data Download
- Resilience Report: <https://sls.geoplan.ufl.edu/resilience-report/>
- MPO Report: <https://sls.geoplan.ufl.edu/resources/>
- Florida Geographic Data Library: <https://www.fgdl.org>
- NOAA SLR, High Tide Flooding (HTF), DEMs
- Extent: GIS data, map services: <https://coast.noaa.gov/slrdata/>
- HTF Projected Days: <https://tidesandcurrents.noaa.gov/high-tide-flooding/annual-outlook.html>

Sketch Tool GIS Data Download

Statewide Data Download

- Download from Map Viewer: <https://sls.geoplan.ufl.edu/viewer>
- Download includes one scenario
- ESRI Map Package with ESRI File Geodatabase 10.7.1, compatible w/ Pro
- Includes inundation (raster only) and affected transportation layers

County Download

SLR Inundation Layers

- All scenario (NOAA & USACE) per decade (2040-2100)
- ESRI File Geodatabase 10.7.1, compatible with Pro
- Raster (flood depth)& vector (extent of flooding only)
- Bathtub & hydro-connected models

Affected Transportation Infrastructure

- All scenarios (NOAA & USACE) per decade (2040-2100)
- ESRI File Geodatabase 10.7.1, compatible with Pro
- Roads, rails, airports, seaports, freight terminals

<https://sls.geoplan.ufl.edu/gis-data/>

AOI Tool Resilience Report

- Screening tool to evaluate multiple flood impacts
- Analyzes flood exposure for a user-specified area of interest
- Integrated into the EST – Area of Interest tool.
- Flexible infrastructure – *additional data layers can be added as available*



Requesting Access to AOI Tool & Resilience Report

FDOT staff or consultants with FDOT IT accounts

- District users request access through your FDOT District ETDM Coordinator
- Central Office users request through Statewide ETDM Coordinator or contacting ETDM Help Desk
- Once approved by the ETDM Coordinator, submit an AARF selecting the EST – AOI Only application

MPO and FDOT consultants without FDOT IT accounts

- Request access through your MPO or FDOT Project Manager
- Your Project Manager can then request through the appropriate ETDM Coordinator
- ETDM Coord can then email authorization to ETDM Help Desk: help@fla-etat.org

MPO staff

- Request access through your MPO ETDM Coordinator
- If Coordinator position is vacant, contact the FDOT District ETDM Coordinator
- ETDM Coordinator can then email authorization to ETDM Help Desk: help@fla-etat.org

EST & ETDM contacts here: <https://etdmpub.fl-a-etat.org/est/index.jsp?url=contacts.jsp>

MPO Report: Integrating Resilience into LRTP



Reviews current state of practice for how Florida MPOs are integrating **climate resiliency** into the long range planning process

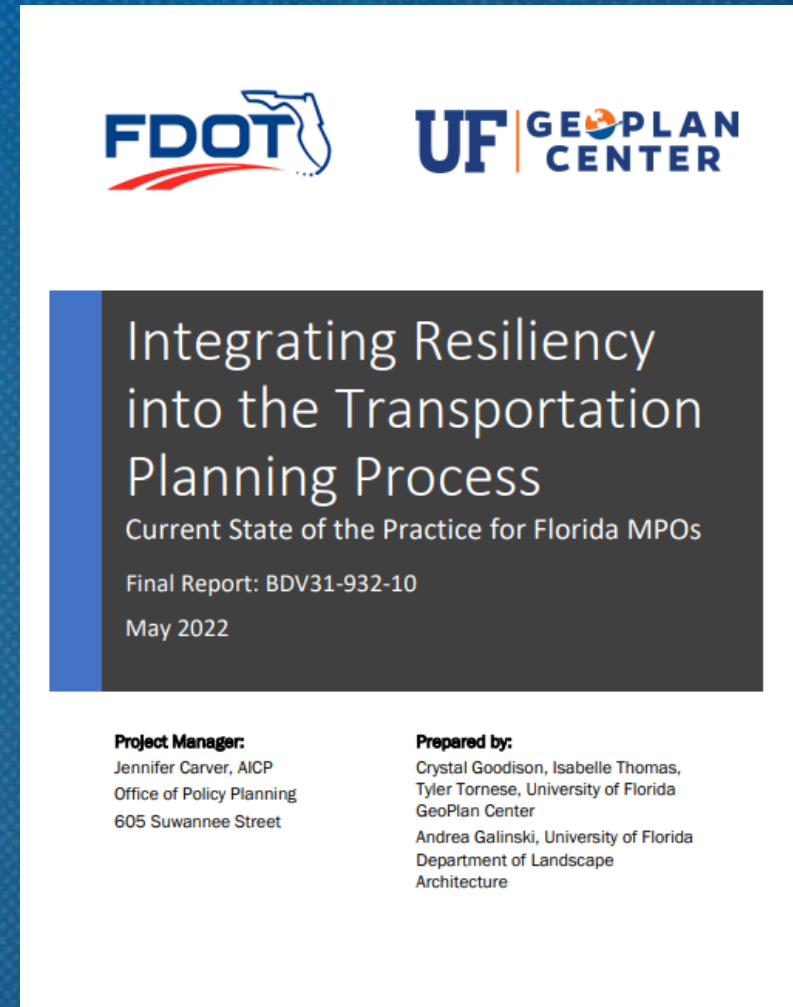


Evaluates **motivations, challenges, and opportunities** for resiliency planning



Assesses the **data, tools, and guidance** needed to support and advance resiliency efforts

<https://sls.geoplan.ufl.edu/resources/>



Thank you!

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