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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

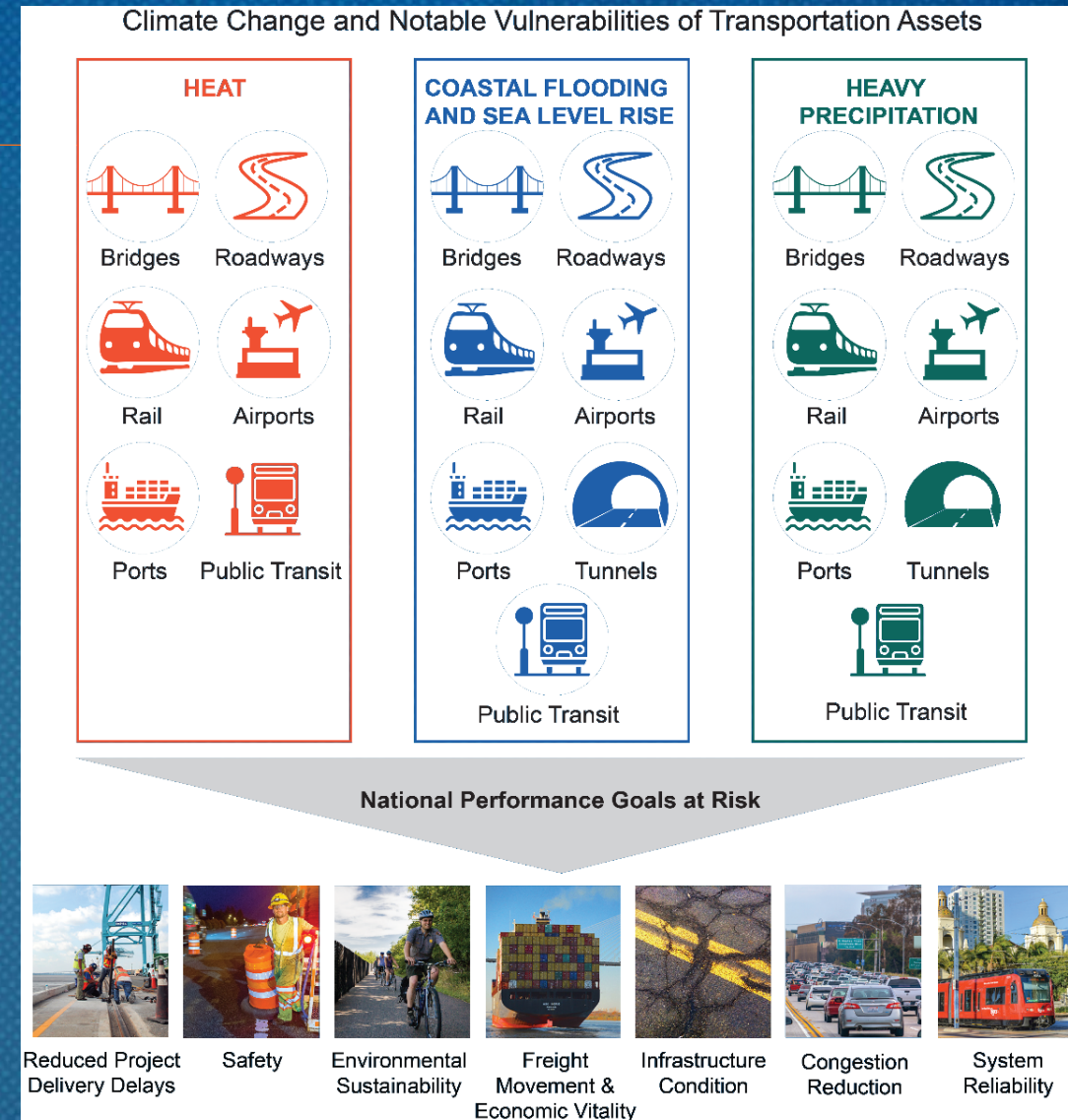
- Damage to facilities
- Health risks to outdoor workers and public

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

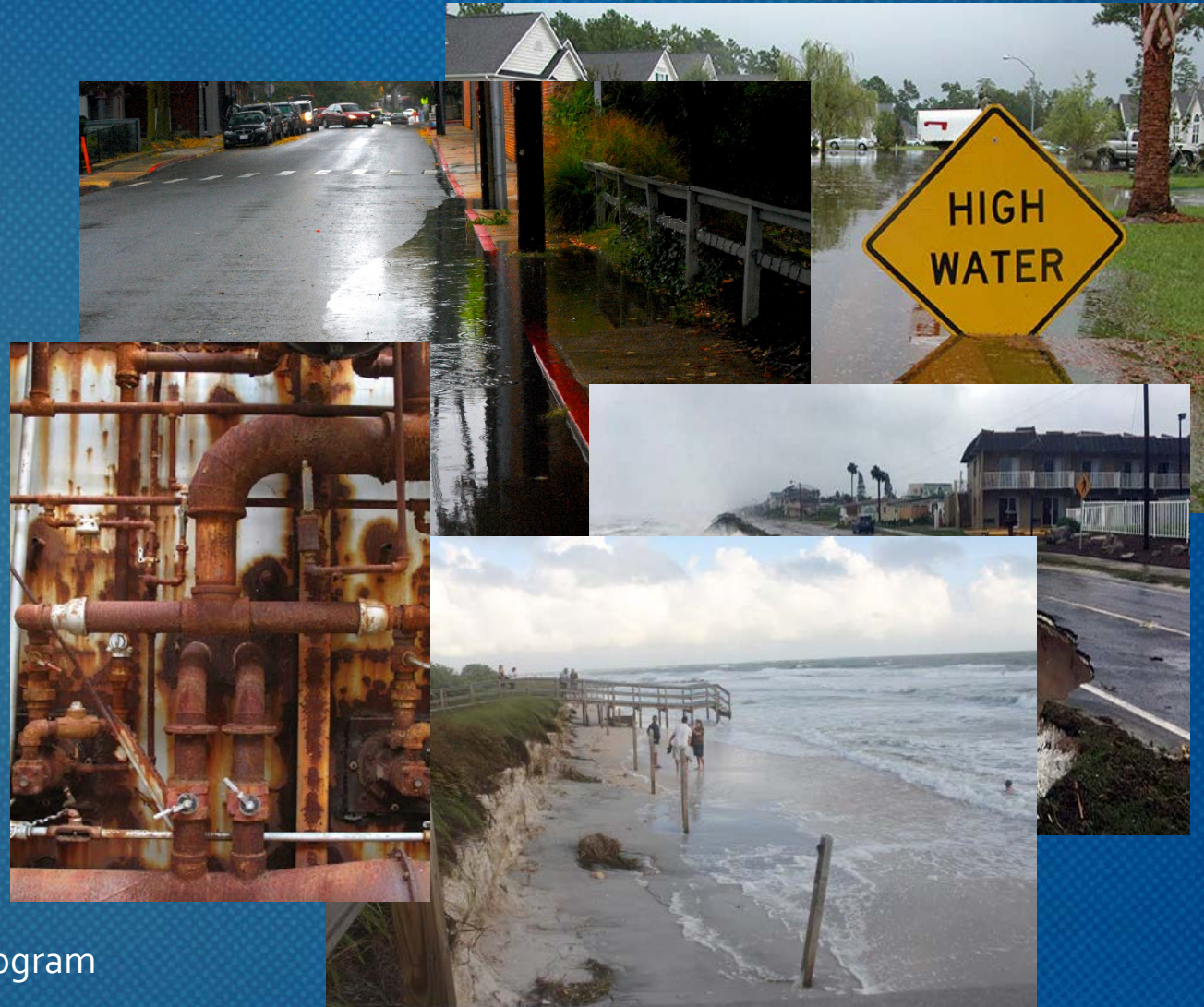
- Heavier rain events > increased runoff, erosion, risk of washout
- Increased riverine flooding - damage roads and increased bridge scour



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



Images: NOAA, Renee Collini, Chesapeake Bay Program

Sea Level Rise Over Next 30 Years

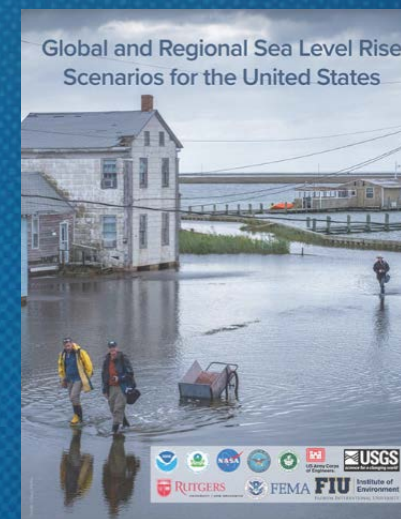
Q: What is the average projected rise along U.S. coast over next 30 years (2020- 2050)?

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

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)

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

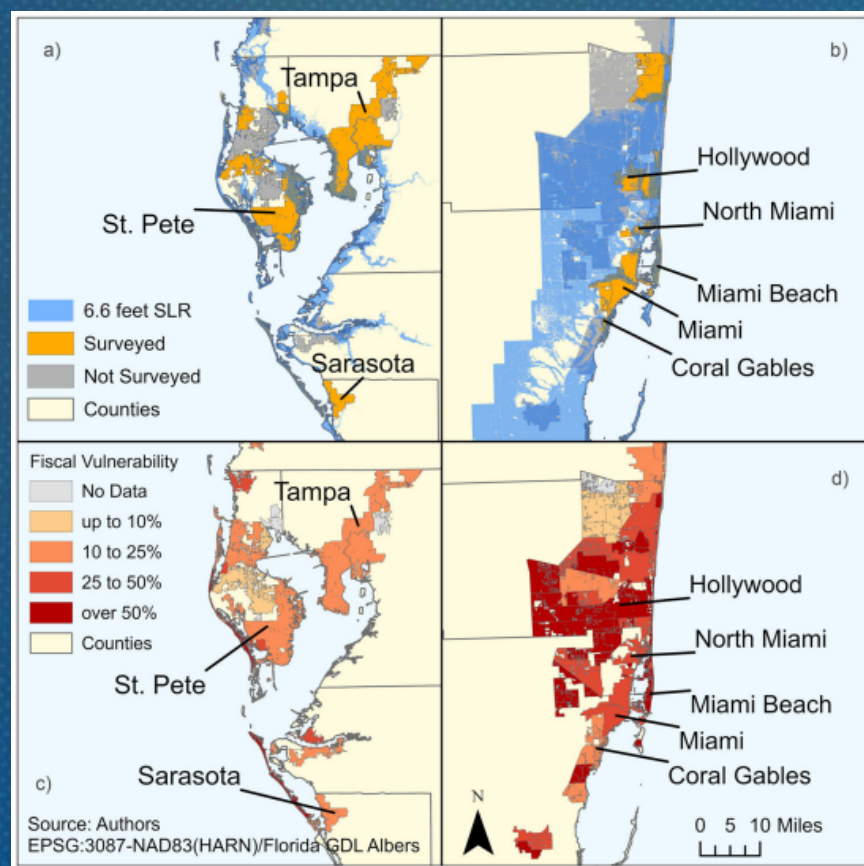


Global and Regional Sea Level Rise Scenarios for the United States: Updated Mean Projections and Extreme Water Level Probabilities Along U.S. Coastlines ("NOAA 2022 Technical Report", Sweet et al., 2022).

<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)



Maps: Shi et al., 2023

51% of
cities

Affected by
6.6ft SLR

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

5
million
people

In cities where
>10% revenues
at risk

\$619
billion

Impacts to
assessed property
values

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

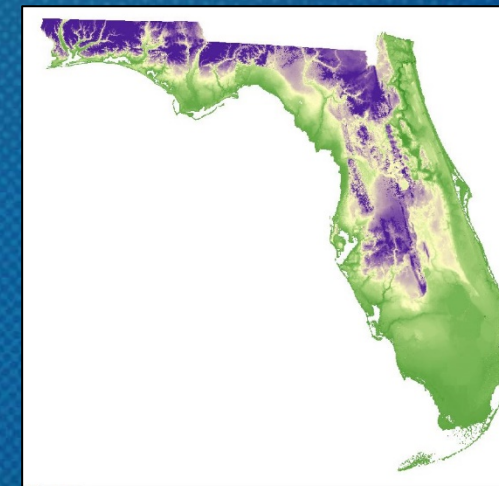
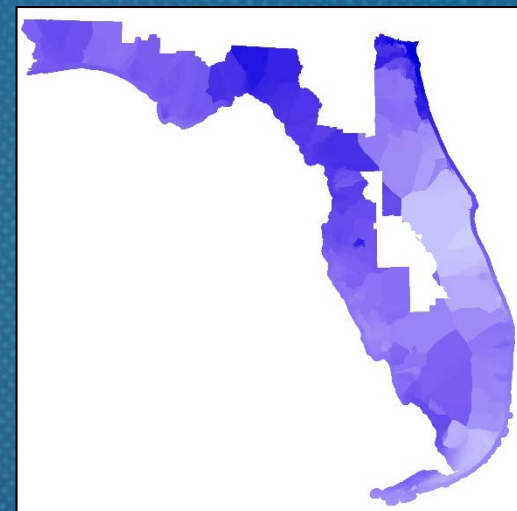
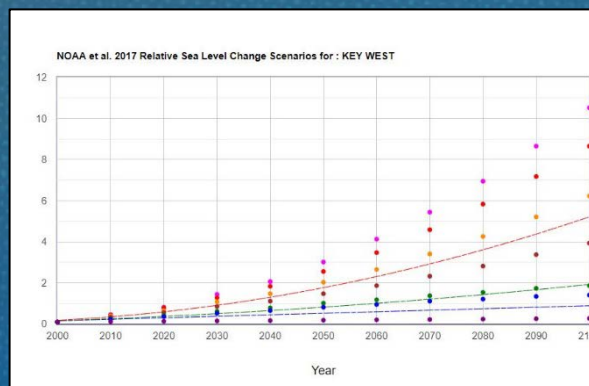
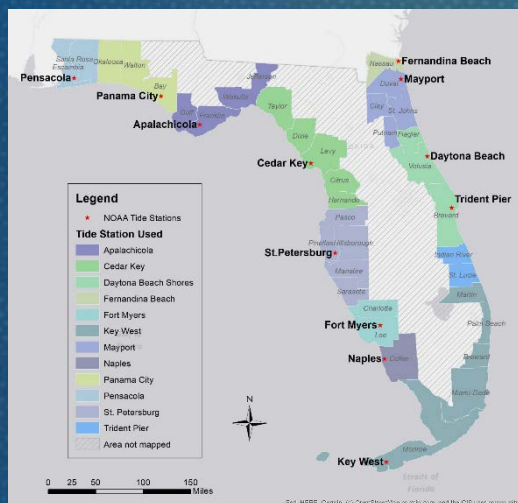
Mapping Local SLR Scenarios

Assign tide station by county

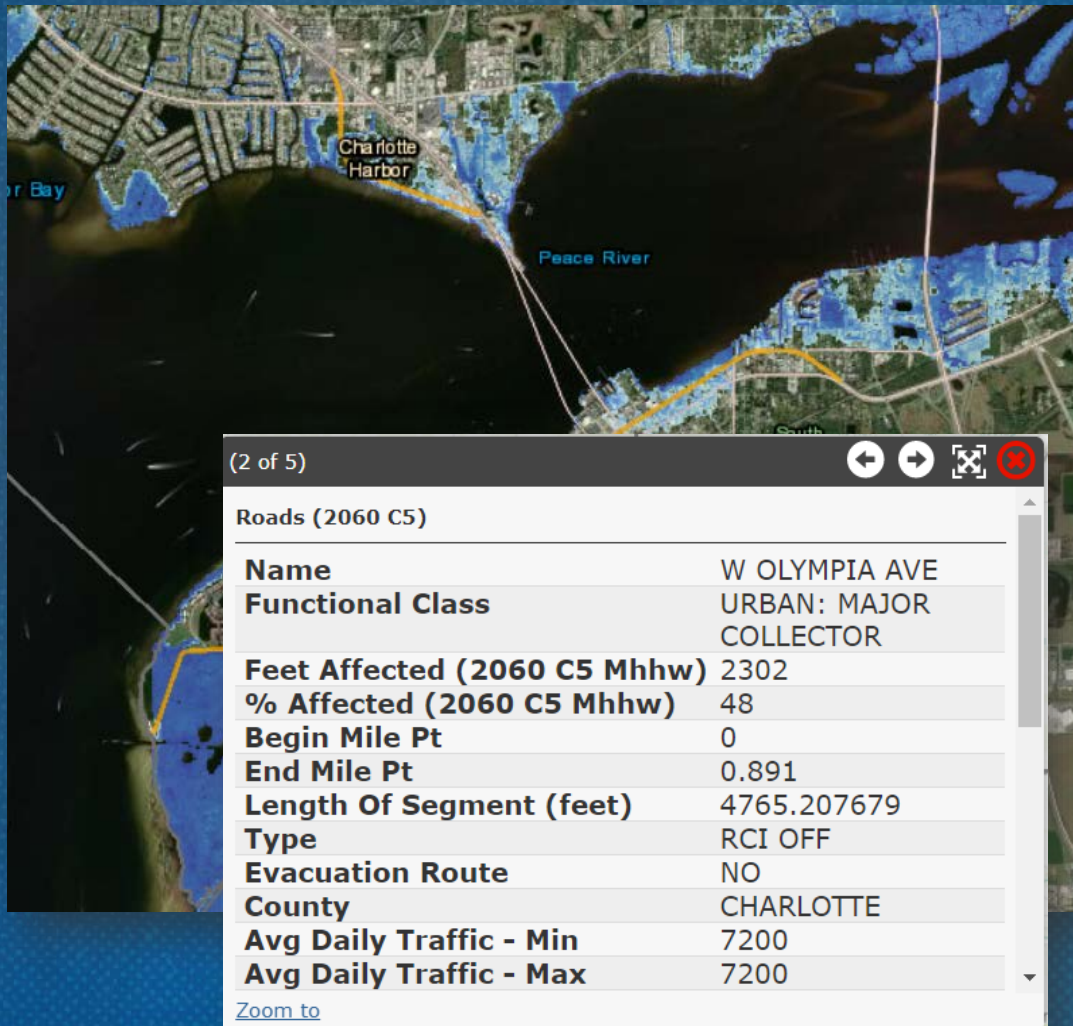
USACE Calculator
(Generate SLR values by decade)

Add SLR to
MHHW (tidal surface)

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



Transportation Exposure Analysis



Transportation assets analyzed:

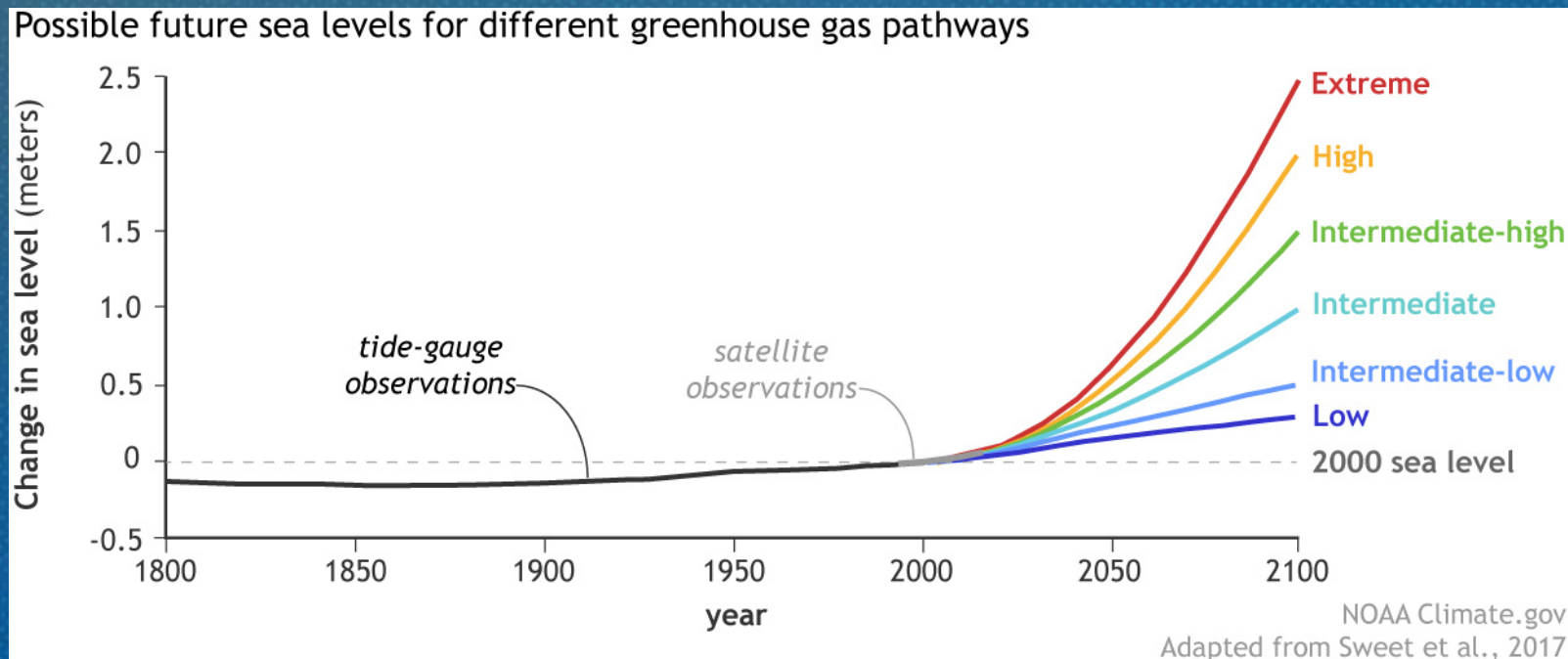
- Roadways (RCI and Tiger)
- Airports, seaports, freight terminals, rails
- SIS designations

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

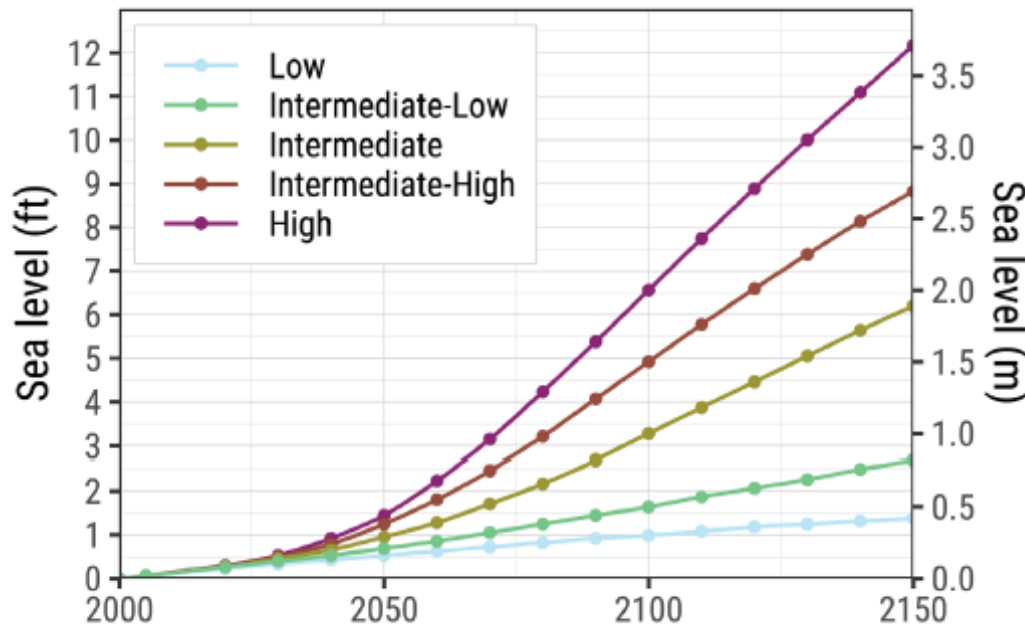
NOAA 2017: Sea Level Rise Scenarios

- 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



| Scenario | Year | | |
|-------------------|------|------|------|
| | 2050 | 2100 | 2150 |
| Low | 0.5 | 1.0 | 1.4 |
| Intermediate-Low | 0.7 | 1.6 | 2.7 |
| Intermediate | 1.0 | 3.3 | 6.2 |
| Intermediate-High | 1.2 | 4.9 | 8.8 |
| High | 1.4 | 6.6 | 12.2 |

Units in feet relative to year 2000

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

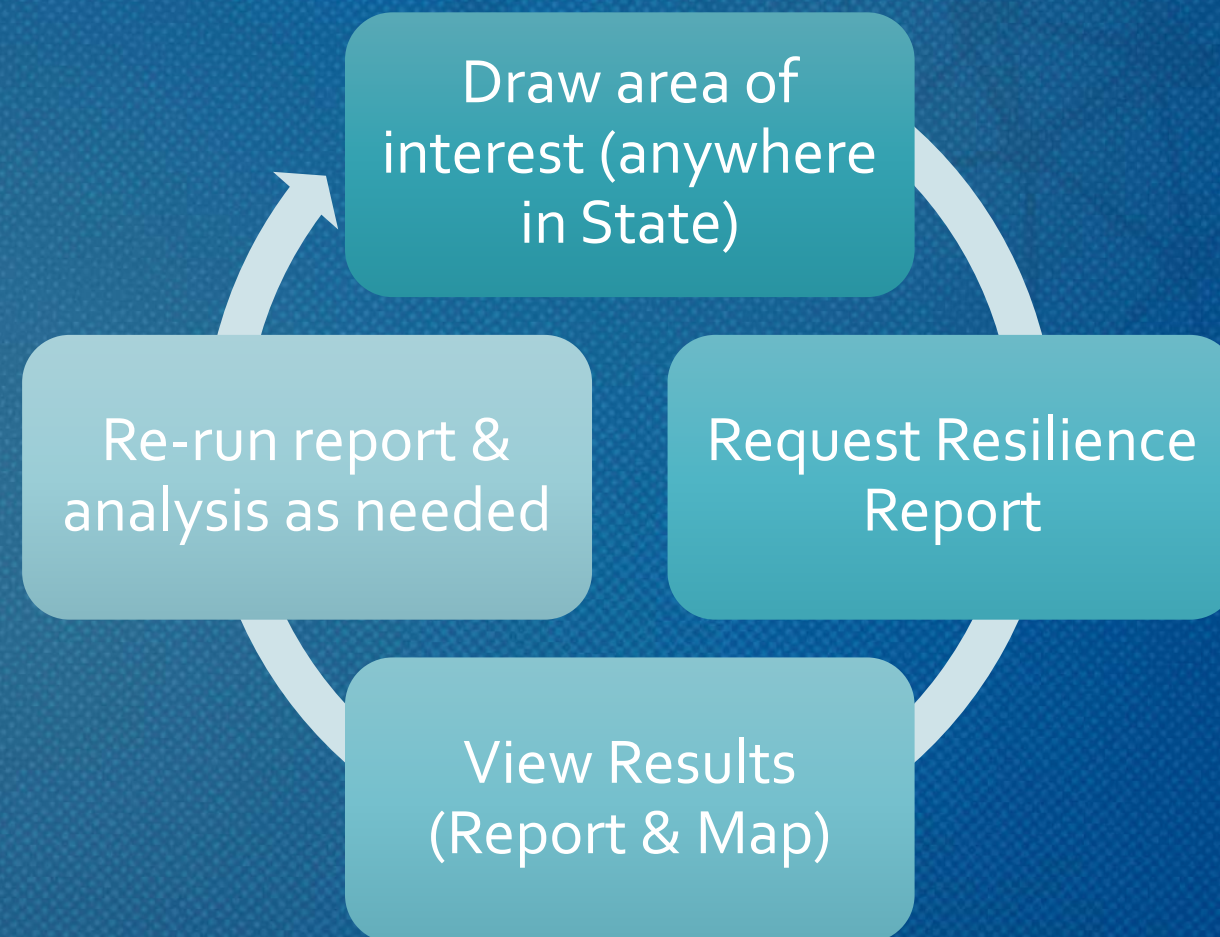
Affected Transportation Infrastructure

- 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/>



Integrating Resiliency into the Transportation Planning Process

Current State of the Practice for Florida MPOs

Final Report: BDV31-932-10

May 2022

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Thank you!

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