Sea Levels & High Tide Flooding
Past and Future

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Sea Level Rise

• About 1 foot of rise over the last 100 years along the US coastline

• The rate of rise has been accelerating over the last 50 years…where is it headed?
2022 Interagency Sea Level Rise Report

- How much sea level rise should the U.S. expect by 2050?

- How much could sea levels rise by 2100 or 2150 (goalposts)?

- What is the risk of now and by 2050:
  - 2-foot (disruptive) flood
  - 3-foot (typically damaging) flood
  - 4-foot (often-destructive) flood
U.S. sea levels predicted to be 10-12 in. higher in the next 30 years (2020-2050)

- Equals rise from the past 100 years
- Observations agree with models
- Fairly tight range of rise by 2050 giving greater confidence of rise
High Tide Flooding and Public Communication

(Minor flooding is about 2', moderate is 3’ and major is 4’ above high tide)

A need to graduate flood heights within FEMA’s coastal floodplain

Minor is usually only disruptive

Moderate is typically damaging

Major is often destructive

Shallow flooding in the most vulnerable locations near the waterfront and shoreline resulting in a low threat of property damage.

Widespread flooding of vulnerable areas will result in an elevated threat of property damage.

Severe flooding will cause extensive inundation and flooding of numerous roads and buildings resulting in a significant threat to property and life.
Daily Highest Water Levels at NOAA Tide Gauge NYC

- Probability of Occurrence (within a year)
- Water Levels above MHHW (m)

1941-1950
1971-1980
2001-2010

SLR

- Minor Flood
- Major flood

Increasing

Water Levels above MHHW (feet)
High tide flooding from sea level rise is here and now

NOAA Coastal Inundation Dashboard

Minor: 2 feet above Average High Tide

1960-2021 Annual Flood Days 8575512, Annapolis MD
High Tide Flooding in 2020

Minor: 3 events/year

Moderate: 0.3 events/year
(about every 3 years)

Major: 0.04 events/year
(about every 25 years)

High Tide Flooding by 2050

Minor: >10 events/year

Moderate: 4 events/year

Major: 0.2 events/year

Considering the scenario aligned with the ‘sea level rise trajectory’:

In 2050, a flood regime shift:

- moderate flooding to occur more frequently than minor flooding occurs today.
- major flooding to occur slightly less than moderate flooding occurs today.

Sweet et al. (2022)
Annual Flood Frequencies in Norfolk region with 1 ft of SLR between 2020-2050:

In 2020:
- **Minor**: 5 events/year
- **Moderate**: 1 event/year
- **Major**: 10-20% annual chance event

By 2050:
- **Minor**: 40-60 events/year
- **Moderate**: 5-10 events/year
- **Major**: 1 event/year
“Moderate Level High Tide Flooding” in Norfolk, VA

Then (1990): Every 5 years
Now (2020): 1 event/year
Headlights (2050): 5-10 events/year
Questions?

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