



Scarborough Flood Vulnerability Assessment

Public Meeting #1

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August 12th, 2024

Presentation Outline

1. Project overview
2. Recent flooding
3. Scarborough's coastline
4. How are we determining flood exposure for this study?
 - Sea level rise projections
 - Storm surge overview
 - Flood scenarios in this study
5. What infrastructure are we including?
6. Adaptation introduction
7. Next steps



Project Overview and Goals

- 1. Understand Coastal Flood Risk**
- 2. Prioritize Infrastructure for Adaptation**
- 3. Provide Adaptation Options**
- 4. Introduce Pilot Projects**
- 5. Community Engagement**



Recent Flooding

January 13, 2024: Higgins Beach



Photos from Google Earth and The Maine Monitor



Recent Flooding

Bayview Avenue Aftermath



Photos from WGME and Downeast.com



Recent Flooding

Pine Point Road



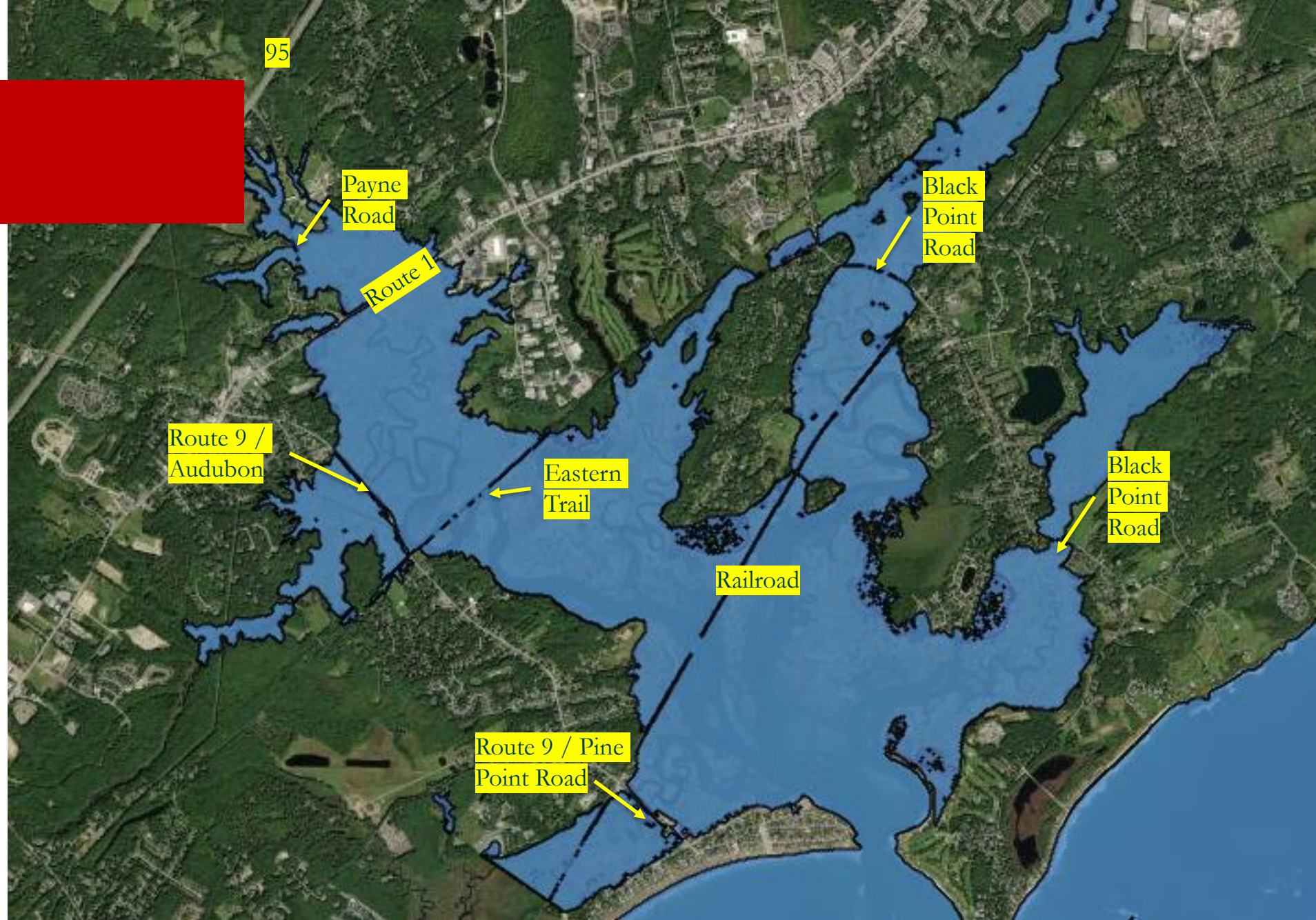
Photos from WGME and Downteast.com



Scarborough Marsh

Highest
Astronomical
Tide

plus 0.8 ft
SLR (2030)



Scarborough Coast

Highest
Astronomical
Tide

plus 0.8 ft
SLR (2030)



1

Sea Level Rise:

- Intermediate and High rates

2

Storm Surge:

- 10%-, 2%-, 1%-, and 0.2% annual chance coastal storm (“10-yr”, “50-yr”, “100-yr”, “500-yr” storm)
- Observed January 13, 2024, water surface elevation

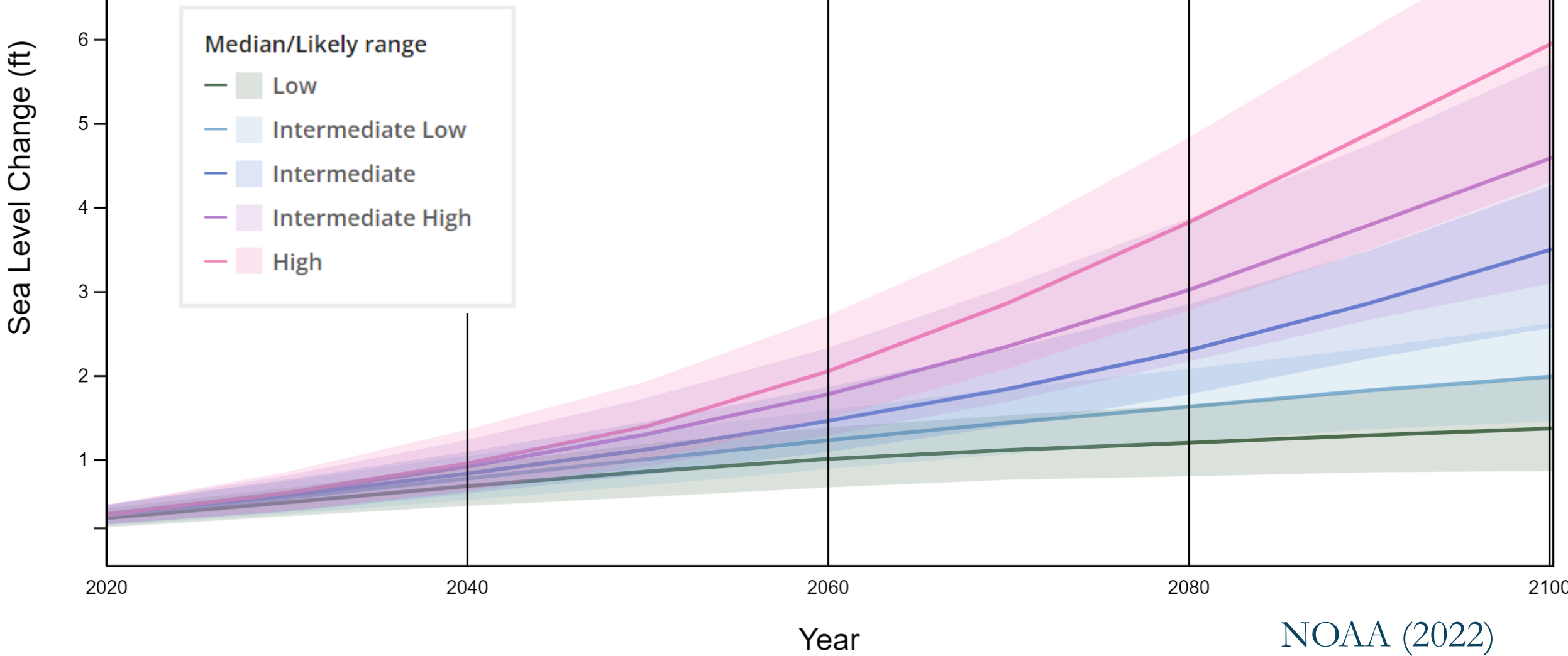
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Time Horizons:

- Near-Term (Present Day, 2030)
- Medium-Term (2050)
- Long-Term (2100)



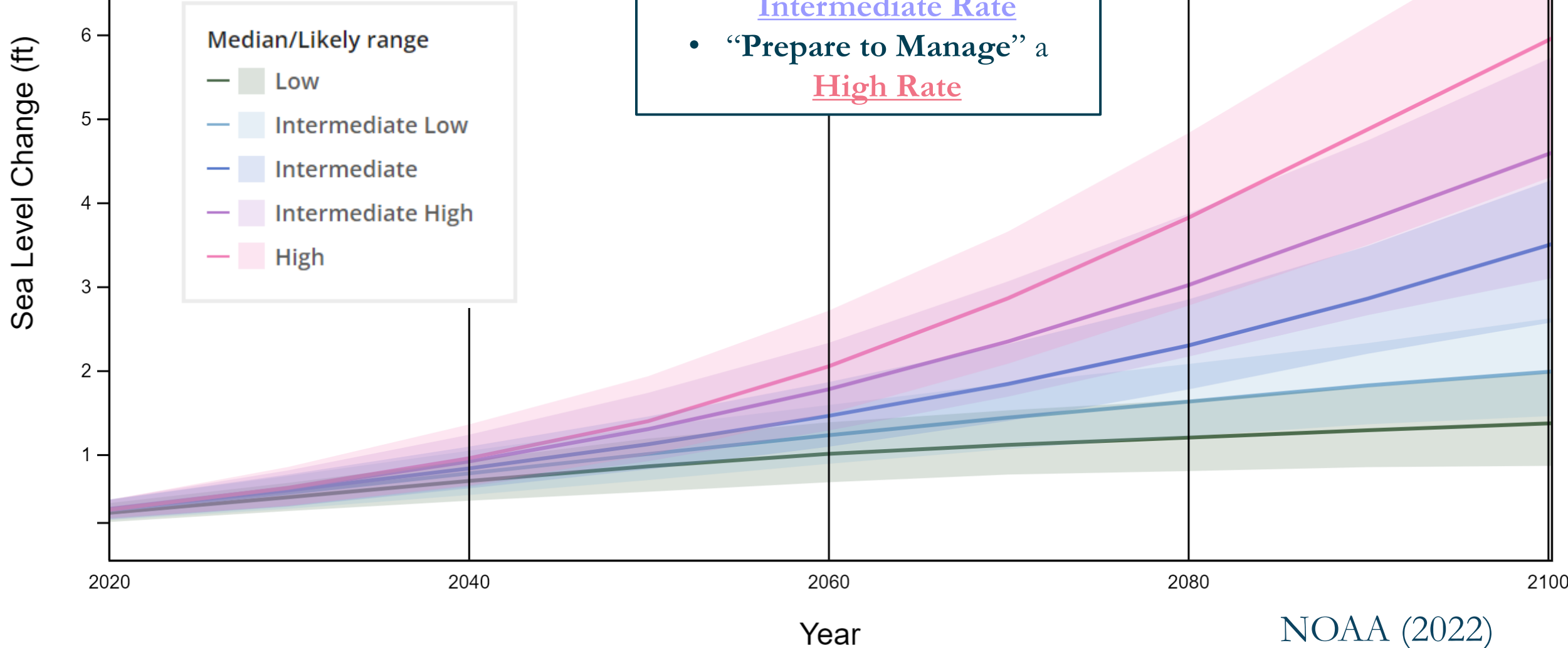
Sea Level Rise Projections



Sea Level Rise Projections

Maine Climate Council Recommendations:

- “Commit to Manage” an Intermediate Rate
- “Prepare to Manage” a High Rate



Sea Level Rise Projections

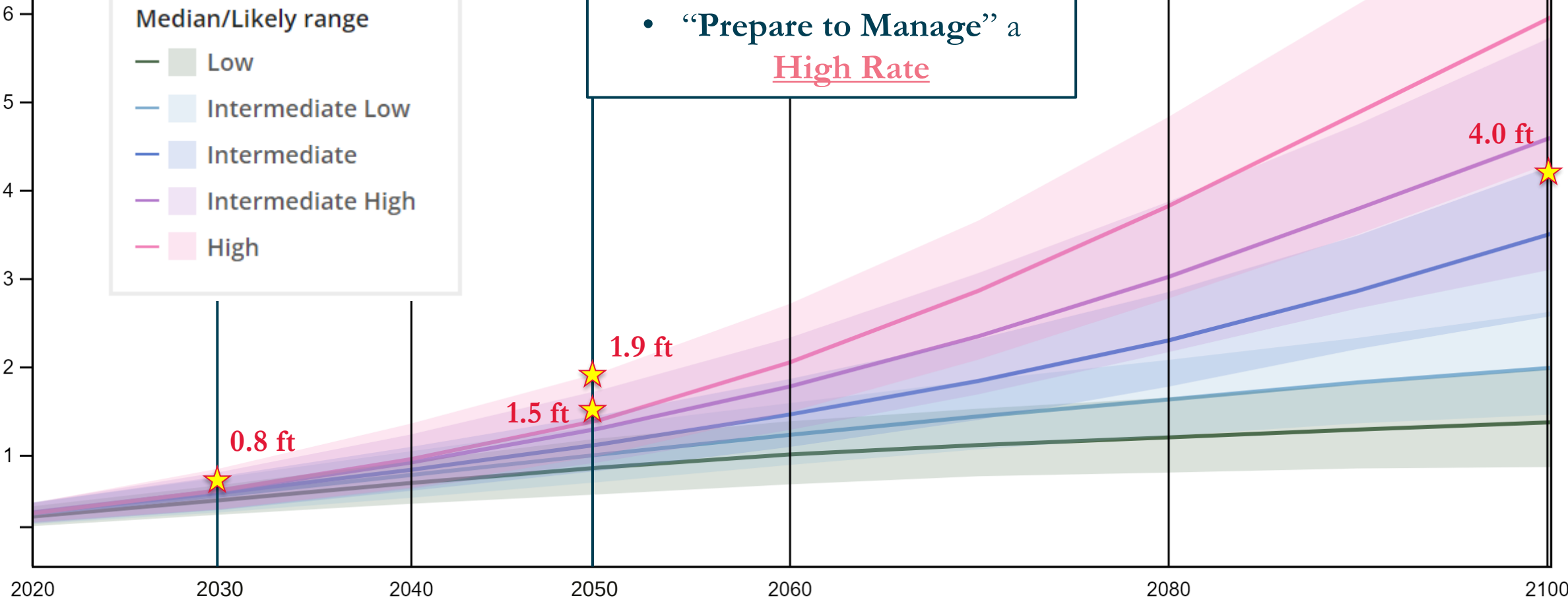
Sea Level Change (ft)

Median/Likely range

- Low
- Intermediate Low
- Intermediate
- Intermediate High
- High

Maine Climate Council Recommendations:

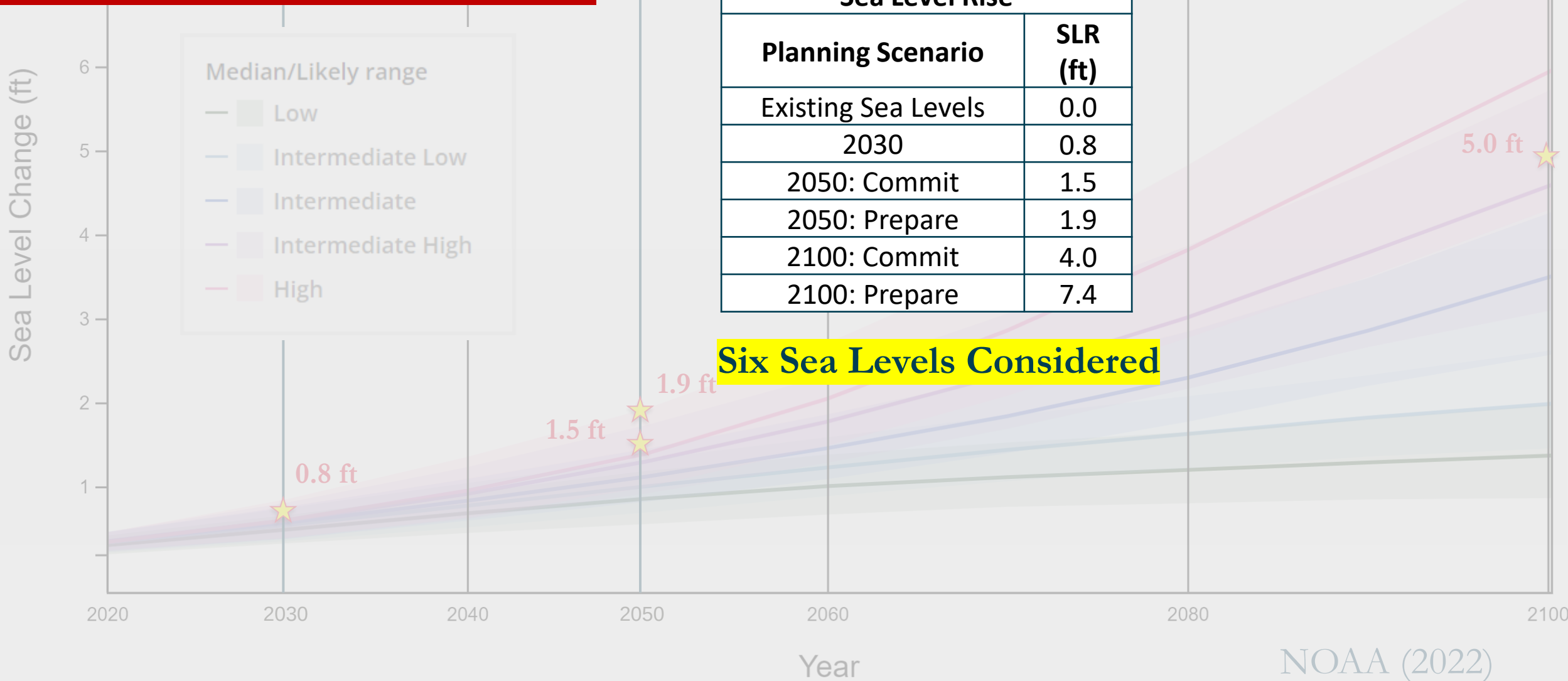
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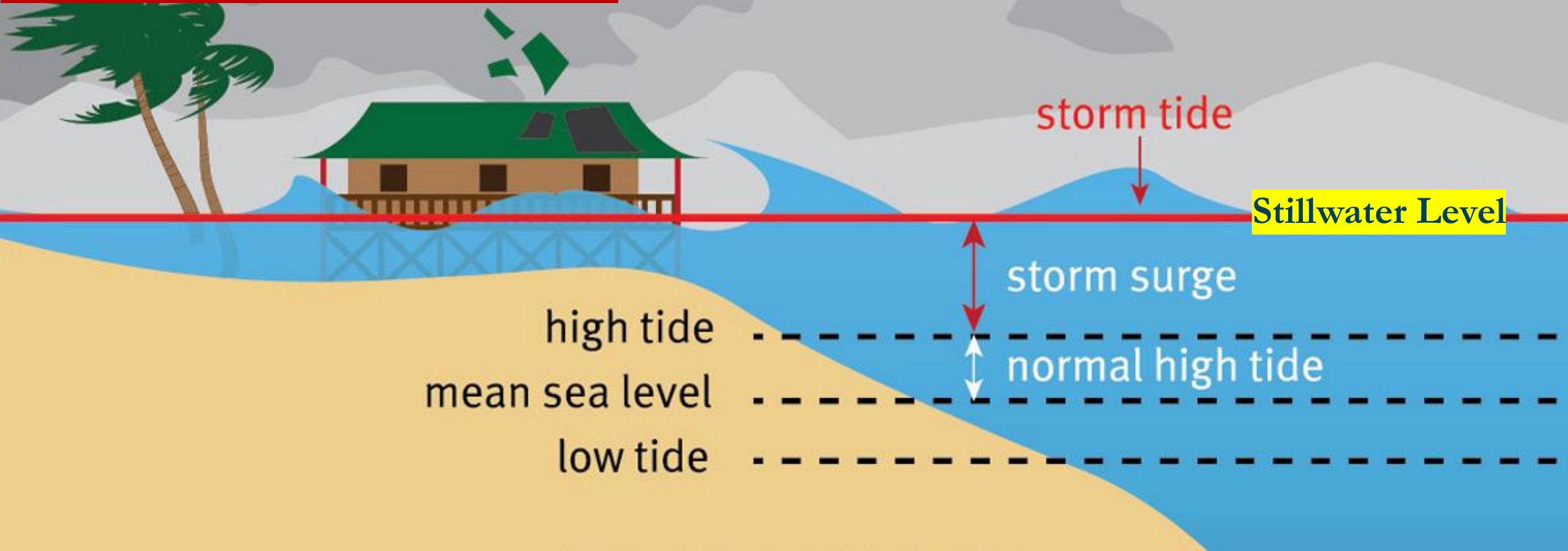
Year

NOAA (2022)

Sea Level Rise Projections



What is Storm Surge?



Source: Rosenstiel Hurricane Hub



Present Day Water Levels

Water Surface Elevations (NAVD88, ft)						
"High Tides"		Coastal Storm Events				
MHHW	HAT	10 yr	50 yr	100 yr	Max Tide January 13, 2024	500 yr
4.6	6.5	7.9	8.5	8.8	9.3	9.5



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Mean-Higher-High-Water:
The average of the higher of
the high tides.



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Highest Astronomical Tide:

The elevation of the highest predicted astronomical tide at a specific tide station. No influence of storm action included.



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Stillwater elevations
("storm surge") due to
coastal storm events.



Flood Scenarios

Add the five sea level rise scenarios to each water elevation

Present Day Elevations:

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+

Sea Level Rise	
Planning Scenario	SLR (ft)
Existing Sea Levels	0.0
2030	0.8
2050: Commit	1.5
2050: Prepare	1.9
2100: Commit	4.0
2100: Prepare	7.4

Mean-Higher-High-Water:
The average of the higher of the high tides.

Highest Astronomical Tide:
The elevation of the highest predicted astronomical tide a specific tide station. No influence of storm action included.

Stillwater elevations due to coastal storm events.



Flood Scenarios

42 Water Levels

Sea Level Rise		Water Surface Elevations (NAVD88, ft)						
		"High Tides"		Coastal Storm Events				
Planning Scenario	SLR (ft)	MHHW	HAT	10 yr	50 yr	100 yr	Max Tide January 13, 2024	500 yr
Existing Sea Levels	0.0	4.6	6.5	7.9	8.5	8.8	9.3	9.5
2030	0.8	5.4	7.3	8.7	9.3	9.6	10.1	10.3
2050: Commit	1.5	6.1	8.0	9.4	10.0	10.3	10.8	11
2050: Prepare	1.9	6.5	8.4	9.8	10.4	10.7	11.2	11.4
2100: Commit	4.0	8.6	10.5	11.9	12.5	12.8	13.3	13.5
2100: Prepare	7.4	12.0	13.9	15.3	15.9	16.2	16.7	16.9



Flood Scenario Grouping

Sea Level Rise		Water Surface Elevations (NAVD88, ft)						
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Flood Scenarios

10 “Groups”

Sea Level Rise		Water Surface Elevations (NAVD88, ft)						
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Flood Scenarios

Mapping Scenario	Water Level (ft, NAVD88)
1	7.3
2	8.0
3	8.8
4	9.6
5	10.3
6	10.8
7	11.4
8	12.8
9	13.9
10	16.9

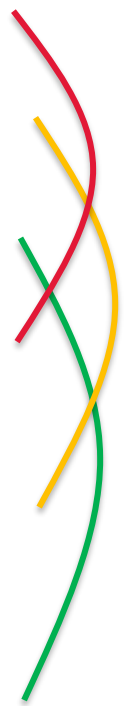
HAT + 0.8 ft SLR

500-yr storm + 7.4 ft SLR



Flood Scenarios

Mapping Scenario	Water Level (ft, NAVD88)
1	7.3
2	8.0
3	8.8
4	9.6
5	10.3
6	10.8
7	11.4
8	12.8
9	13.9
10	16.9



Near-Term Flood Risk

Medium-Term Flood Risk

Long-Term Flood Risk



Flood Scenarios

Mapping Scenario	Water Level (ft, NAVD88)	Flood Risk Time Horizon	
		Coastal Storm Event	"High Tide"
1	7.3	Now	2030
2	8.0	Now	2050
3	8.8	Now	2050
4	9.6	Now	2100
5	10.3	2030	2100
6	10.8	2050	2100
7	11.4	2050	2100
8	12.8	2100	2100
9	13.9	2100	2100
10	16.9	2100	2100



Flood Scenarios

Mapping Scenario	Water Level (ft, NAVD88)
1	7.3
2	8.0
3	8.8
4	9.6
5	10.3
6	10.8
7	11.4
8	12.8
9	13.9
10	16.9

What isn't included?

- Wave action
- Rain events



Assets in Study

Transportation Infrastructure

- Roads
- Rail Lines
- Sidewalks
- Bridges

Sewer Utilities

- Manholes
- Sewer Pump Stations
- Treatment Plant
- Septic Tanks

Buildings/Structures

- Structures (buildings, etc.)
- Municipal Property

Public Health & Safety

- DEP Remediation Sites
- Fire Hydrants
- Fire Stations
- Hospitals
- DEP Registered Tanks
- Police Stations
- Wells
- Evacuation Routes
- Streetlights

Coastal Structures

- Boat Ramps
- Coastal Structures

Drainage Utilities

- Dams
- Catch Basins
- Culverts
- Outfalls
- Outlet Control Structures

Conservation and Recreation

- Beaches
- Parks and Open Spaces
- Sand Dunes
- Walking Trails
- Wetlands



Example of Results:

Public Roads (a sample)

Road (Public) Flood Exposure Summary (Length Inundated, ft)										
ROAD NAME	1	2	3	4	5	6	7	8	9	10
<i>Total Length of Roads Inundated, miles</i>	<i>0.5</i>	<i>1.2</i>	<i>2.7</i>	<i>4.1</i>	<i>5.4</i>	<i>6.5</i>	<i>8.2</i>	<i>14.6</i>	<i>18.5</i>	<i>25.1</i>
Black Rock Rd	478	727	1,067	1,429	1,561	1,585	1,653	2,111	2,382	2,382
Champion St	160	246	402	468	468	468	468	468	468	468
King St	241	375	758	1,618	1,659	1,678	1,699	2,955	2,955	2,955
Payne Rd	230	584	1,182	1,292	1,482	1,600	1,715	2,045	2,349	2,574
Sawyer St	656	802	887	949	979	998	1,021	1,079	1,114	1,204
Snow Canning Rd	922	1,115	1,213	1,297	1,319	1,335	1,348	1,382	1,432	1,621
Winnocks Neck Rd	22	162	502	1,485	2,592	2,882	3,056	4,385	6,002	6,248
Avenue 6	-	5	23	217	223	223	223	223	223	223
Black Point Rd	-	1,106	1,697	2,171	2,707	3,043	3,375	7,903	8,888	12,103
Jones Creek Dr	-	181	853	1,286	1,698	1,989	2,246	2,246	2,246	2,246
Milliken Rd	-	70	121	174	246	307	360	403	435	666
Old Neck Rd	-	241	459	827	1,194	1,521	2,386	3,451	3,823	3,823
Pine Point Rd	-	573	1,749	1,898	2,091	2,253	3,382	5,725	5,879	6,198
Avenue 1	-	-	206	296	325	361	374	602	674	674
Avenue 2	-	-	206	245	363	382	396	435	435	435
Avenue 3	-	-	236	266	359	410	413	413	413	413
Avenue 4	-	-	288	372	372	372	372	372	372	372
Avenue 5	-	-	254	433	492	543	594	781	815	815
Avenue 7	-	-	169	190	217	228	228	228	228	228
Bayview Ave	-	-	285	360	603	692	783	884	934	1,373
Clay Pits Rd	-	-	662	1,046	1,291	1,738	1,994	2,378	2,543	2,785
Kent St	-	-	19	76	76	76	76	76	76	76
Sargent Rd	-	-	73	105	147	179	228	387	447	646
Seavey Landing Rd	-	-	31	74	108	136	192	450	499	612
Shipwreck Rd	-	-	73	363	496	547	547	547	547	547
Starbird Rd	-	-	538	626	685	726	782	907	925	1,009
Tasker Ave	-	-	112	154	253	295	315	332	332	332
Vesper St	-	-	411	616	660	691	705	737	756	930
Woodside Dr	-	-	6	37	83	137	181	275	355	622



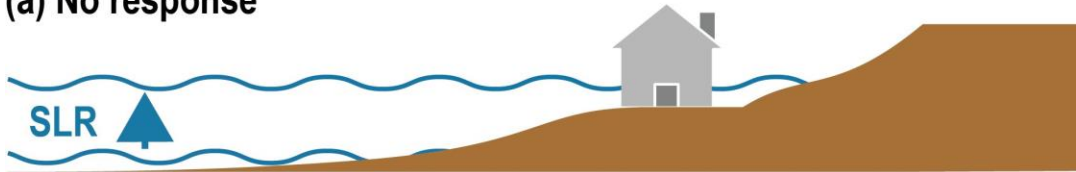
What is considered for prioritization?

- How exposed to flooding is the asset?
- Are there alternate routes?
- How many people could be impacted?
- Is it an emergency route or another “vital” asset?



Adaptation Overview

(a) No response



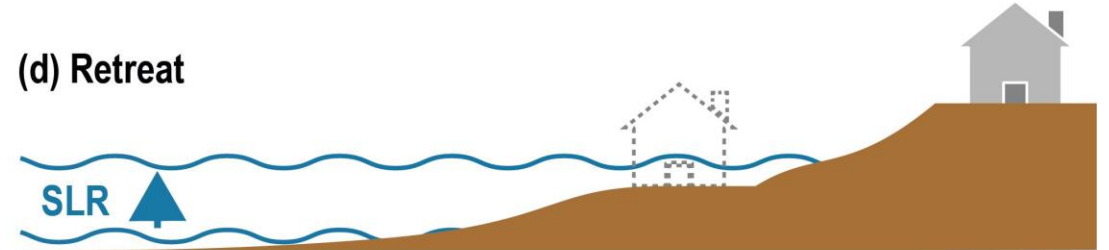
(b) Advance



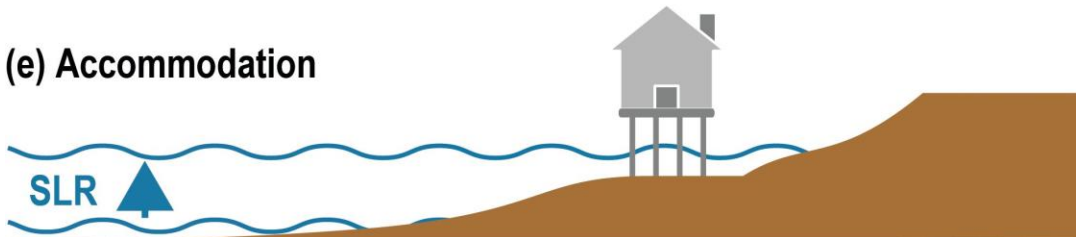
(c) Protection



(d) Retreat



(e) Accommodation



(f) Ecosystem-based adaptation



From IPCC (2019) Chapter 4, Box 4.3, Fig. 1



Next Community Events

Higgins Beach Neighborhood Meeting

- September 5th, 6pm: Higgins Beach Clubhouse, 49 Greenwood Ave

Pine Point Neighborhood Meeting

- September 24th, 6pm: Pine Point Fire Station, 12 King St



Next Steps

- Interactive online StoryMap available in early 2025
- Pilot Project selection and design October 2024 through April 2025
- Project finished July 2025



Thank you!
Questions?



GEI
Consultants

Consulting
Engineers and
Scientists

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