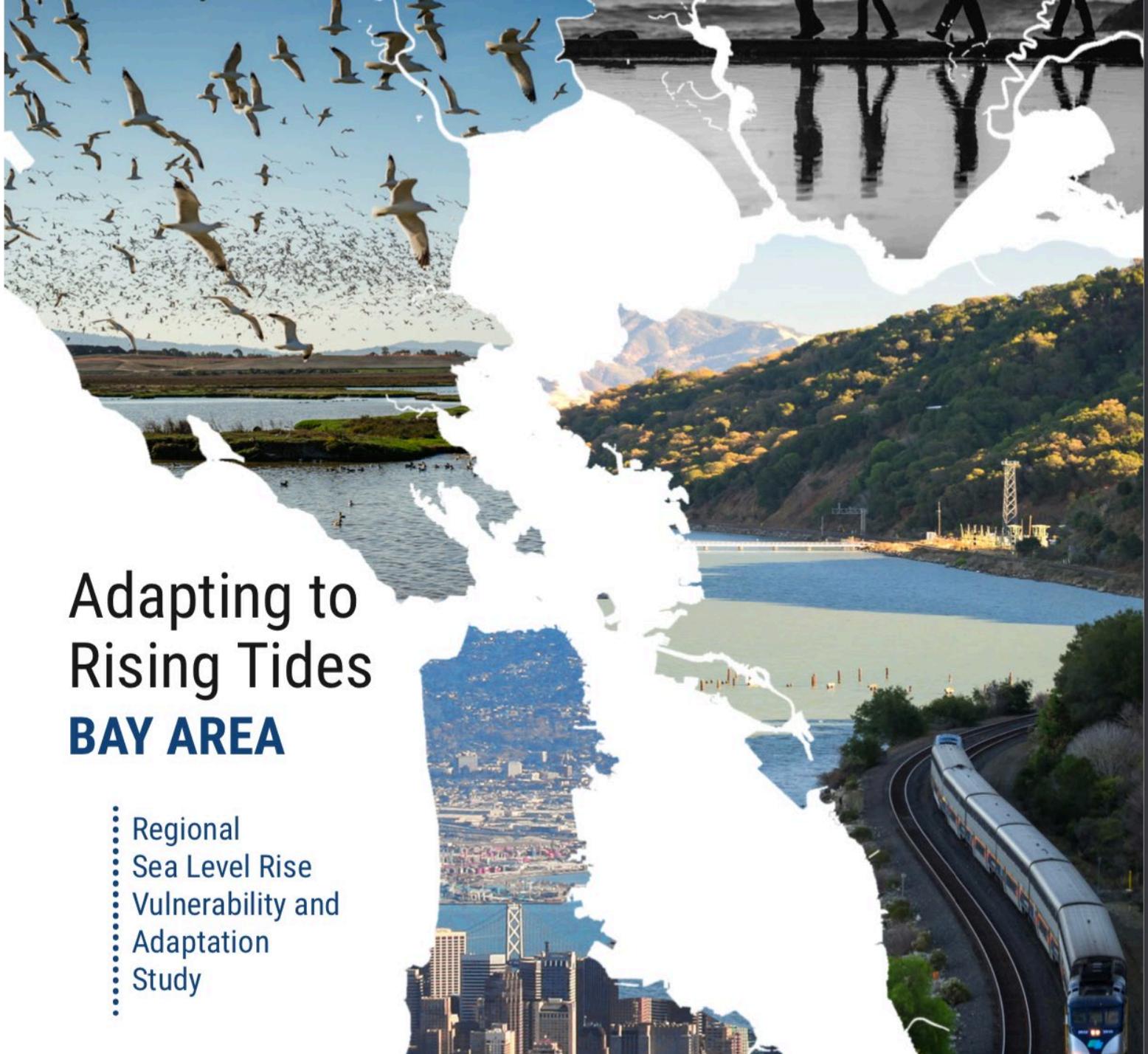


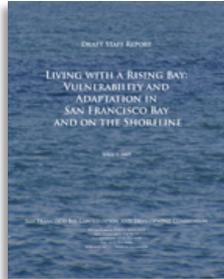


Adapting to Rising Tides **BAY AREA**

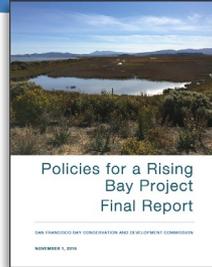
..... Regional
..... Sea Level Rise
..... Vulnerability and
..... Adaptation
..... Study



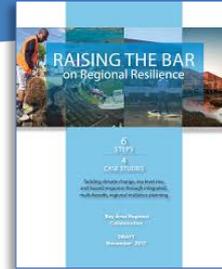
Climate Change Planning at BCDC



2011
Climate Change Policies



2015-16
Policies for a Rising Bay



2017
Raising the Bar on Regional Resilience

2018
Environmental Justice and Fill for Habitat Bay Plan Amendments

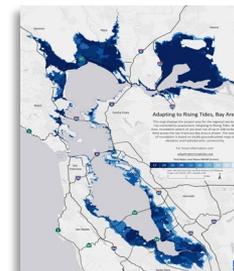


ART Program Established
2012



BCDC Commissioner SLR Workshops
2016-17

ART Bay Area
2016 - 20



Horizon Plan Bay Area 2050
2018 - 21



What's at Risk

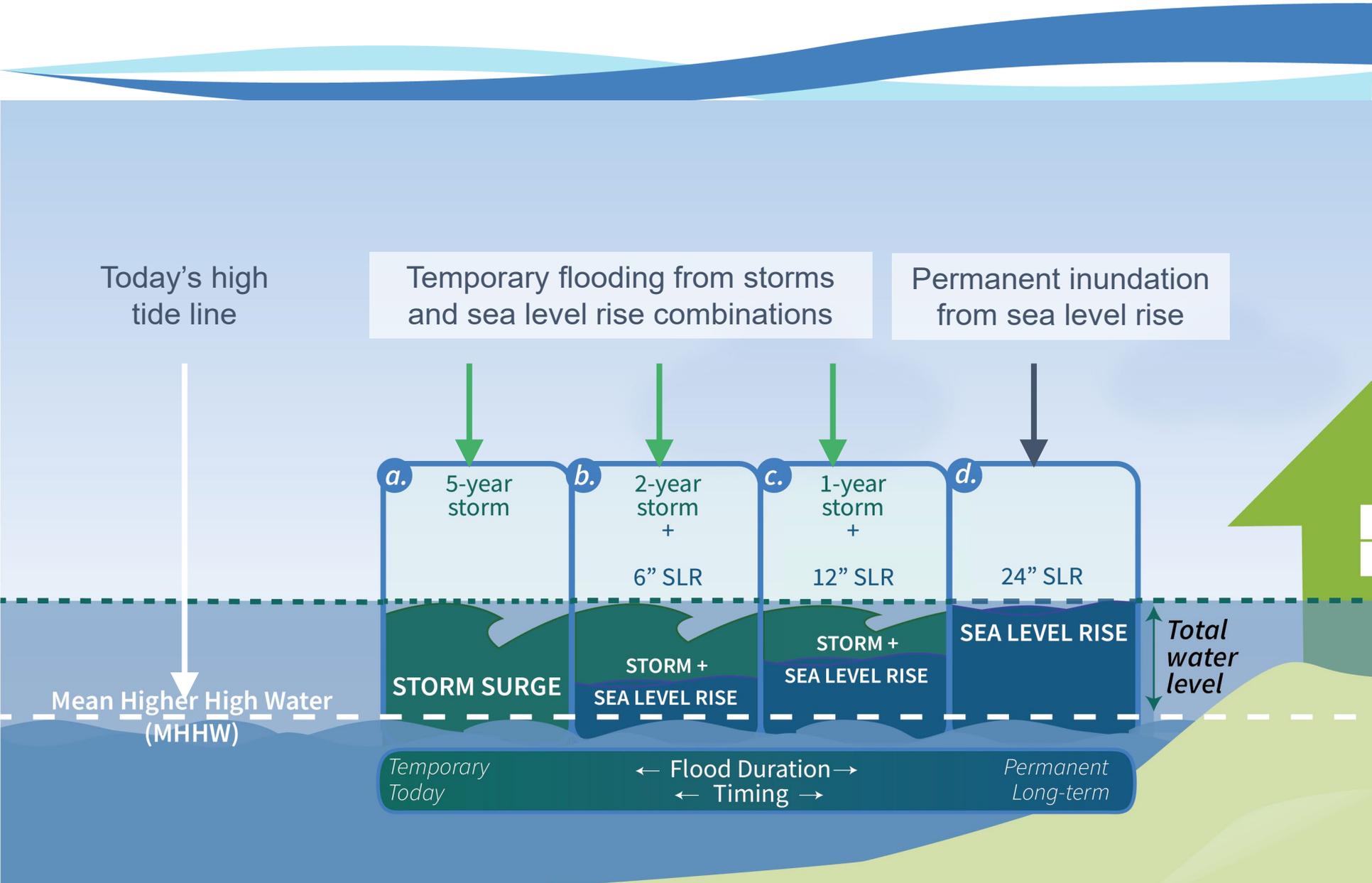


ALREADY SEEN:
+ 8 inches SLR

PROJECTED BY 2050:
+ 12 to 32 inches



One Map, Many Futures



Building on a History of Agency Collaboration



Bay Area
**Regional
Collaborative**



AECOM

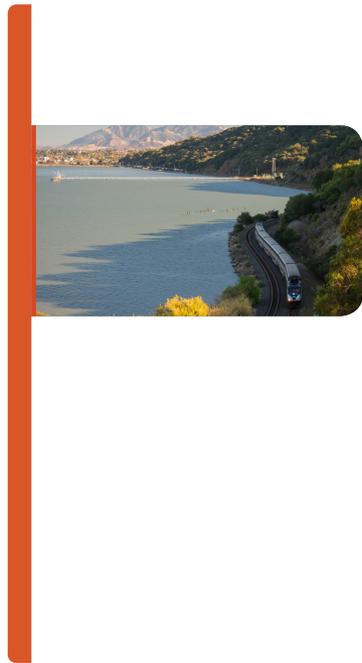


natural
capital
PROJECT

Collaborating to Solve Regional Challenges



ART Bay Area Systems and Scales

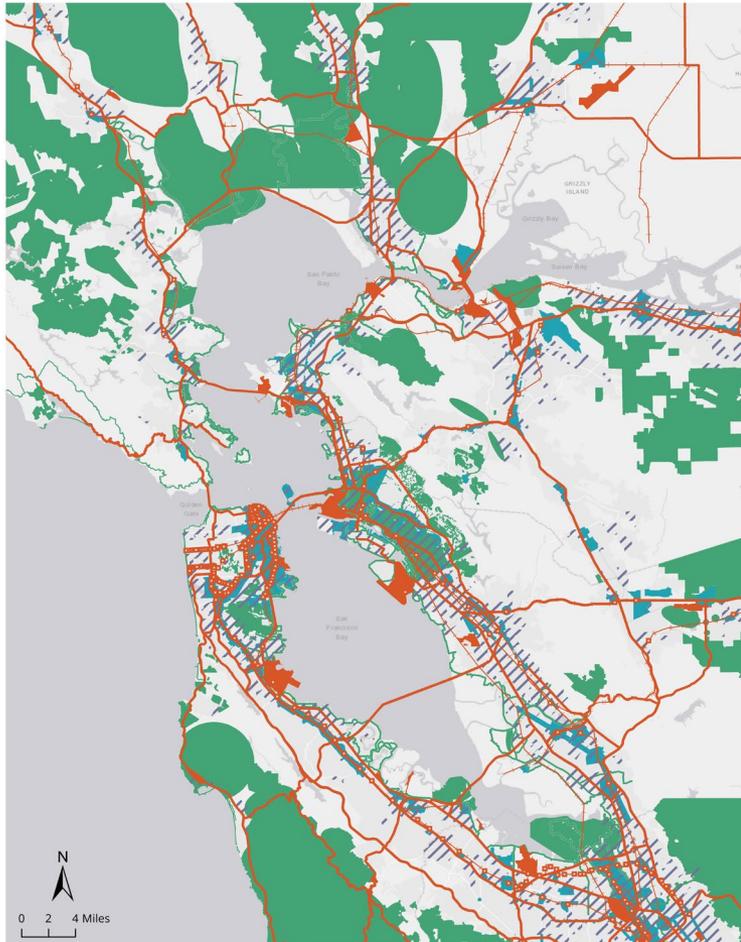


**FUTURE
GROWTH AREAS**

**NATURAL
LANDS**

and Cover Database)

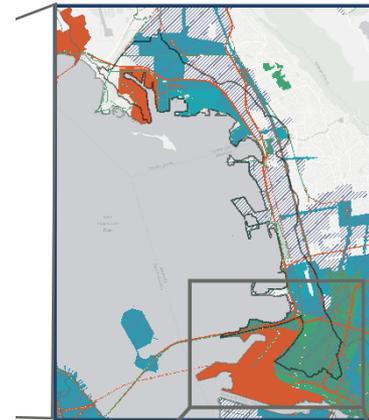
ART Bay Area Systems and Scales



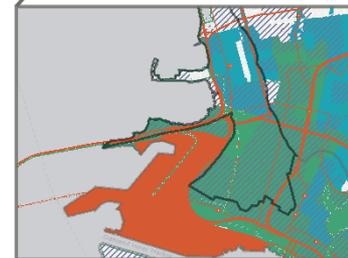
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▶ OPERATIONAL LANDSCAPE UNIT (OLU)



▼ FOCUS AREA / AREA OF IMPACT



OLUs provided boundaries as part of threefold criteria for selecting individual assets for assessments



A scale smaller than OLU were needed to communicate how individual assets shared common vulnerabilities to flooding and thus Focus Areas/Areas of Impact were identified based on where individual assets overlapped or were co-located near the shoreline

Regional Analysis



1. What gets wet within each system and where are impacts worst around the region?
2. Where are high consequence assets co-located around the region?
3. What regional planning issues emerged as common or pressing across the region?

Regional Indicators of Consequence



Asset Class	Asset Type	Consequence Indicator	Units
Transportation	Passenger Rail Lines	Passenger Flow	Passengers per average weekday
	Passenger Rail Stations	Ridership	Passengers per average weekday
	Freight Rail Lines	Freight Train Flow	Freight trains per day
	Highways	AADT	Annual average daily traffic
		Truck AADT	Annual average daily truck traffic
		Lifeline Route	Binary (yes or no)
	High Quality Bus Routes	Number of Impacted HQ Bus Routes	HQ Bus Routes (meters)
	SF Bay Trail	Miles of Impacted Trail	Bay Trail (meters)
	Regional Bicycle Network	Miles of Impacted Bicycle Infrastructure	Bicycle routes (meters)
	Ferry Terminals	Ridership	Passengers per average weekday
	Airports	Passengers	Boardings per year
Cargo Volume		Pounds of freight per year (millions)	
Seaports	Cargo Volume	Dollar value of exports and imports	
Vulnerable Communities	Social	Residential Units 2010	Number of residential units impacted
	Contamination	Residential Units 2010	Number of residential units impacted
PDAs	Residential Units	Residential Units 2010	Number of 2010 residential units impacted
		Residential Units 2040	Number of 2040 residential units impacted
		Residential Units Growth 2010-2040	Number of new residential units impacted
	Job Spaces	Job Spaces 2010	Number of 2010 job spaces impacted
		Job Spaces 2020	Number of 2040 job spaces impacted
		Job Spaces Growth 2010-2040	Number of new job spaces impacted
PCAs	Recreation	Visitation Rates	Photo-user-days
	Stormwater	Stormwater Retention	Cubic meters of water
		Stormwater Infiltration	Cubic meters of water
	Habitats	Habitat - Depressional Wetlands	Square meters
		Habitat - Lagoons	Square meters
		Habitat - Tidal Marshes	Square meters
	Endangered Species Habitats	Endangered Species - Ridgeway Rail	Square meters
		Endangered Species - Snowy Plover	Square meters
		Endangered Species - Salt Marsh Harvest Mouse	Square meters
	Agriculture	Agricultural Lands	Dollar value of annual crop production
Carbon Storage	Soil Organic Matter	Area (acres) x Weighted % Soil Organic Matter	

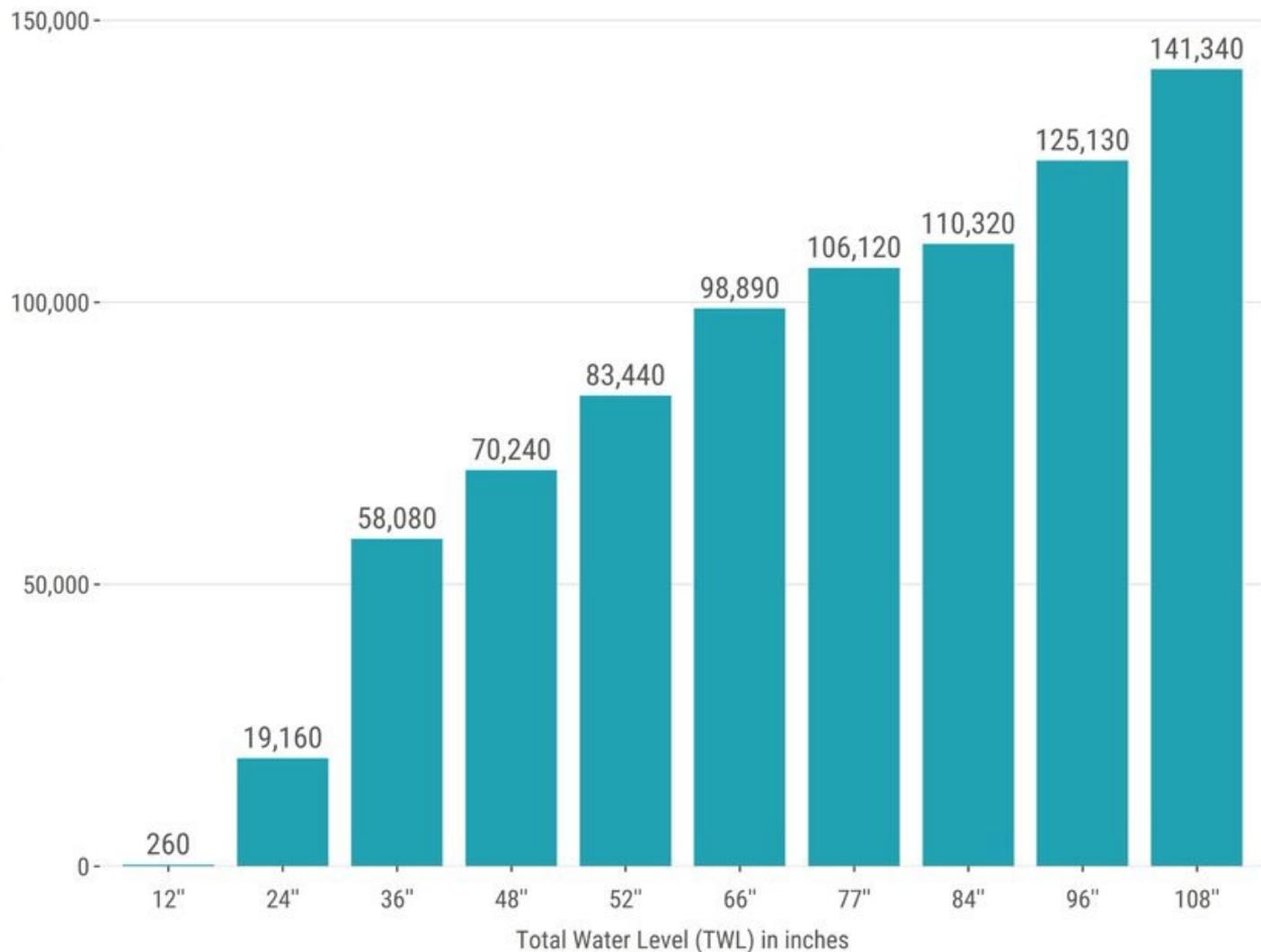


The Regional Future Growth Areas Picture



Total Regional Impacts to Growth in New Residential Units from Flooding

Number of new residential units (growth)



The Regional Future Growth Areas Picture



PDAs with Highest Impacts to New Residential Unit Growth from Flooding

Number of new residential units (growth)

	12"	24"	36"	48"	52"	66"	77"	84"	96"	108"
Downtown (San Rafael)	260	340	400	640	650	680	680	690	710	720
North San Jose (San Jose)	6,570	6,570	8,830	9,140	11,950	12,970	12,970	18,780	23,850	
Downtown & Jack London Square (Oakland)	3,550	4,560	4,560	4,560	4,870	5,850	5,870	5,980	6,030	
Naval Air Station (Alameda)	2,980	2,980	2,980	2,980	2,980	2,980	2,980	2,990	2,990	
South Richmond (Richmond)	2,750	2,750	2,750	2,760	3,190	3,470	3,610	3,620	3,700	
Downtown & Waterfront (Suisun City)	580	640	650	650	650	650	650	650	650	
Bayview/Hunters Point Shipyard/Candlestick Point (San Francisco)	11,160	11,160	14,720	15,780	16,640	16,760	17,890	18,430		
Coliseum BART Station Area (Oakland)	6,470	9,790	9,850	11,190	11,290	11,430	11,660	11,680		
North Bayshore (Menlo Park)	6,340	6,340	6,800	7,990	7,990	7,990	7,990	8,040		
Treasure Island & Yerba Buena Island (San Francisco)	3,570	6,450	6,450	6,930	7,410	7,410	7,410	7,410		
TOD Corridors - San Antonio/Central Estuary (Oakland)	2,690	3,590	3,590	4,880	5,110	5,910	5,990	8,090		

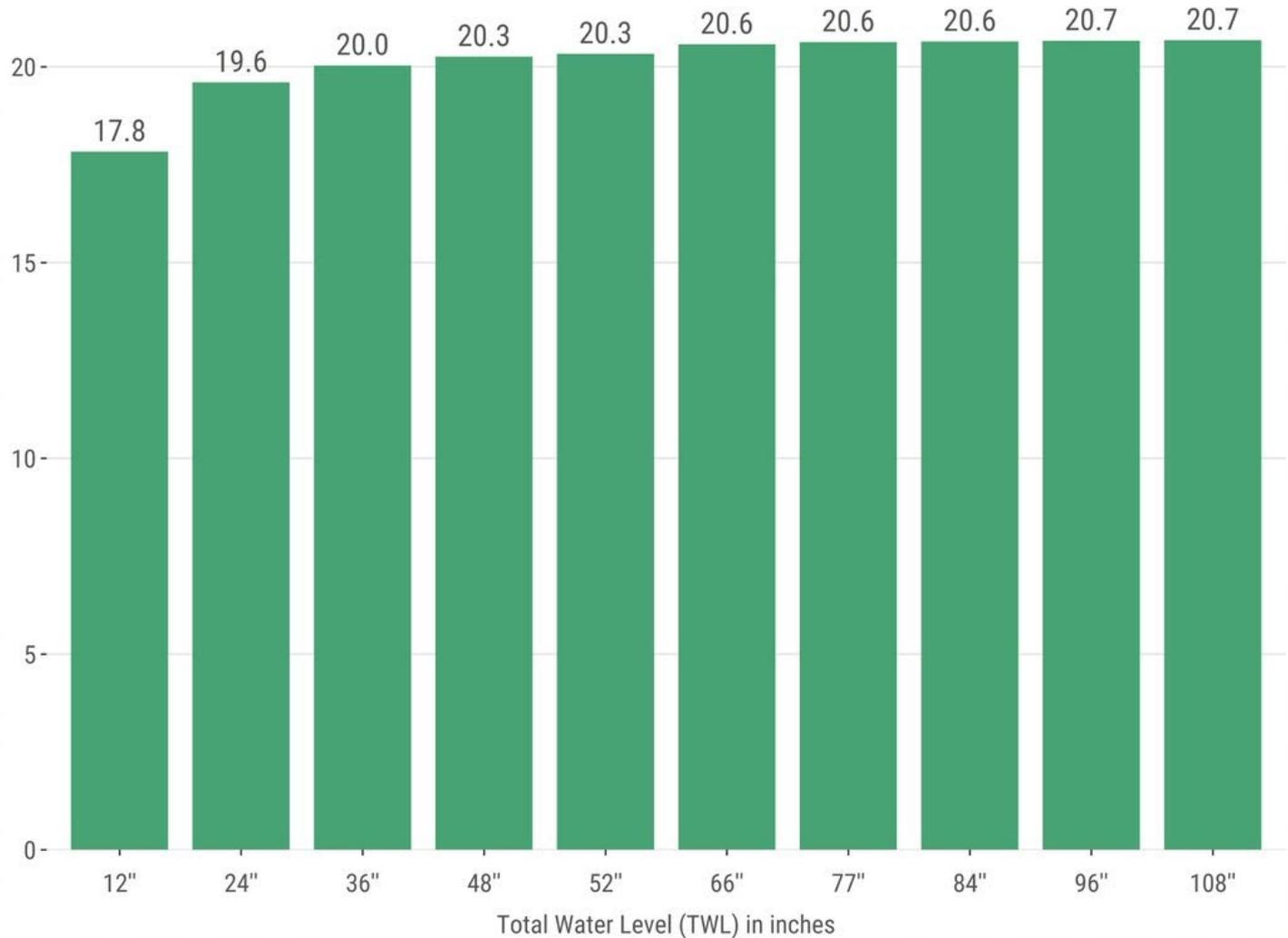
Total Water Level (TWL) in inches

The Regional Tidal Marsh Habitat Picture



Total Regional Impacts to Tidal Marsh Habitat from Flooding

Square Miles



The Regional Tidal Marsh Habitat Picture



PCAs with Highest Impacts to Tidal Marsh Habitat from Flooding
Square Miles Impacted

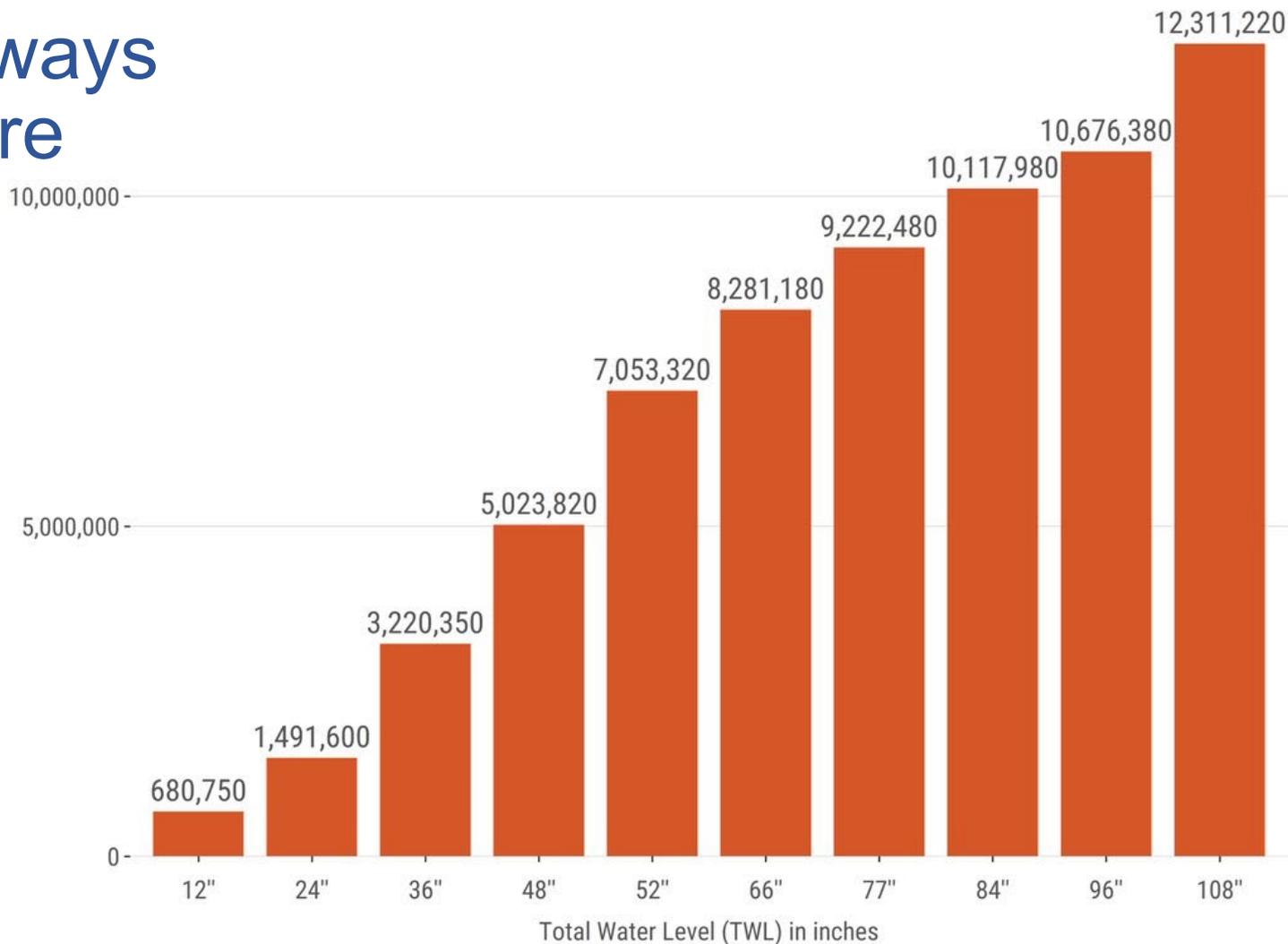
	12"	24"	36"	48"	52"	66"	77"	84"	96"	108"
Napa County Agricultural Lands and Watersheds	5.2	5.5	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7
Napa Valley - Napa River Corridor	3.2	3.4	3.4	3.4	3.5	3.5	3.5	3.5	3.5	3.5
Point Edith Wetlands Area	2.4	2.7	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Sonoma Baylands	1.2	1.4	1.4	1.4	1.4	1.5	1.5	1.5	1.5	1.5
Baylands	0.7	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Total Water Level (TWL) in inches

The Regional Freeways Picture

Total Regional Impacts to Vehicle Volume from Flooding

Annual average daily traffic

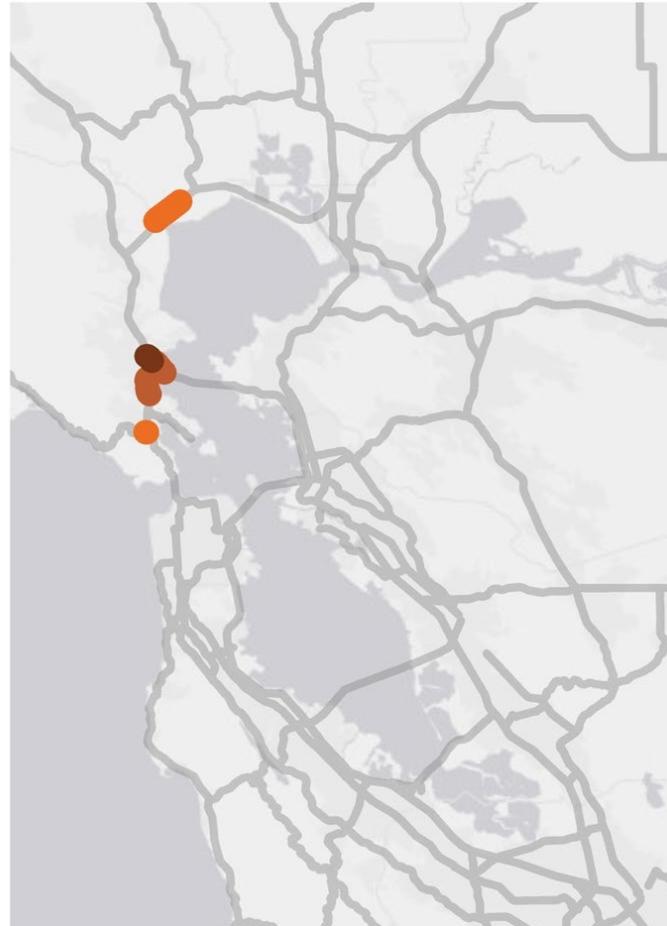


The Regional Freeways Picture

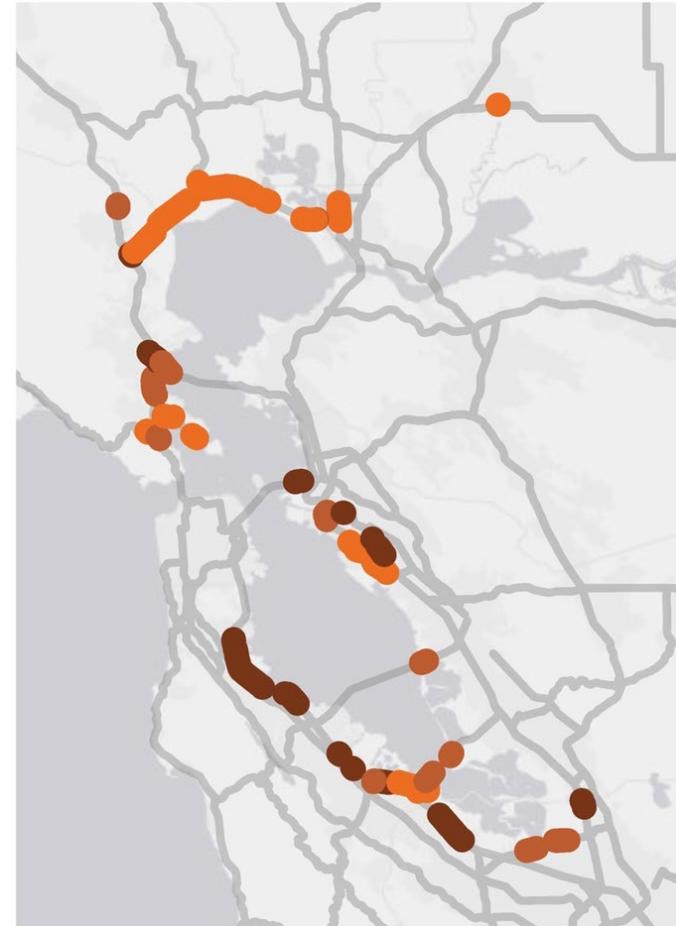
Average Annualized Daily Traffic (AADT)

-  18,475 - 48,500
-  48,501 - 161,000
-  161,001 - 275,000
-  Highway

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12" TWL



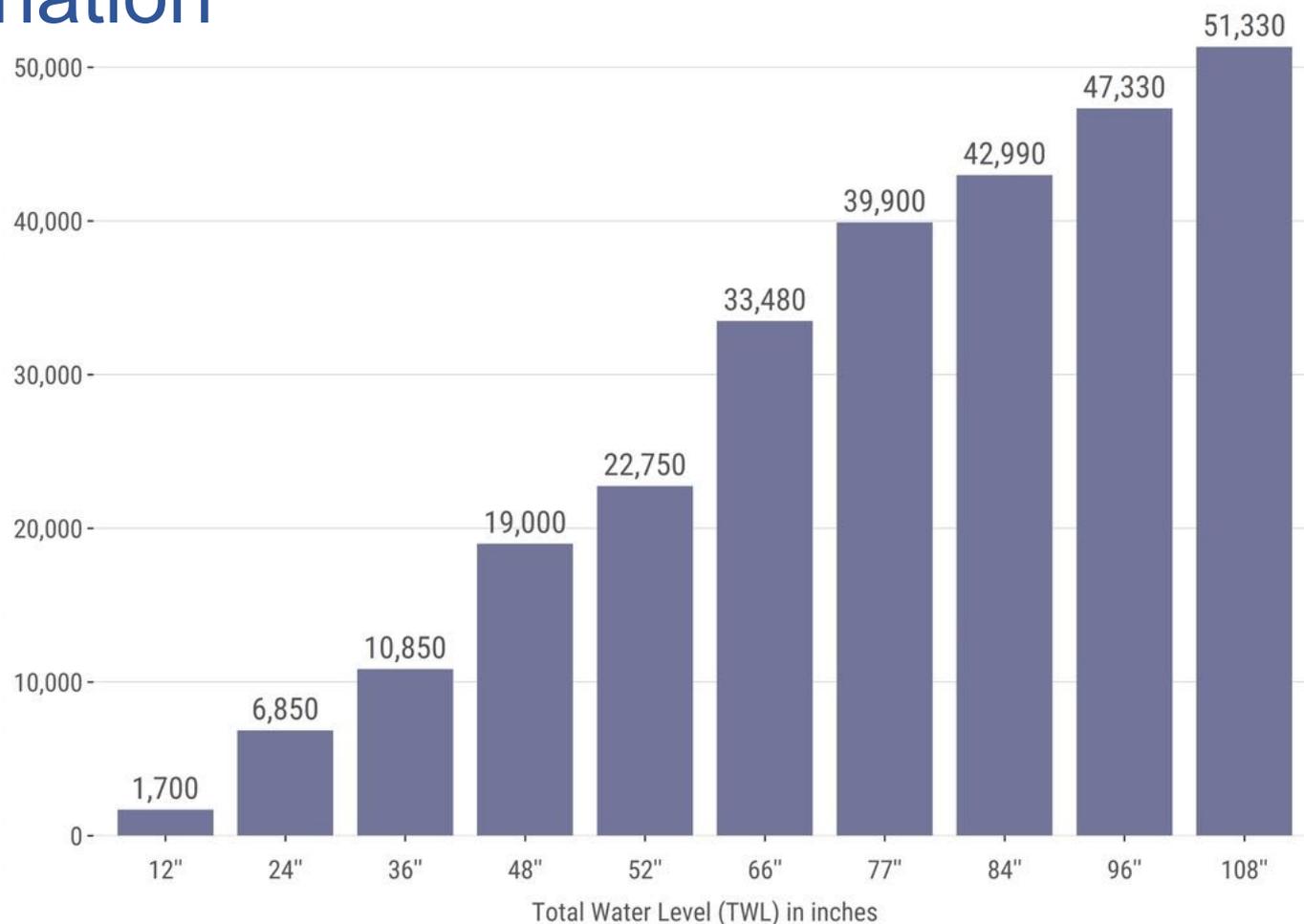
48" TWL



The Regional Contamination Picture

Total Regional Impacts to Residential Units in Contamination Burdened Block Groups from Flooding

Number of current residential units (2010)



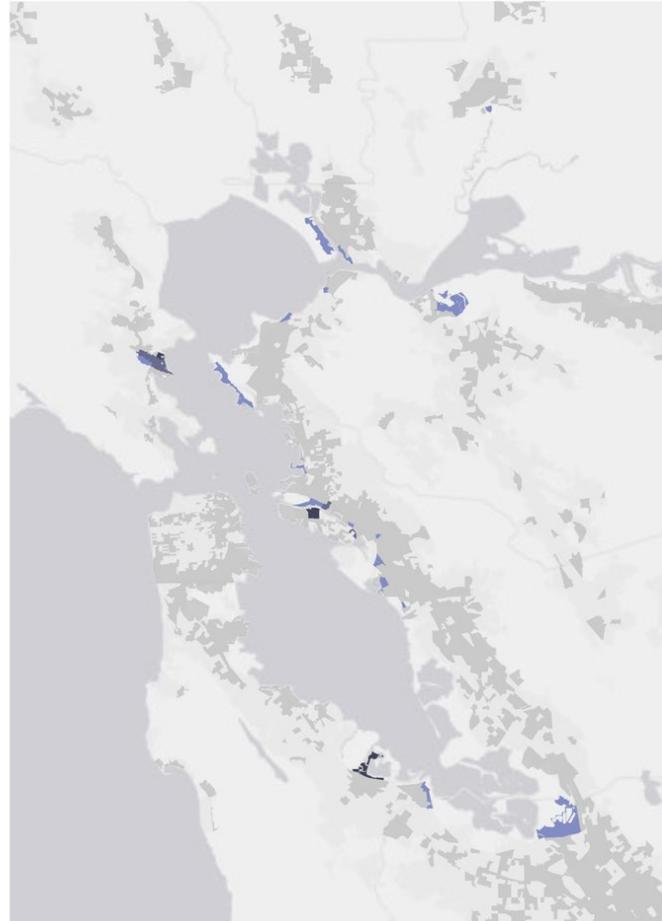
The Regional Contamination Picture



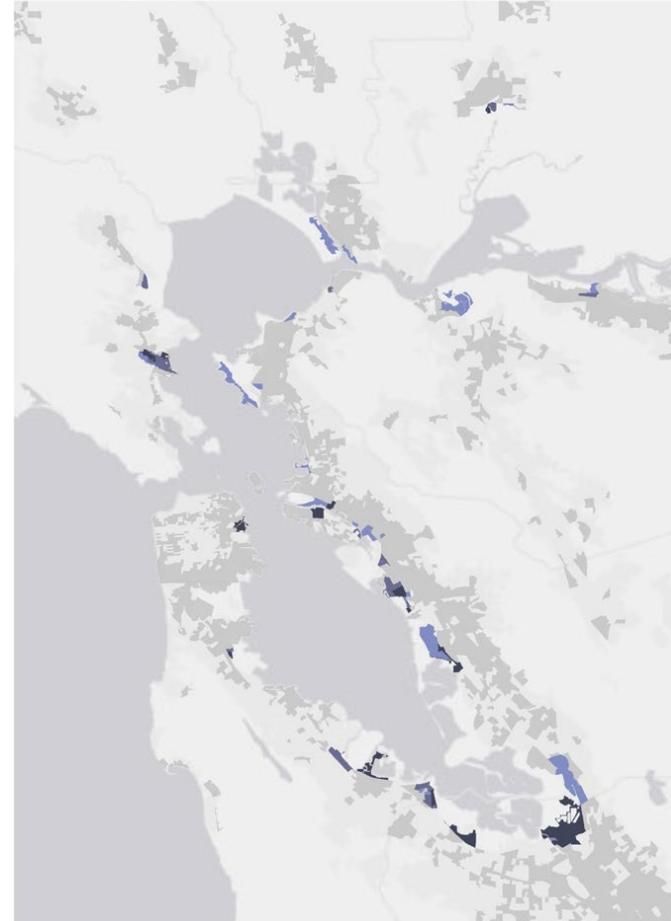
Number of Contamination VC Residential Units Impacted



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12" TWL



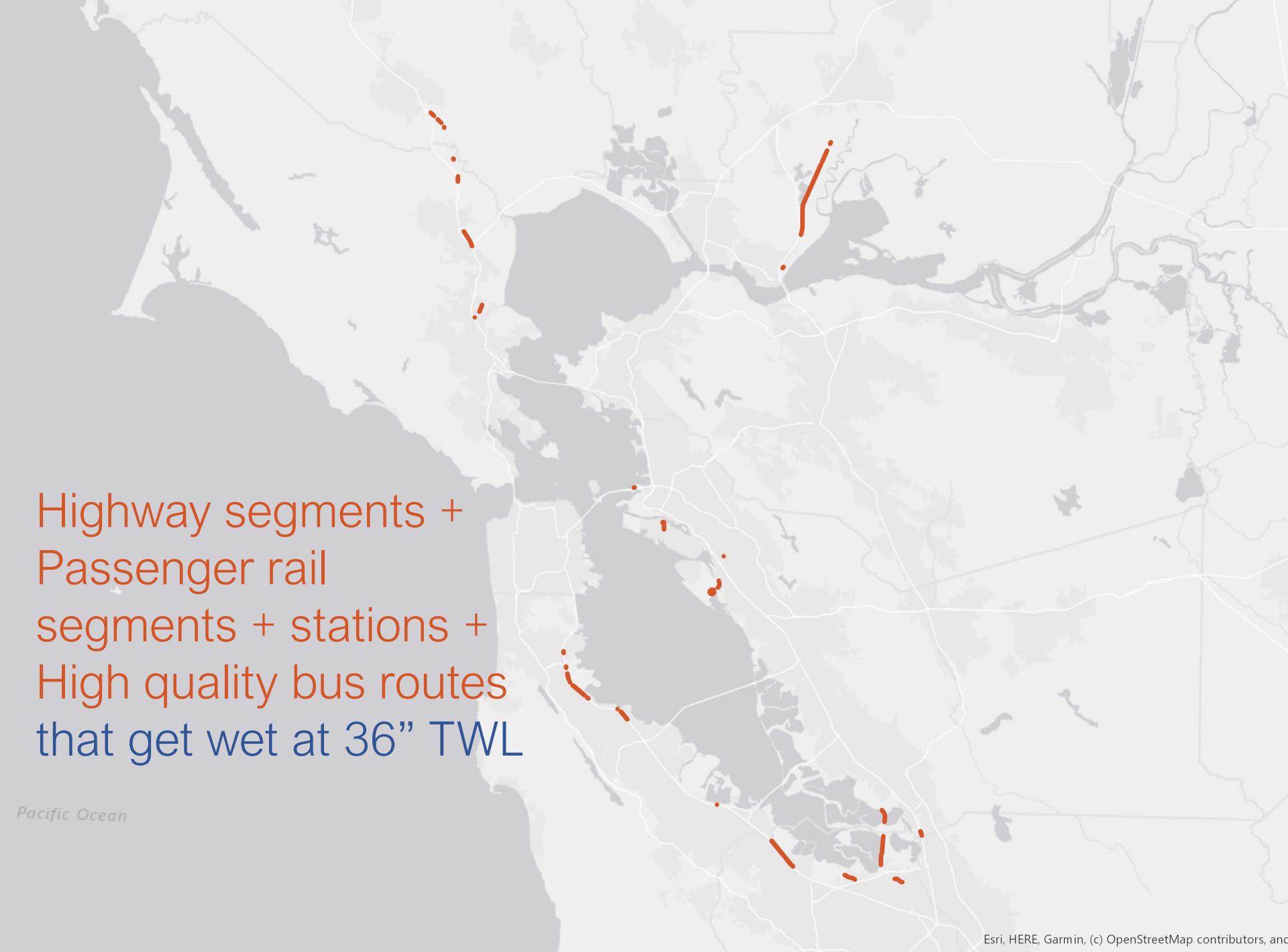
48" TWL

Highway segments with
the most ridership
(autos and trucks) that
get wet at 36" TWL

Pacific Ocean

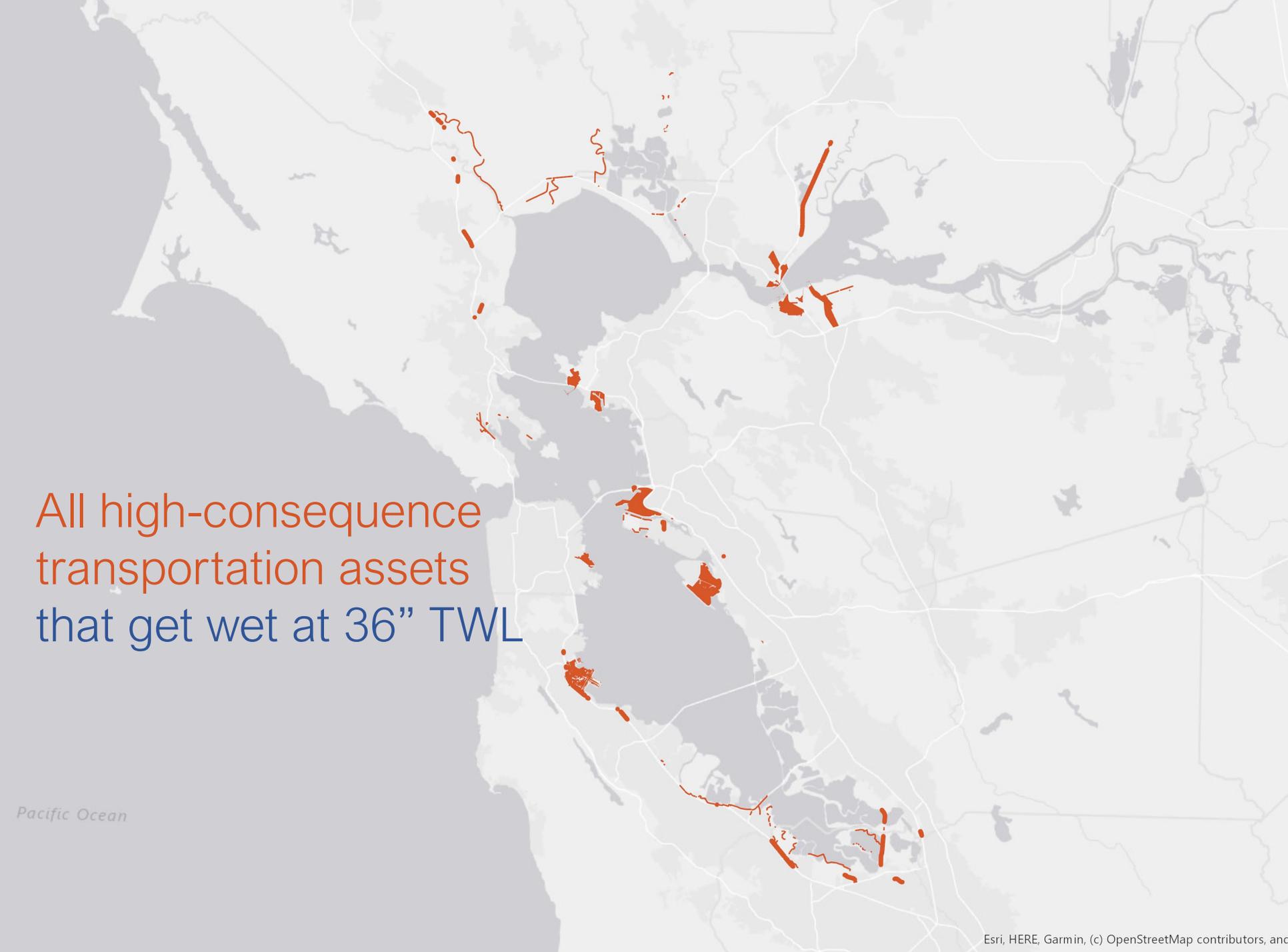
Highway segments +
Passenger rail
segments + stations
that get wet at 36" TWL

Pacific Ocean

A map of the Pacific Northwest region of the United States, showing the coastline and major transportation routes. The map is overlaid with orange lines and dots representing transportation segments affected by 36-inch TWL flooding. The lines are a mix of solid and dashed, indicating different types of routes. The dots represent stations. The text on the left side of the map lists the types of routes: Highway segments, Passenger rail segments, stations, and High quality bus routes. The text is in orange and blue colors. The map shows a significant portion of the transportation network in the coastal and inland areas of the Pacific Northwest is affected by flooding.

Highway segments +
Passenger rail
segments + stations +
High quality bus routes
that get wet at 36" TWL

Pacific Ocean

A map of the Pacific Northwest region of the United States, showing the coastline and major transportation routes. The map is overlaid with a network of orange lines and dots, representing high-consequence transportation assets that are affected by flooding at a 36-inch water table level (TWL). The orange lines are thicker in some areas, indicating higher consequence or more extensive flooding. The map also shows major cities and geographical features like the Pacific Ocean to the west and the Cascade Range to the east.

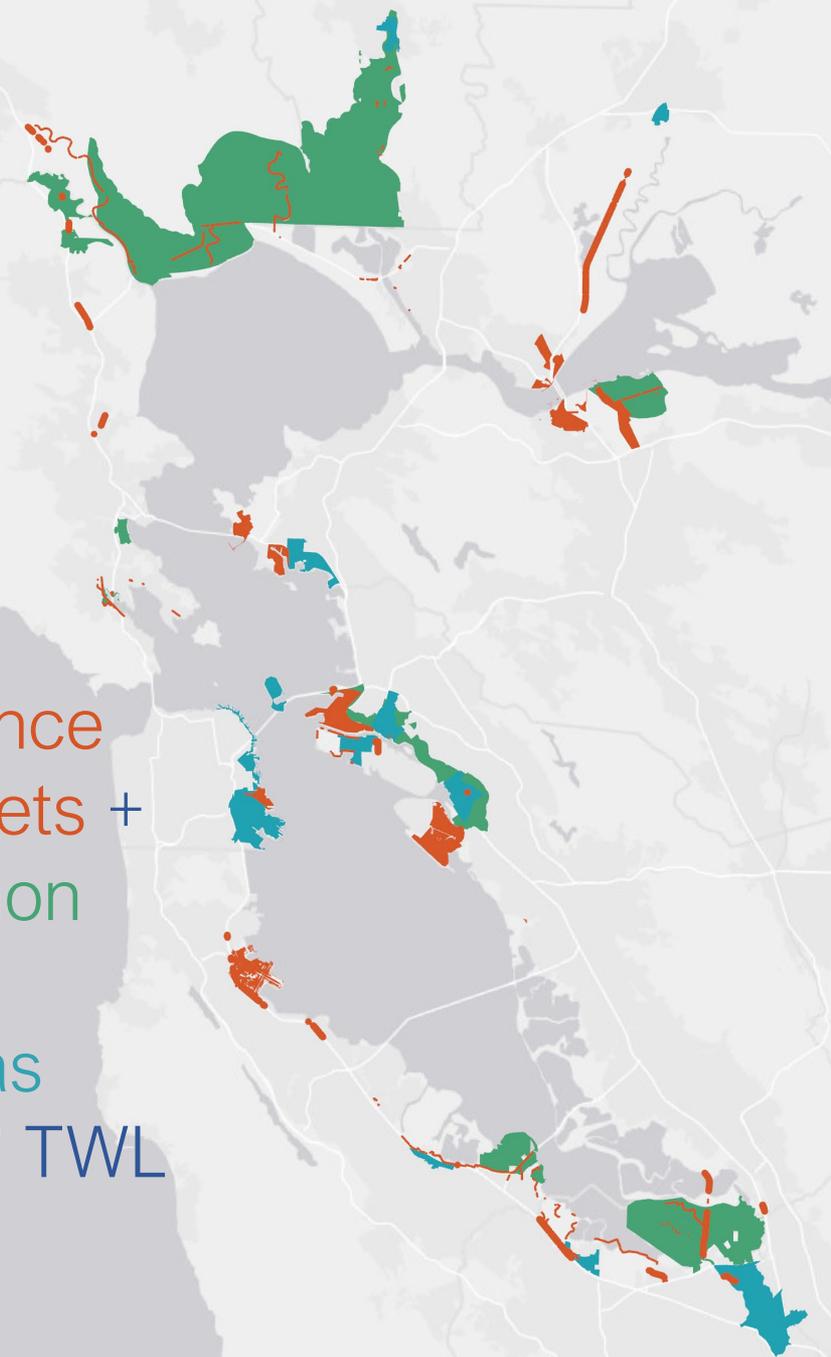
All high-consequence
transportation assets
that get wet at 36" TWL

Pacific Ocean

All high-consequence
transportation assets +
Priority Conservation
Areas
that get wet at 36" TWL

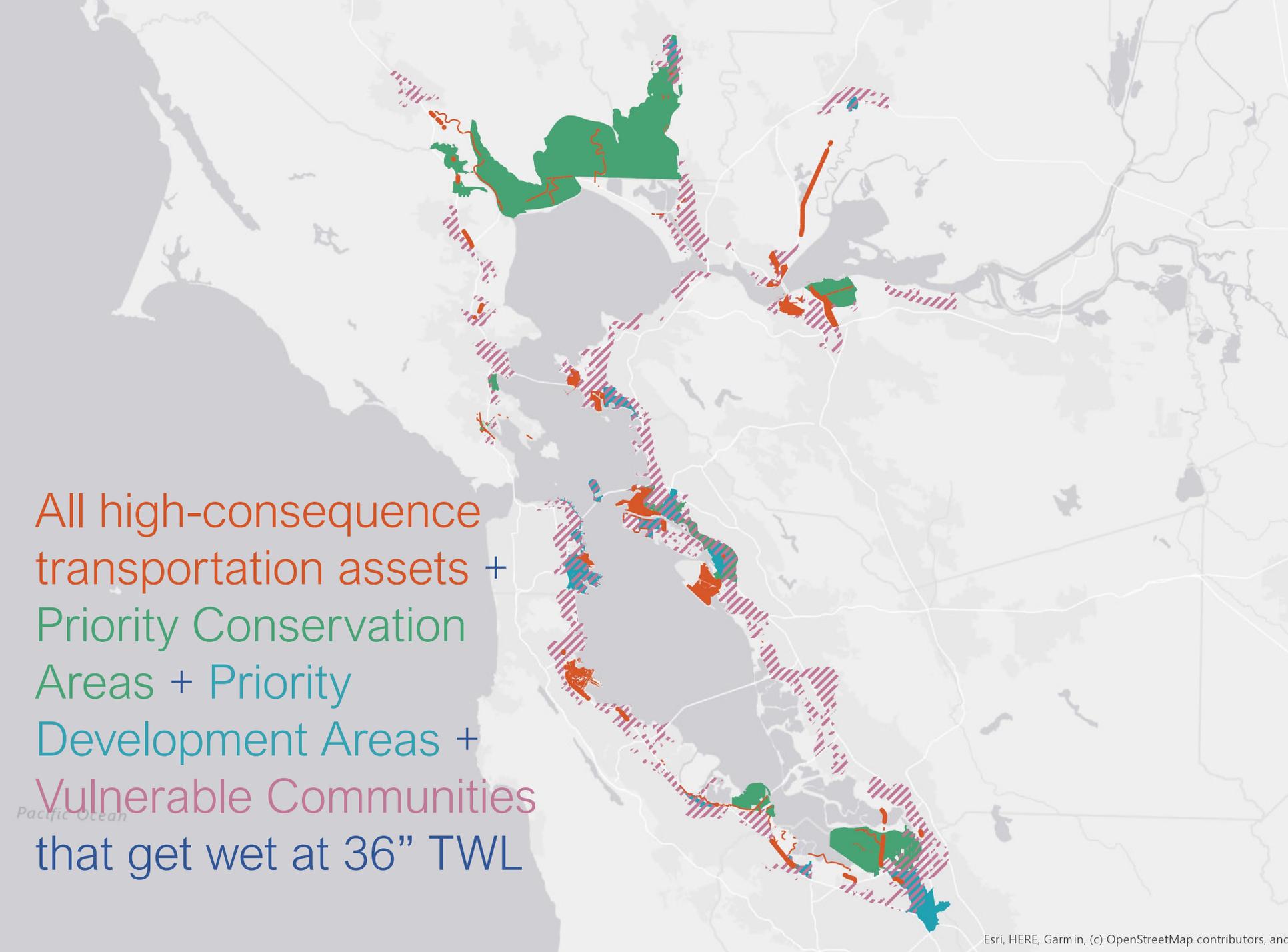
Pacific Ocean

All high-consequence
transportation assets +
Priority Conservation
Areas + Priority
Development Areas
that get wet at 36" TWL

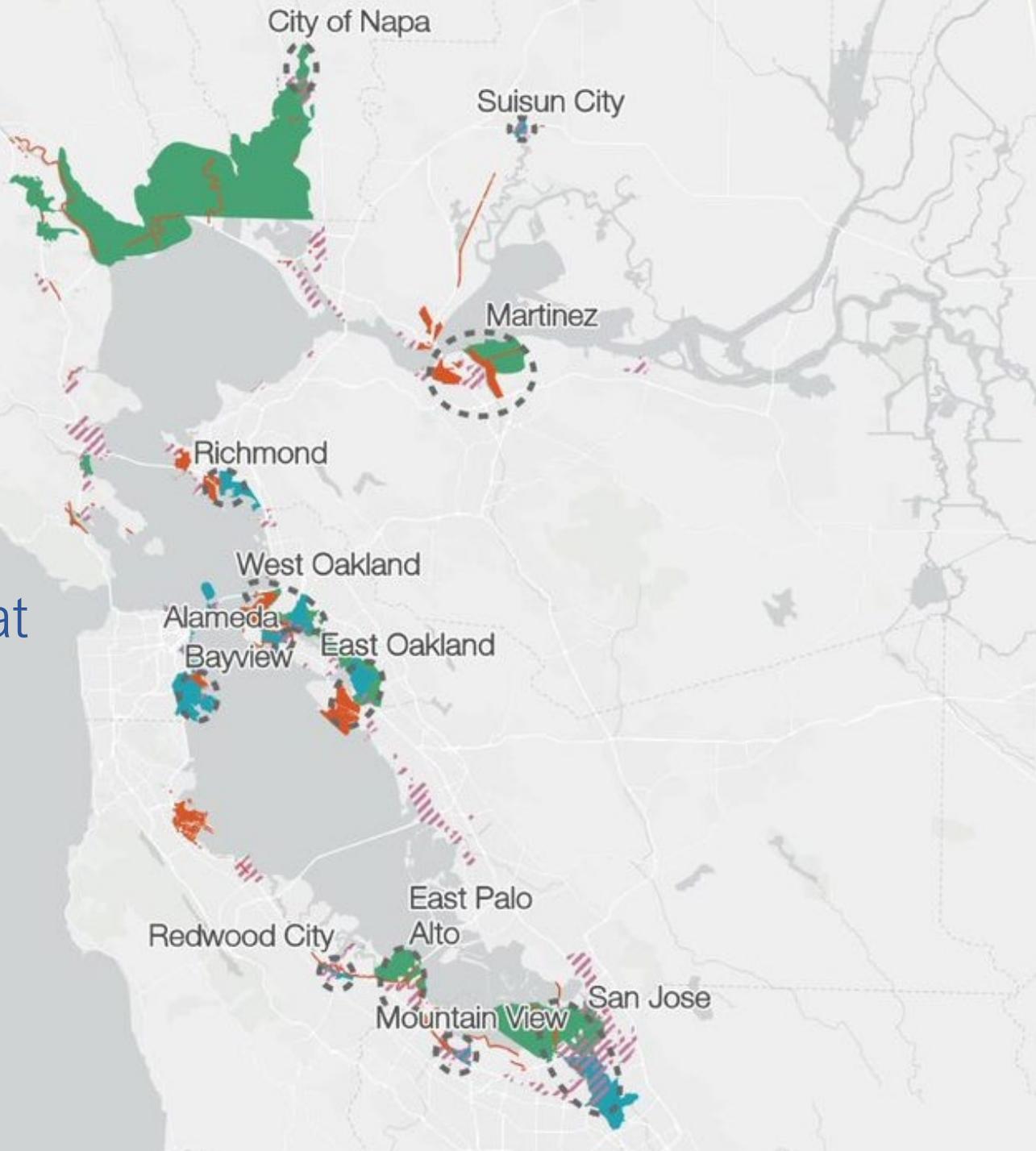


All high-consequence
transportation assets +
Priority Conservation
Areas + Priority
Development Areas +
Vulnerable Communities
that get wet at 36" TWL

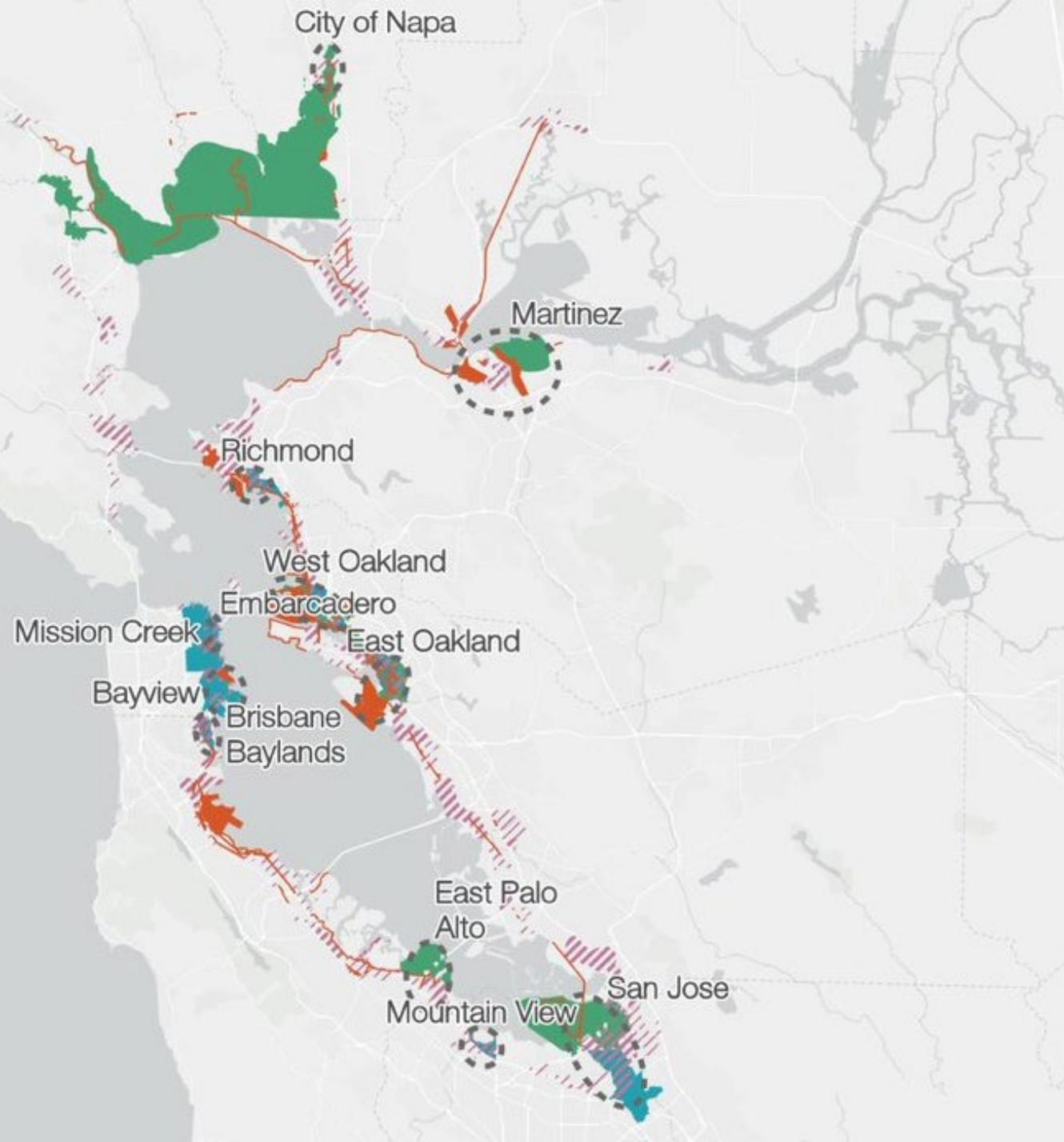
Pacific Ocean



Regional Clusters at 36" TWL



Regional Clusters at 108" TWL





Bayview Cluster



- Focus Areas
- Areas of Impact
- OLU
- Yosemite - Visitation OLU
- Transportation Infrastructure
- Vulnerable Community
- Priority Conservation Area
- Priority Development Area



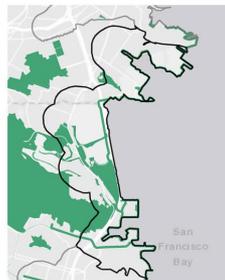
1:34,336



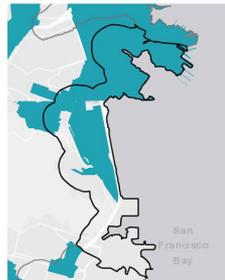
Transportation



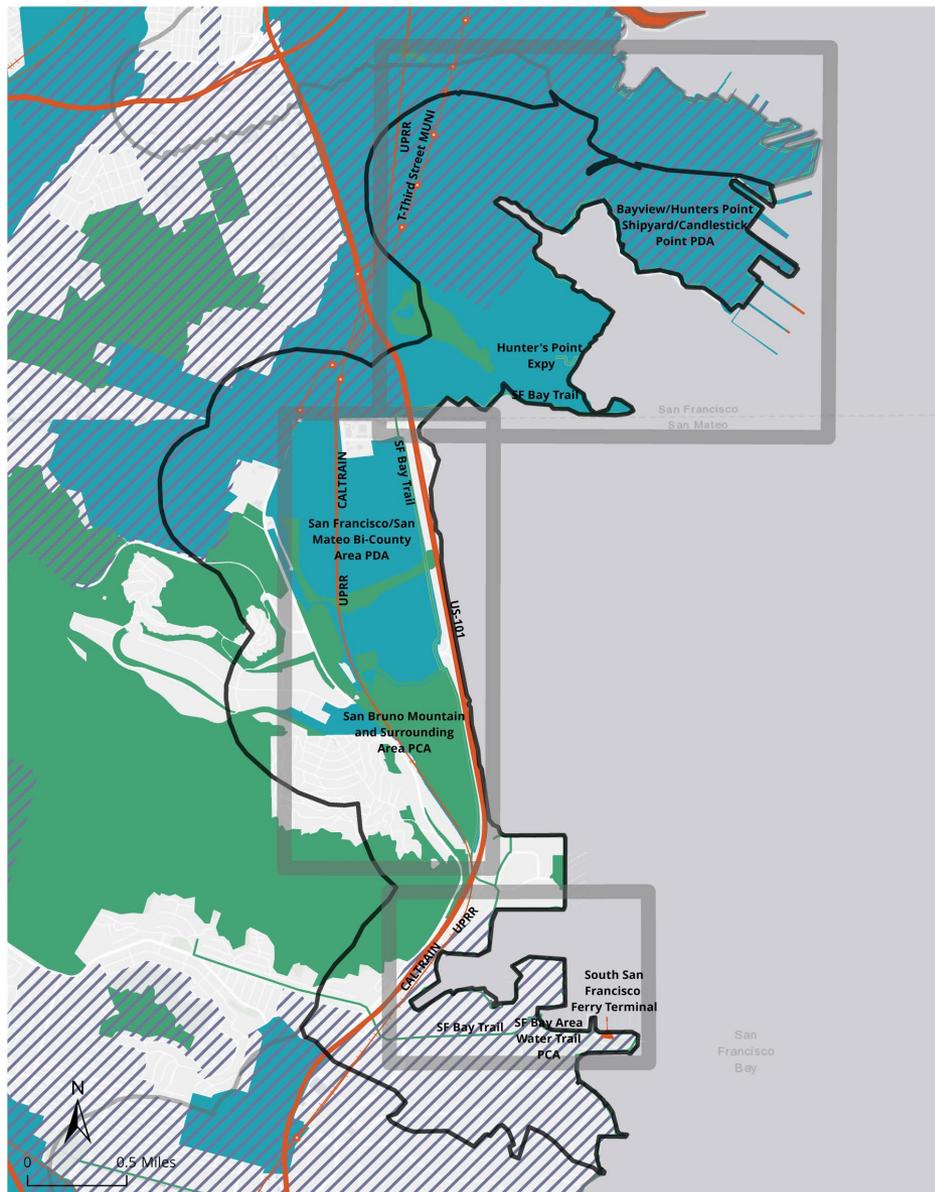
Vulnerable Community



Priority Conservation Area

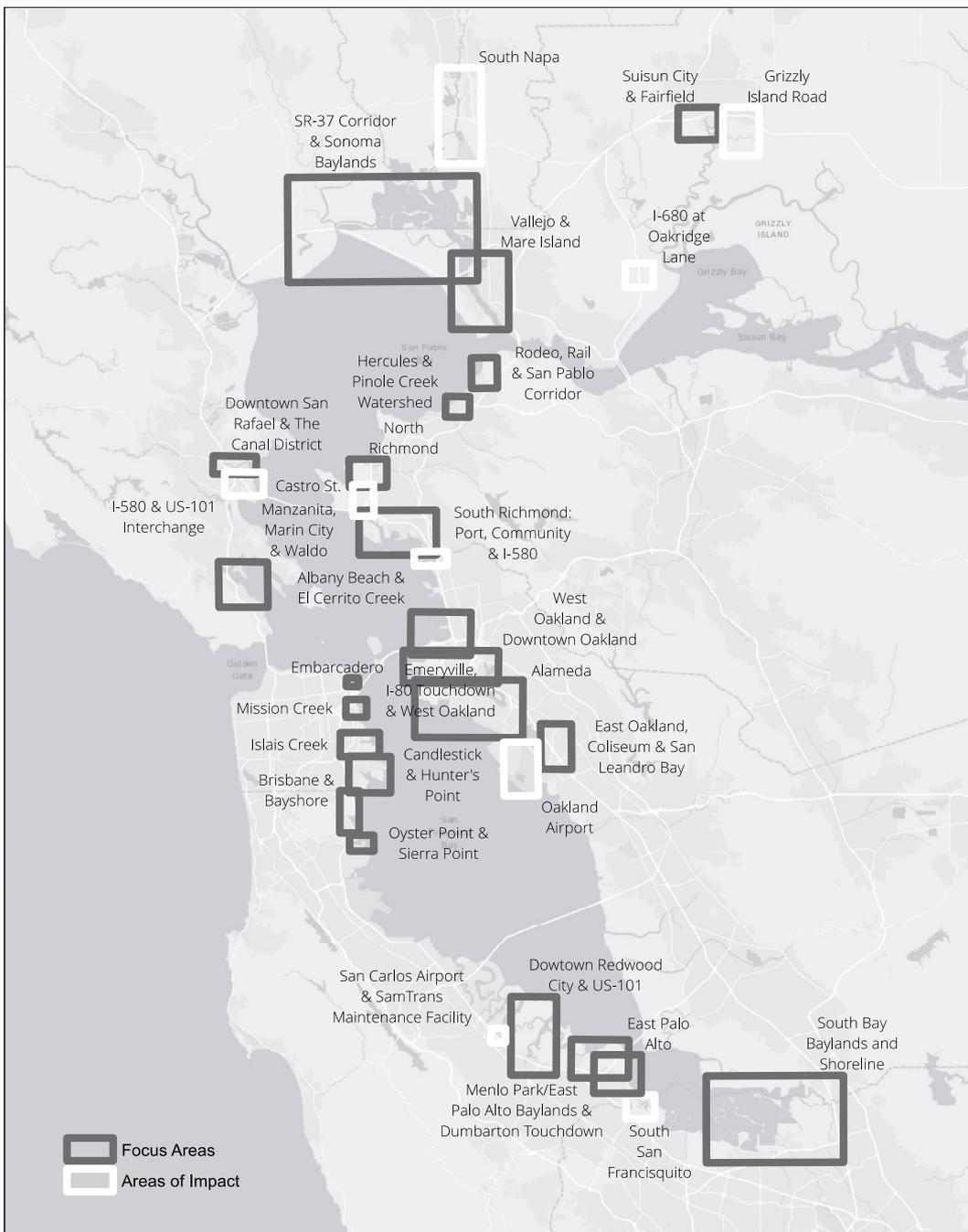


Priority Development Area



Yosemite-Visitacion 10/29/19

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Local Analysis Focus Areas

Regional Key Planning Issues



1. Local and regional transportation system connection hubs flood together
2. Sea level rise decision-making is complicated by ownership, governance, management, and regulatory issues
3. Interconnected local and regional emergency and critical service functions are at risk
4. Contamination complicates and exacerbates flooding issues

Regional Key Planning Issues



5. Sea level rise will amplify existing housing displacement concerns
6. Future development areas can be critical tools for resilience
7. Sea level rise will put pressure on the relationship between regional recreation and habitat
8. Nearshore habitats and the ecosystem services they provide are sensitive to sea level rise early on

Building Resilience, Region-Wide



Components of an Adaptation Response

Timing	Action	Partners	Category
<ul style="list-style-type: none">• Short-term• Medium-term• Long-term	Description of how the action responds to vulnerability	Who would need to lead and support the strategy	<ul style="list-style-type: none">• Plans and Policies• Programs and Operations• Capacity Building• Financing Mechanisms• Build a Project

Key Regional Strategies



Transportation

Timing	Action	Partners	Category
Short-term	Using ART Bay Area consequence analysis, establish regional priorities for high consequence transportation asset nodes ("critical nodes") that connect multiple transportation types (e.g. roadways, rail, and other forms of transit), scales of service (local, sub-regional, or regional system), types of service (e.g. moving people or goods), and service to vulnerable communities, and utilize regional funding mechanisms to plan and implement protection measures in these locations	MTC/ABAG, BCDC, Caltrans, CTAs, BART, local transit authorities, private transit providers, rail	Programs and Operations

Key Regional Strategies



Governance

Timing	Action	Partners	Category
Short-term	Using ART Bay Area evaluation criteria and other existing criteria as the basis, and the Regional Shoreline Adaptation Strategy as the platform, facilitate conversations and the development of decision-making criteria or models that allow local jurisdictions to assess the consequences and impacts of local decisions on the rest of the region	BCDC, MTC/ABAG, BARC, SCC, Universities, Cities, Counties, CBOs, Private Sector Partners, CCC, BayCAN, CHARG, NPOs	Capacity Building

Key Regional Strategies



Future Growth Areas

Timing	Action	Partners	Category
Short-term	Identify existing and/or develop a toolkit and guidance, including model ordinances, for local zoning and planning tools that encourage more resilient decision-making around local land use planning, such as downzoning, zoning for wetland migration space, clustering of development, increasing buffers and setbacks, redevelopment restrictions, special districts, or other such tools	CalOES, OPR, SCC, MTC/ABAG, BCDC, BARC, NGOs (American Planning Association), community groups	Plans and Policies

Key Regional Strategies



Nearshore Habitats

Timing	Action	Partners	Category
Short-term	Develop policies, guidance or incentives to encourage setbacks and buffers adjacent to tidal marshes that protect sensitive species, and/or establish zoning or conservation of upland locations for marsh migration while maintaining appropriate types of public access and recreation uses	Cities and counties, BCDC, SCC, SFEP, CA DFW, USFWS, NOAA, NPOs	Plans and Policies

What ART Bay Area Does



- Provides definitive answers about what gets wet, where, and when
- Provides a foundation to help guide regional and local decision-making
- Helps build networks and local and regional capacity
- Primes a region-wide group of stakeholders for action
- Informs regional and local planning, including Plan Bay Area

Where Do We Go From Here?

1. Integrated planning for housing, transportation, and sea level rise – we can walk and chew gum at the *same time, and it's critical we do!*
2. Being proactive vs. reactive – wildfires are a lesson in the need for planning and investments before disaster strikes
3. Getting to a comprehensive regional plan for equitable adaptation and resilience
 - Guiding principles
 - Clear goals and outcomes
 - Roles and responsibilities at the local, regional, state, and federal levels

What to Expect Next



- Report official release end of February
 - Summary Report
 - Full report
- Last Regional Working Group meeting to celebrate!
- Regional road show – let us come talk in your county!
- Webinars, media, oh my!
- Companion reports
 - Community Engagement & Financing White Paper
 - Updated Adaptation Guidance



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Adapting to Rising Tides Program
Manager

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