

Adaptation Pathways in California's Sea-Level Rise (SLR) Guidance

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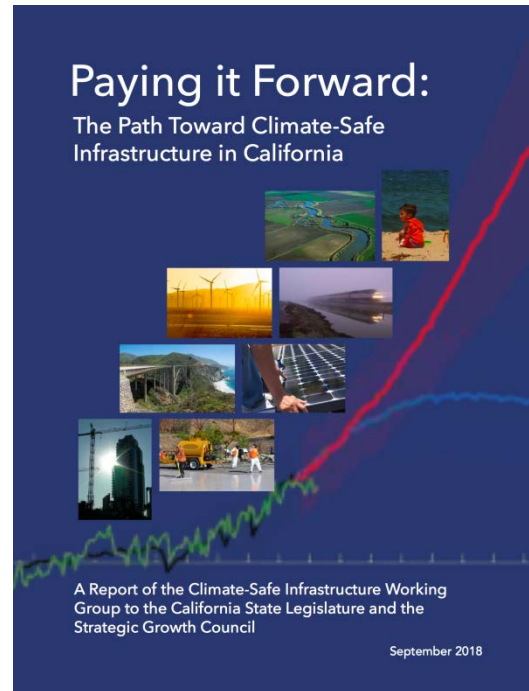
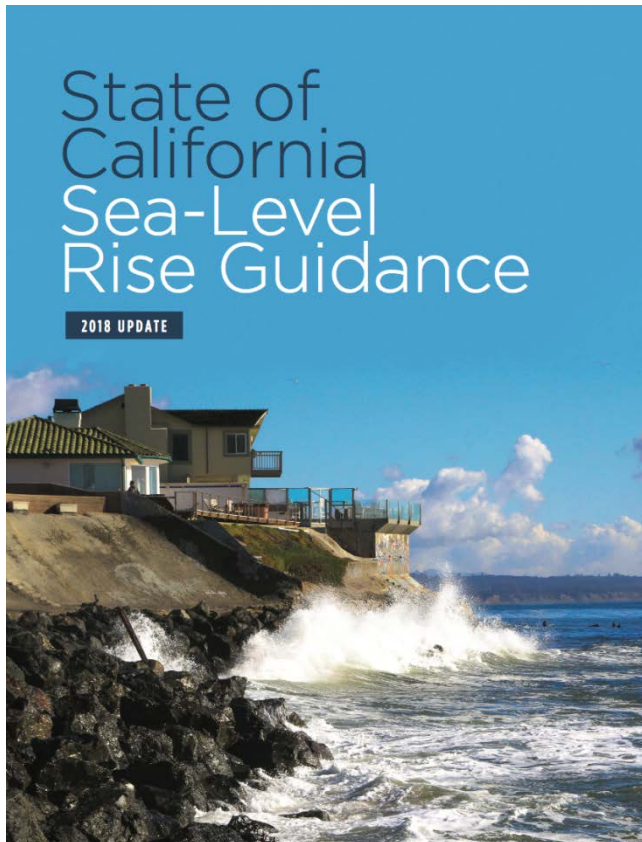
Chapter Lead, Fourth US National Climate Assessment
Convening Lead Author, IPCC WGII Sixth Assessment Report

California Coastal Commission

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Sea Level Rise Requires New Approaches to Planning

- Stationarity is dead
- Continuous change is the new normal
- Future is uncertain

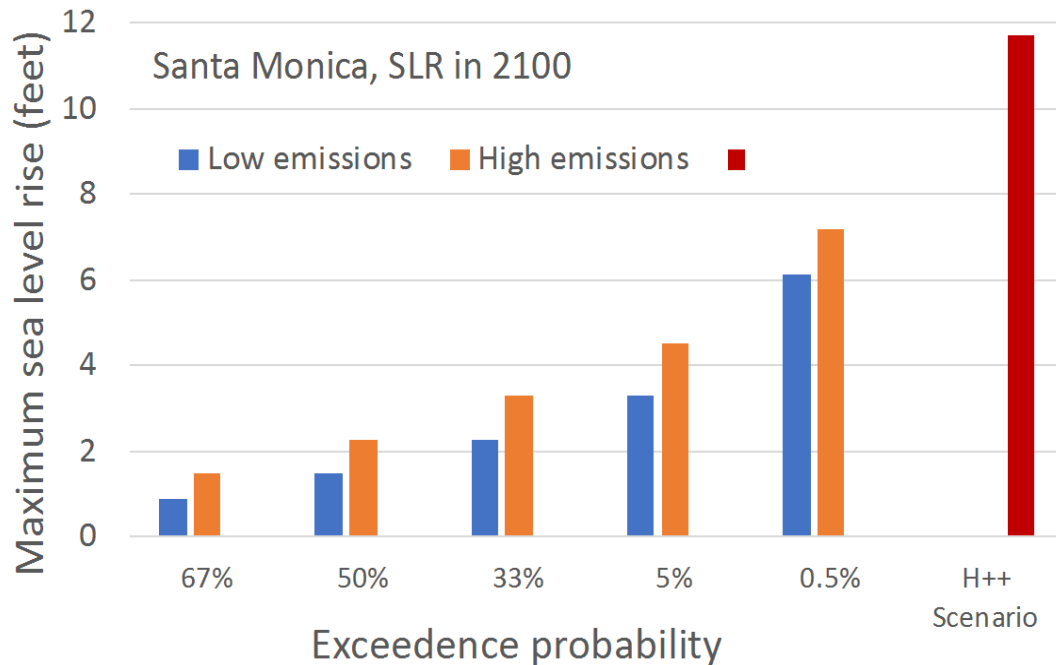


Recent guidance documents recommend *Adaptation pathways* approach

STEP 5: *Select sea-level rise projections based on risk tolerance and, if necessary, **develop adaptation pathways that increase resiliency to sea-level rise and include contingency plans if***

Best Available Science Generates a Wide Range of Scenarios

OCP sea level rise projections:



- Include probabilistic projections and a non-probabilistic worst case (H++)
- Don't include uncertainty in storm surge
- Are virtually certain to change by the next guidance

Adaptation Pathways Addresses This Uncertainty With Well-Structured Contingency Plans

An Adaptation pathway consists of:

1. Initial action

- e.g. infrastructure investment, land use decision, etc.

2. Tipping point(s) and signposts

- A tipping point is the amount of sea level rise that can occur before the initial action can no longer serve its intended purpose
- A signpost indicates that we are approaching a tipping point

3. Contingency action,

- to be taken if and when the tipping point is reached

Notional Example of Adaptation Pathways

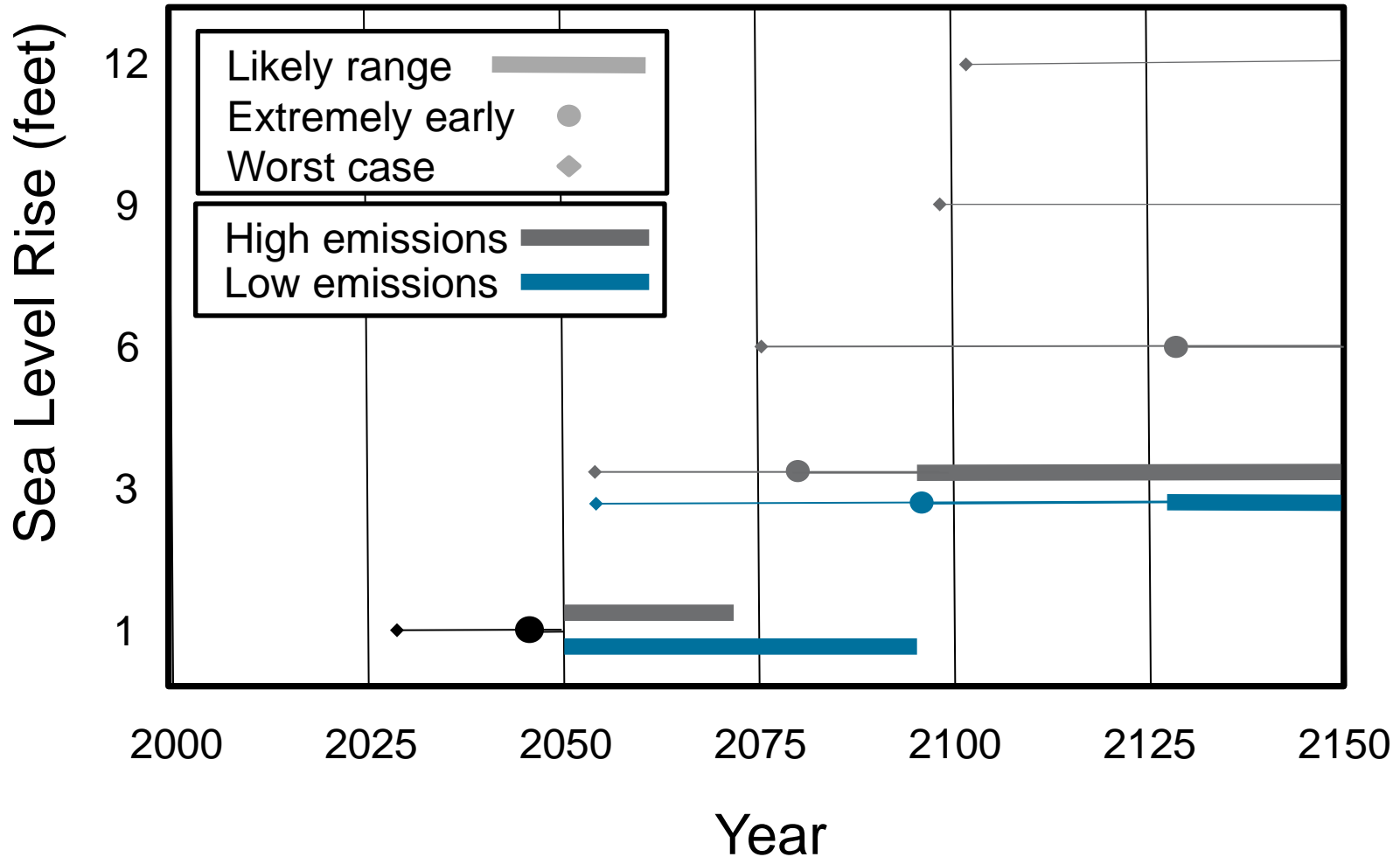
Notional decision – Should we repair or relocate an aging coastal road?

	Tipping point
Repair	2 feet
Repair + Upgrade	6 feet
Relocate	12 feet

- If the road is:
 - Repaired it can meet safety and capacity goals for up to 2 feet of SLR
 - Relocated it can meet safety and capacity goals for up to 12 feet of SLR
- If the road is repaired, it can be upgraded in the future and meet safety and capacity goals for up to 6 feet of SLR

With SLR Projections, Ask “By When?” Rather Than “How Much?”

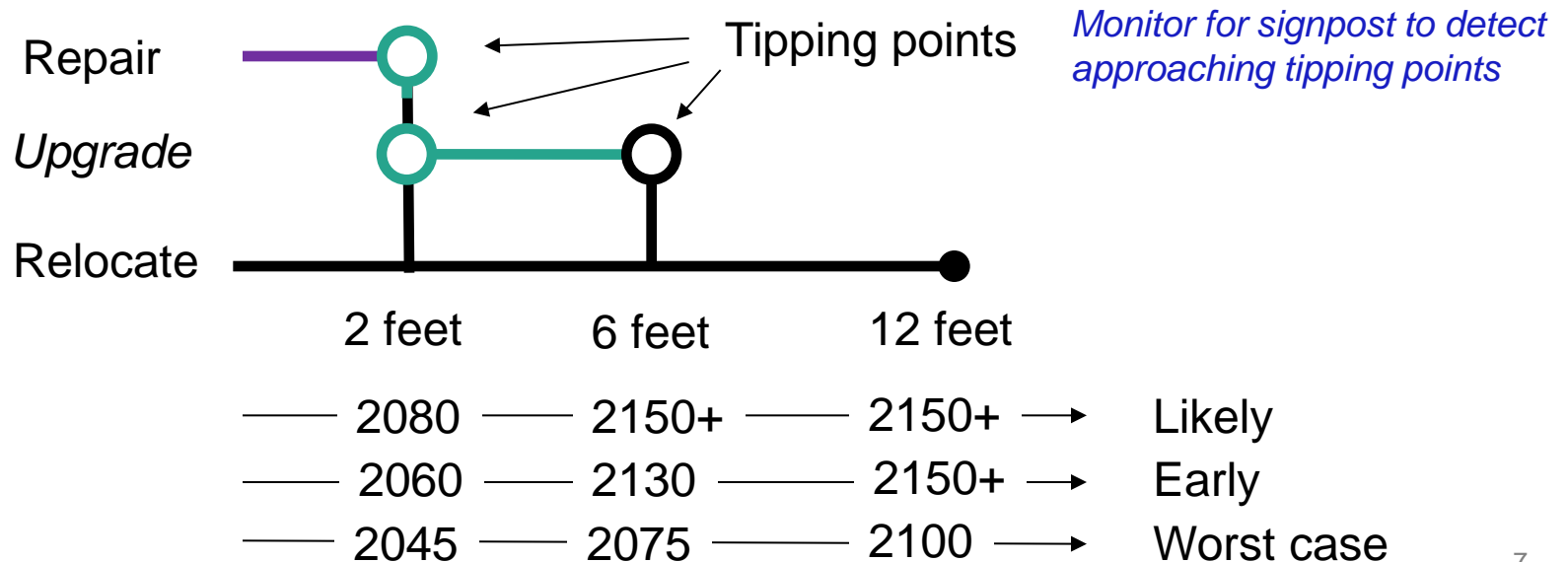
OPC projects expressed as year in which various levels of SLR might be reached



Use this Information to Create Adaptation Pathways

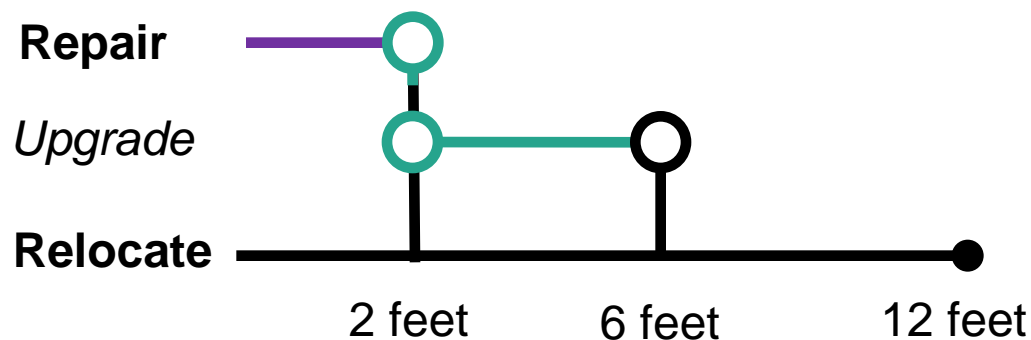
	Tipping point	Worst case	Early	Likely
Repair	2 feet	2045	2060	2080*
Repair + Upgrade	6 feet	2075	2130	2150+
Relocate	12 feet	2100	2150+	2150+

* High emissions scenario only



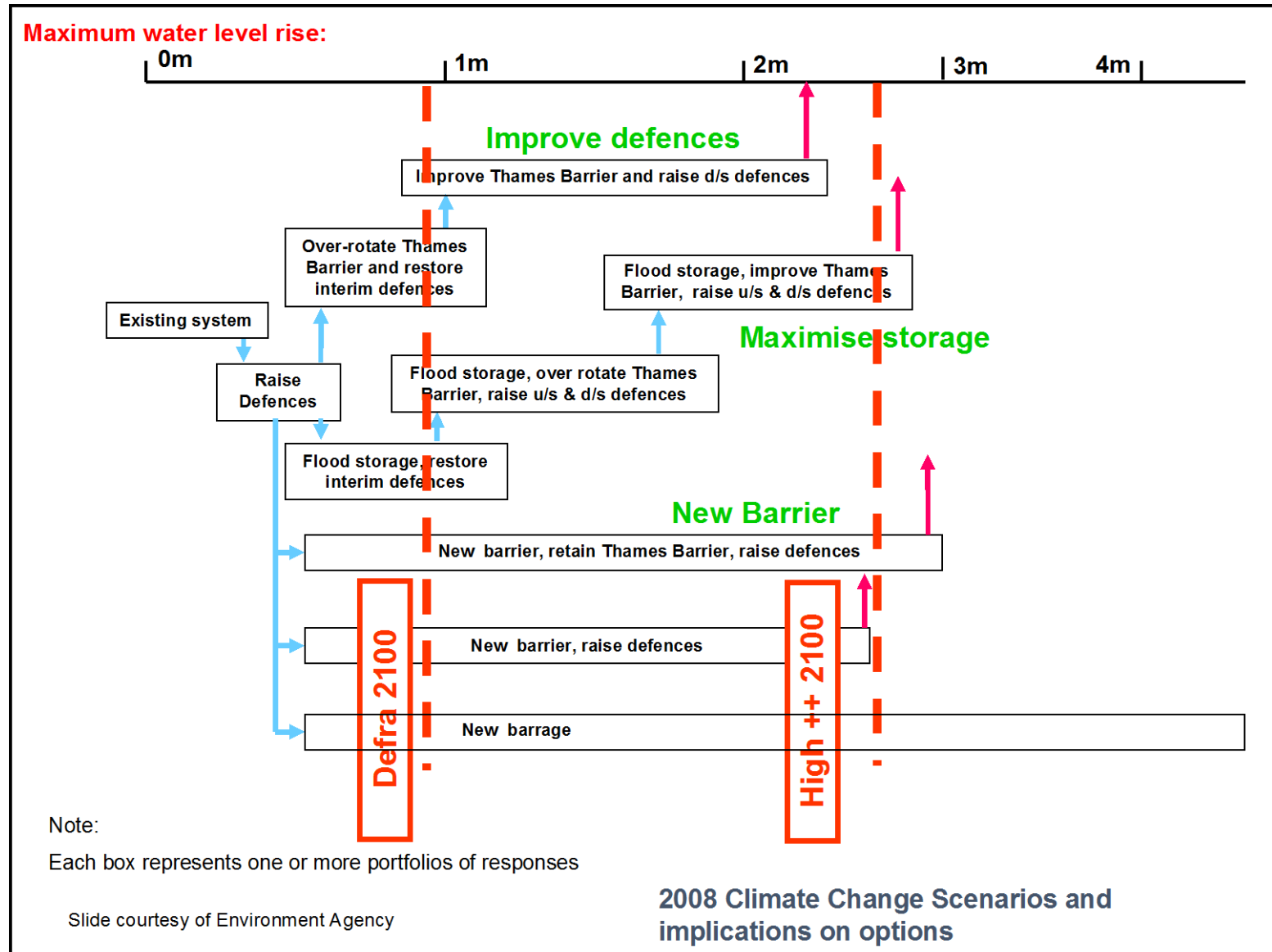
Can Choose Among Near-Term Options Using Adaptation Pathways Maps

- Relocating may be a good near-term choice if
 - Relocating today is easy and inexpensive, or
 - Future upgrading or relocating is very costly
- Repair may work well for most of this century, but could fail much earlier, so shouldn't be implemented without a contingency plan
- Both the repair and relocate options unlikely to last forever, especially if global ghg emissions don't drop quickly to net zero



Adaptation Pathways Increasingly Employed

Adaptation pathways map for Thames River Barrier



Some Benefits of Adaptation Pathways

- Adaptation pathways can help:
 - Avoid both under- and over-commitment in response to SLR
 - Focus resources on the most important near-term decisions
 - Focus attention the full range of possible futures
 - Generate consensus with explicit plans for addressing both likely and extreme scenarios
- Approach can:
 - Employ economic and non-economic measures to evaluate alternative pathways
 - Address land use and other policy choices in addition to infrastructure

Adaptation Pathways Presents Some Implementation Challenges

Implementing Adaptation pathways may require:

- Willingness to adopt new approaches
- Appropriate monitoring to detect approaching tipping points
- Expanded use of conditional permits
- Financial mechanisms to ensure funds are available for future adaptations
- Pilot programs to demonstrate new approach

Thank you!

www.rand.org/pardee

www.deepuncertainty.org

