* Progress Towards a Climate Adaptation Plan at LACMTA

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FTA Transit Climate Change Adaptation Webinar

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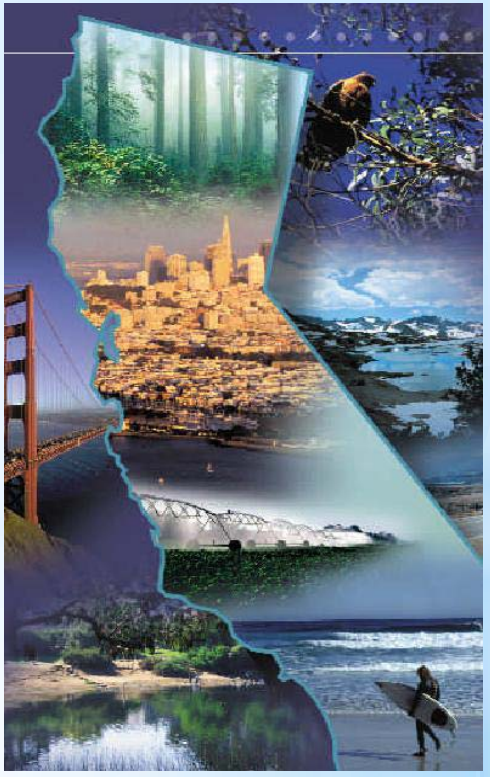
*Climate Planning Drivers in California

* AB 32: Reduce state's global warming emissions be reduced to 1990 levels by the year 2020

* SB 375: Coordinated land use and transportation planning as a means to address climate change

* 2009 California Climate Adaptation Strategy

* Amendments to the California Environmental Quality Act Guidelines Section 15126.2



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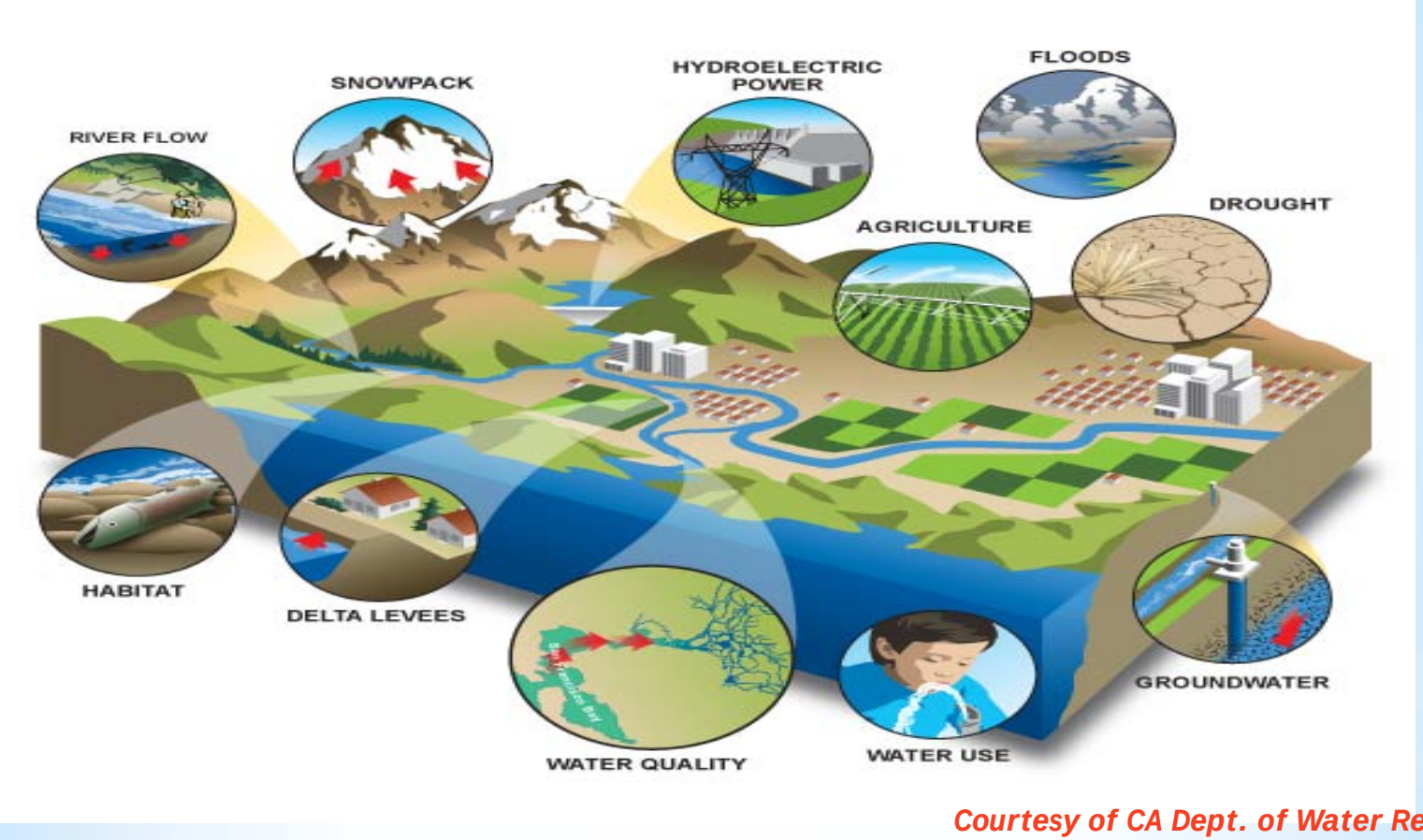
*Overview of Potential Climate Change Impacts in CA



Courtesy of CA Dept. of Water Resources

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*Why is LACMTA thinking about climate?

What's happening?	*How climate information might help.*
Service disruptions occur **now** during periods of extreme heat and heavy precipitation.	Identifying portions of the transit system/particular services that are most vulnerable can help guide planning and operations.
Large infrastructure projects (Measure R) are in progress and being planned. Ensuring their performance and safety is critical, in both the current and future climate.	Information about impacts and adaptation can be incorporated into decisions about mode selection, siting, alternatives, and materials.

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* Goal of the Adaptation Plan

We ***know*** that climate-related risk exists.

We need to understand:

- the nature and magnitude of the risk
- the planning and operational options for reducing risk
- the relative costs and benefits of the options

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*Methodology

***Screening** approach designed to identify major vulnerabilities and then identify/evaluate options*

*Identify Critical Assets and Services

*Analyze Historical Climate and Projected Future Climate

*Identify Vulnerability to Impacts

*Evaluate Potential Adaptation Options

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The LACMTA's Service Area is *GEOGRAPHICALLY LARGE* [1,433 mi² (3,711 km²)]

Multi-modal
- heavy and light rail
- bus
- BRT

Over 1 million daily bus boardings and approximately 300,000 daily rail boardings

And service is ***EXPANDING*** through Measure R: LA County's $40B Transit and Highway Capital Program

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*What's critical?

Critical = services and assets that are essential to transporting LACMTA's customers

i.e., "*If this service or asset were removed from the transit system, would the transit system be fundamentally different*?"

*Limited to transit assets and services owned and operated by LACMTA

*Future transit projects under Measure R

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*Criticality Results

- *Preliminary analysis focused at the service level
  - *Bus operations (mainly the fleet; includes BRT)
  - *Light and heavy rail operations (includes fleet, railways, stations, and support facilities)
  - *Measure R transit projects

- *Framework outlined for determining criticality among stations/locations
  - *Based on ridership, connectivity within system, presence of development projects, and staff input

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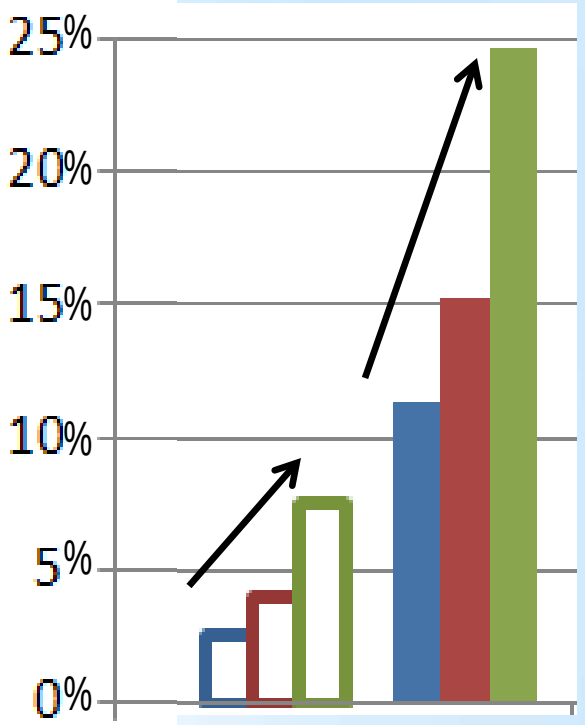
Observed Climate Change in Southern California

- Region has experienced warming in the 20th century across all seasons (~2°F) comparing last 30 years to earlier decades
- Frequency of extremely warm days has increased
- Precipitation changes not statistically significant, far less than large year to year variability



Frequency of Hot Summer Days, Pasadena
Green 1980-2009
Red 1910-2009
Blue 1910-1979
(solid is for days reaching low 90's°F; filled is for days reaching 100°F)

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*Future Climate

*Projected warming of **2-6°F by 2050**

3-10°F by 2100

High end of range make future springs and falls at least as warm as current summers.

* Precipitation changes vary by model; majority show slight overall drying.

* Large year-to-year variability (including chance of heavy rainfall events) expected to continue into the future.

Despite being a "dry" place on average, LA has experienced episodes of 10-12" of rain within 5 days and winters with more precipitation than Seattle receives in an average year (~40")!

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* Impacts and Key Risks – Driven by Extreme Heat and Precipitation Events

Service/Asset	Climate Impact
Rail Operations	Equipment malfunction (electrical systems; air conditioning systems) during periods of **extreme heat**
	Railway buckling during periods of **extreme heat**
	Flooding of underground stations and tracks, at-grade railways , and Bus Rapid Transit right-of-ways during **heavy rainfall events**
Bus Operations	Fleet breakdowns and increased maintenance during periods of **extreme heat**
New Construction/ Measure R Projects	Exposing new infrastructure to episodes of **extreme heat** and **heavy rainfall events**
	Labor interruptions or delays during periods of **extreme heat**

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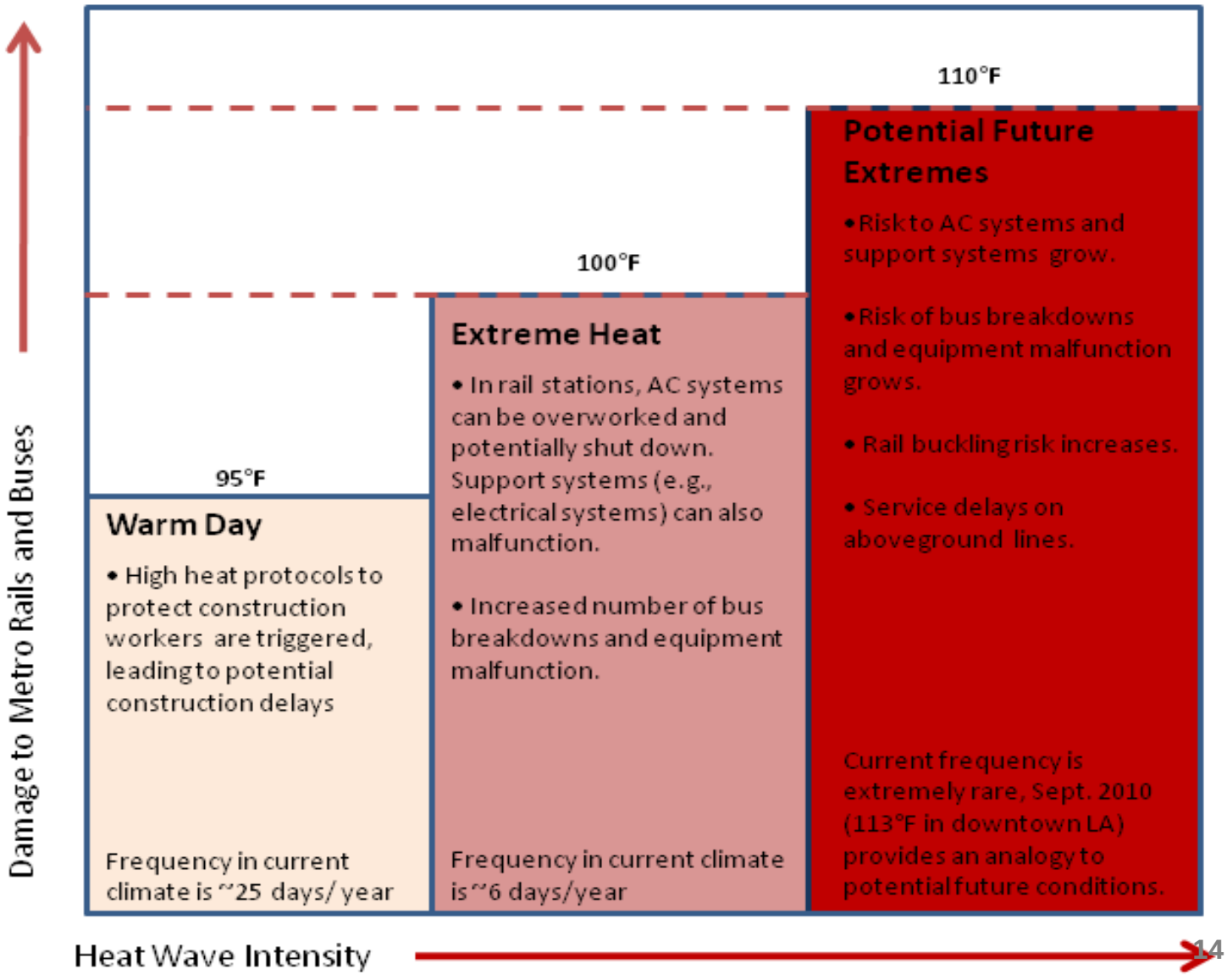
Damage to Metro Rails and Buses
110°F
Potential Future Extremes
• Risk to AC systems and support systems grow.
• Risk of bus breakdowns and equipment malfunction grows.
• Rail buckling risk increases.
• Service delays on aboveground lines.
Current frequency is extremely rare, Sept. 2010 (113°F in downtown LA) provides an analogy to potential future conditions.
100°F
Extreme Heat
• In rail stations, AC systems can be overworked and potentially shut down. Support systems (e.g., electrical systems) can also malfunction.
• Increased number of bus breakdowns and equipment malfunction.
Frequency in current climate is ~6 days/year
95°F
Warm Day
• High heat protocols to protect construction workers are triggered, leading to potential construction delays
Frequency in current climate is ~25 days/year
Heat Wave Intensity

*Adaptation Options to Consider…

*Combining weather/climate information with infrastructure monitoring and maintenance?

*Exploring the use of more heat-resistant track materials?

*Improving "flood defense" at sensitive locations (like underground stations)?

Examples: expanded "greener" stormwater management; changes to vents, or elevation of pumps

*Options during construction?

Examples: siting, alignment alternatives, labor schedules

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* How to evaluate and pursue options?

Still a work in progress!

* How can the **costs** of adaptive actions (or lack of action) be estimated?

* How can adaptation be made **iterative**?

*i.e., How can we **monitor** the impact of weather events, **learn something,** and **update/adjust** operations and planning…*

* How to integrate adaptation into management/planning?

i.e., What are we already doing that could be considered adaptation? How might adaptation help us achieve existing management goals?

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*Questions/Discussions

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