

Climate Risk and Real Estate Investment Decision-Making

November 12, 2019 at 12:00pm CT



Climate Risk and Resilience in Real Estate

BILLY GRAYSON, EXECUTIVE DIRECTOR FOR THE ULI CENTER FOR SUSTAINABILITY AND ECONOMIC PERFORMANCE

CLIMATE RISK
AND REAL ESTATE
INVESTMENT
DECISION-MAKING

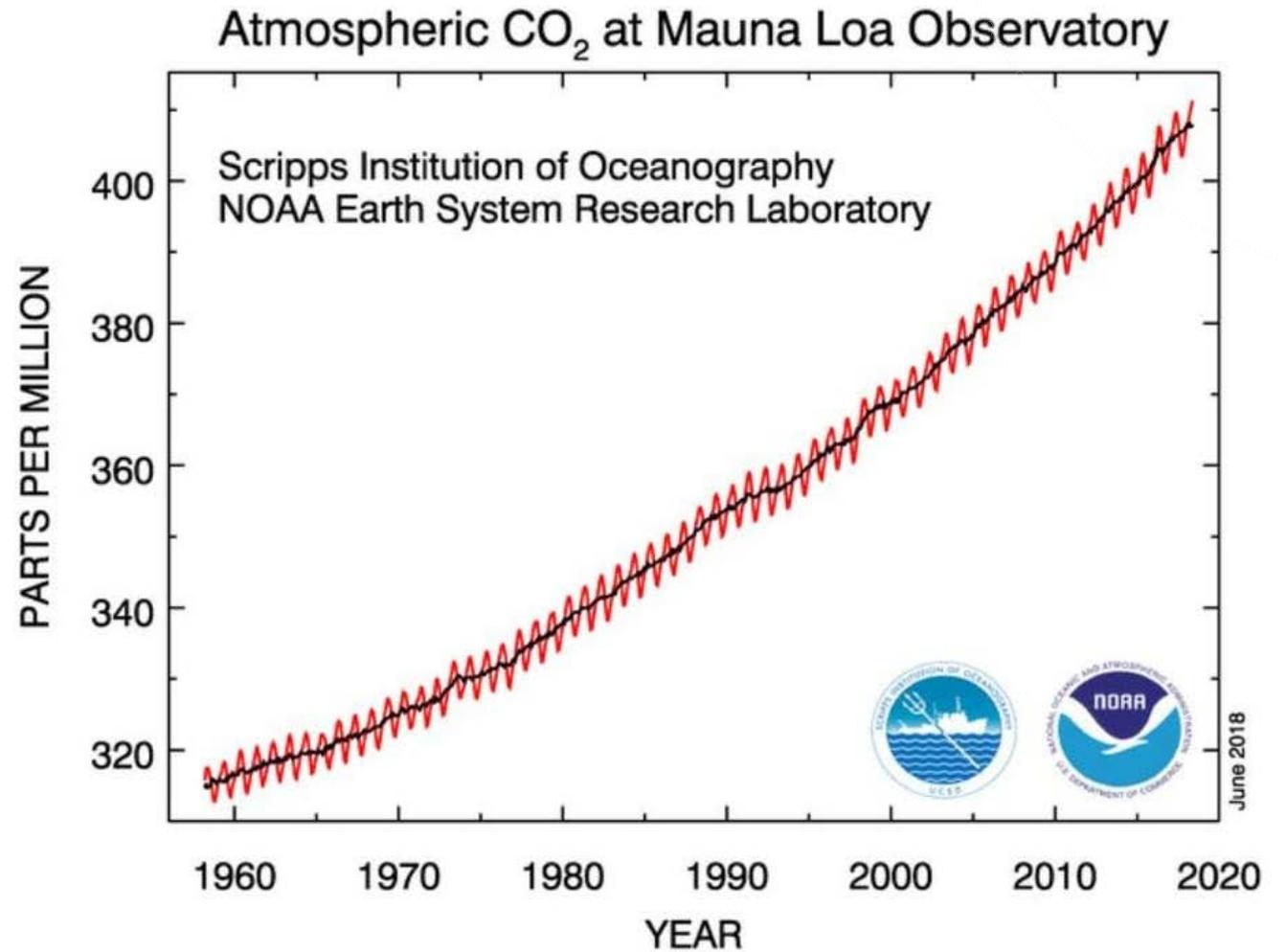


HEITMAN
A REAL ESTATE INVESTMENT MANAGEMENT FIRM



What is “Climate Risk and resilience”?

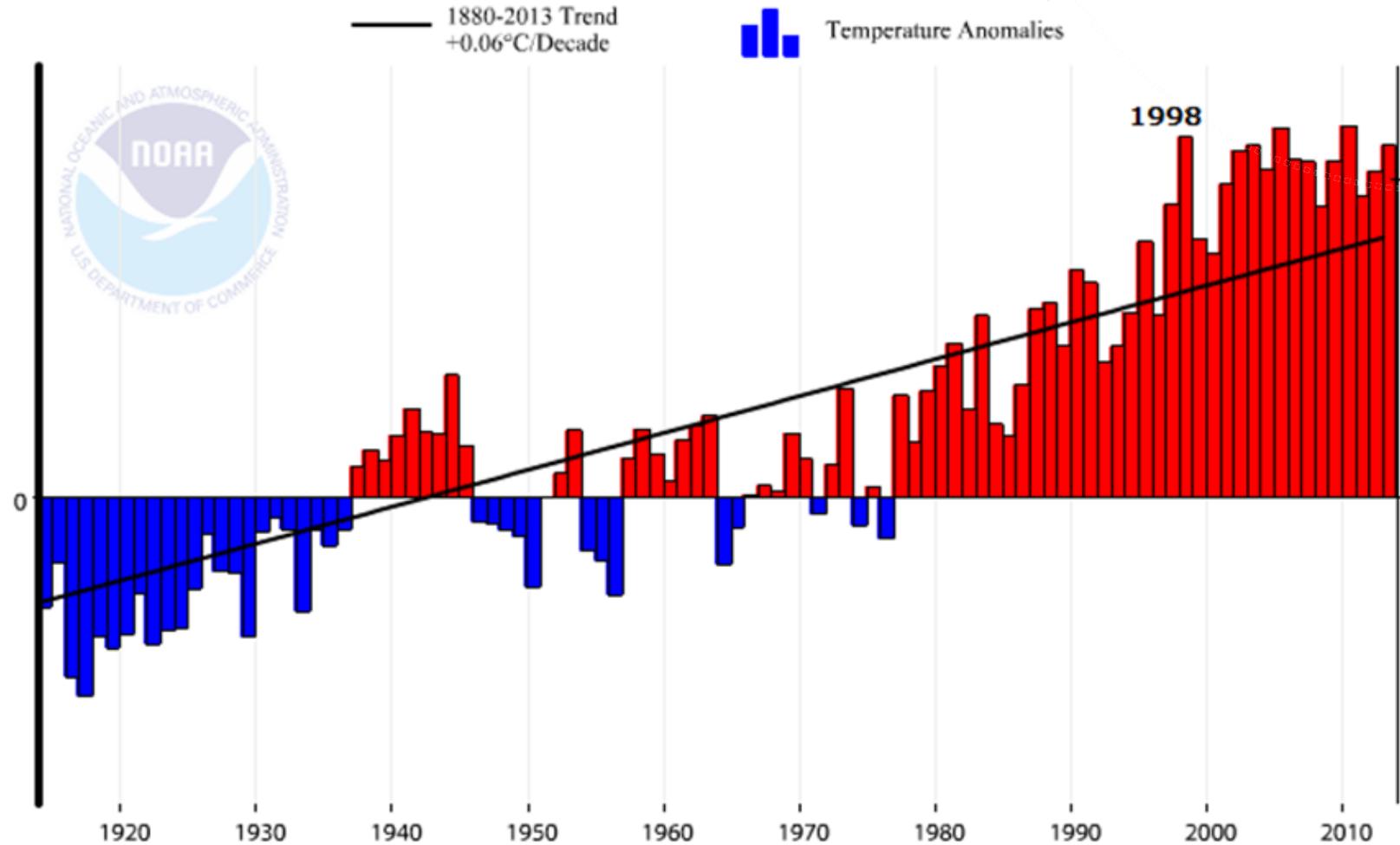
GHG
Emissions
are going
up...



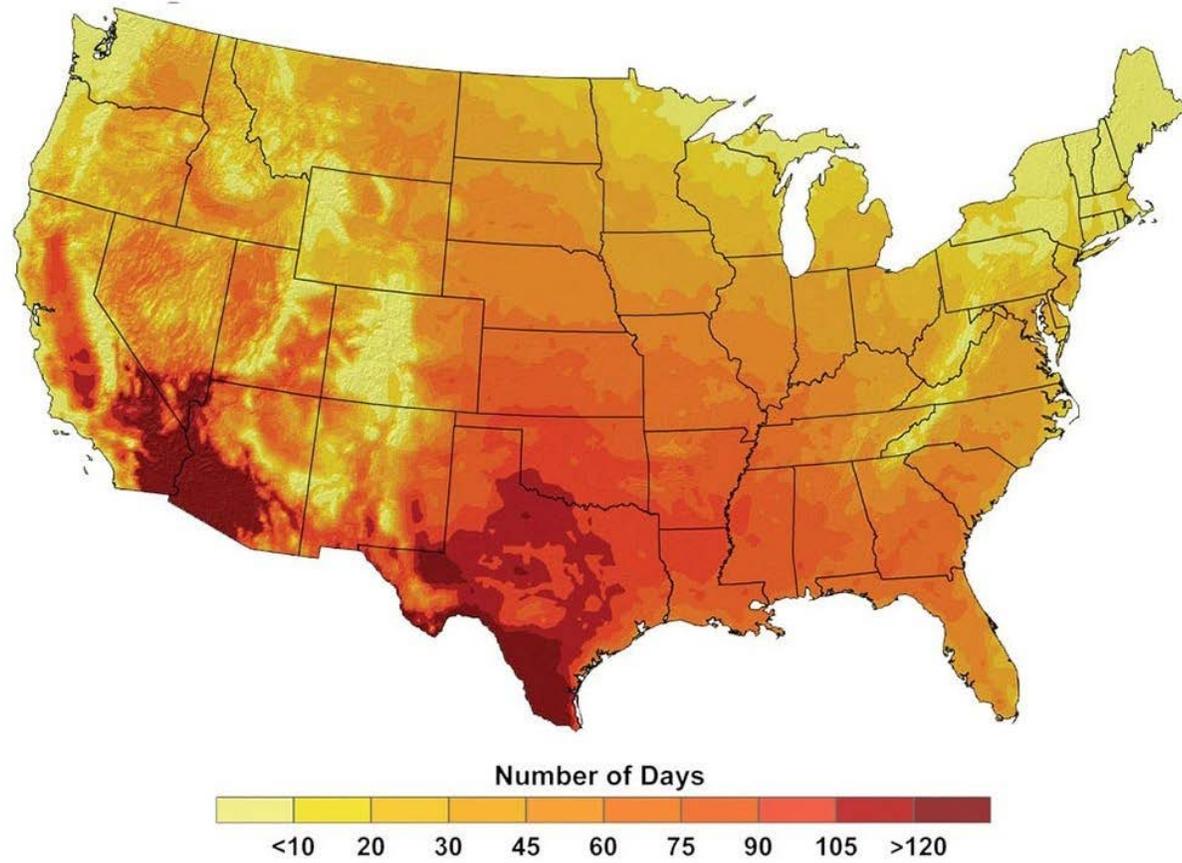
This leads to
higher average
global
temperatures

...

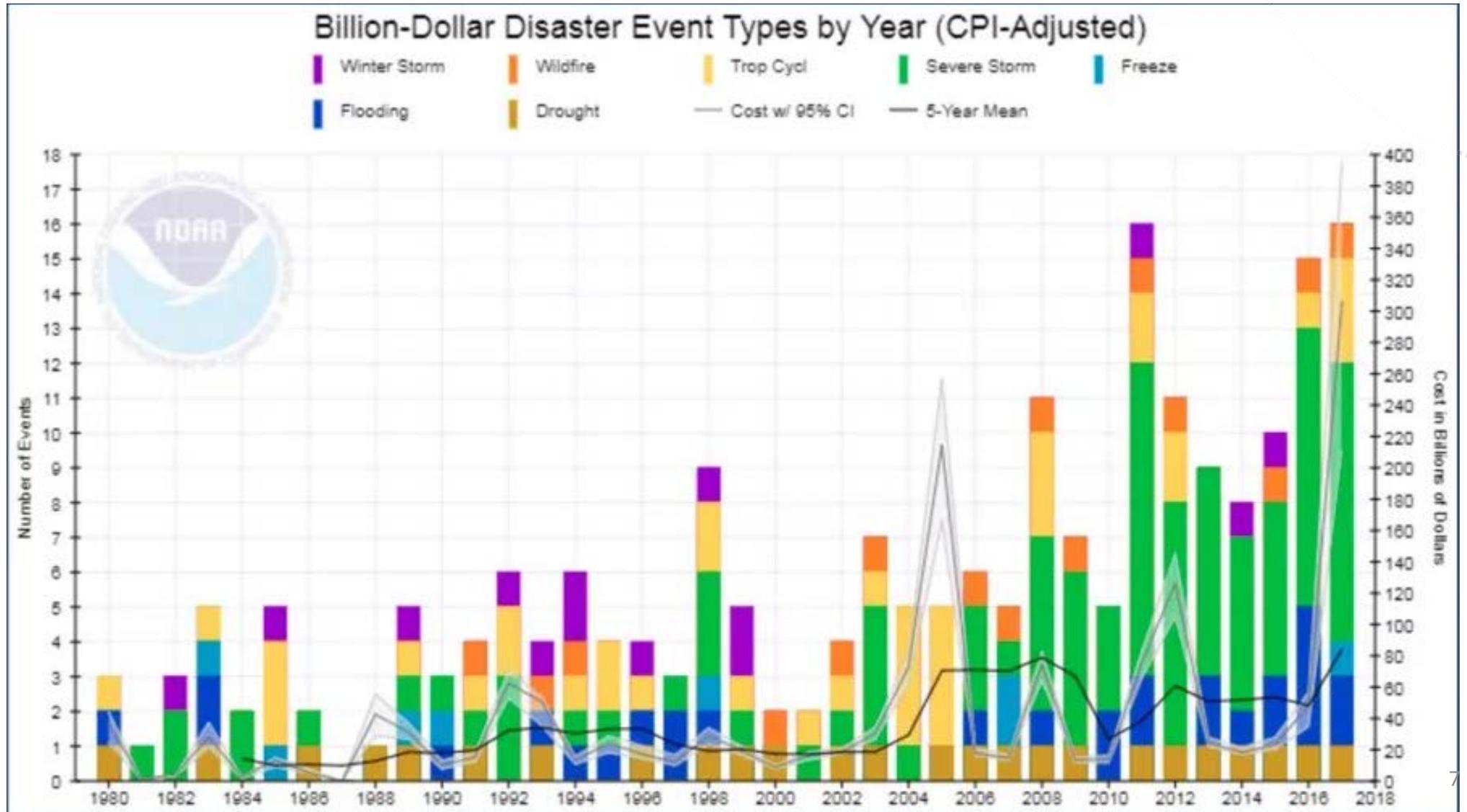
Global Land and Ocean Temperature Anomalies, January-December



Which leads to more frequent and intense extreme weather events...



...and more losses for real estate, insurance, and the public sector from natural disasters



Markets are starting (slowly) to respond



**WE ARE
STILL IN**



Moody's



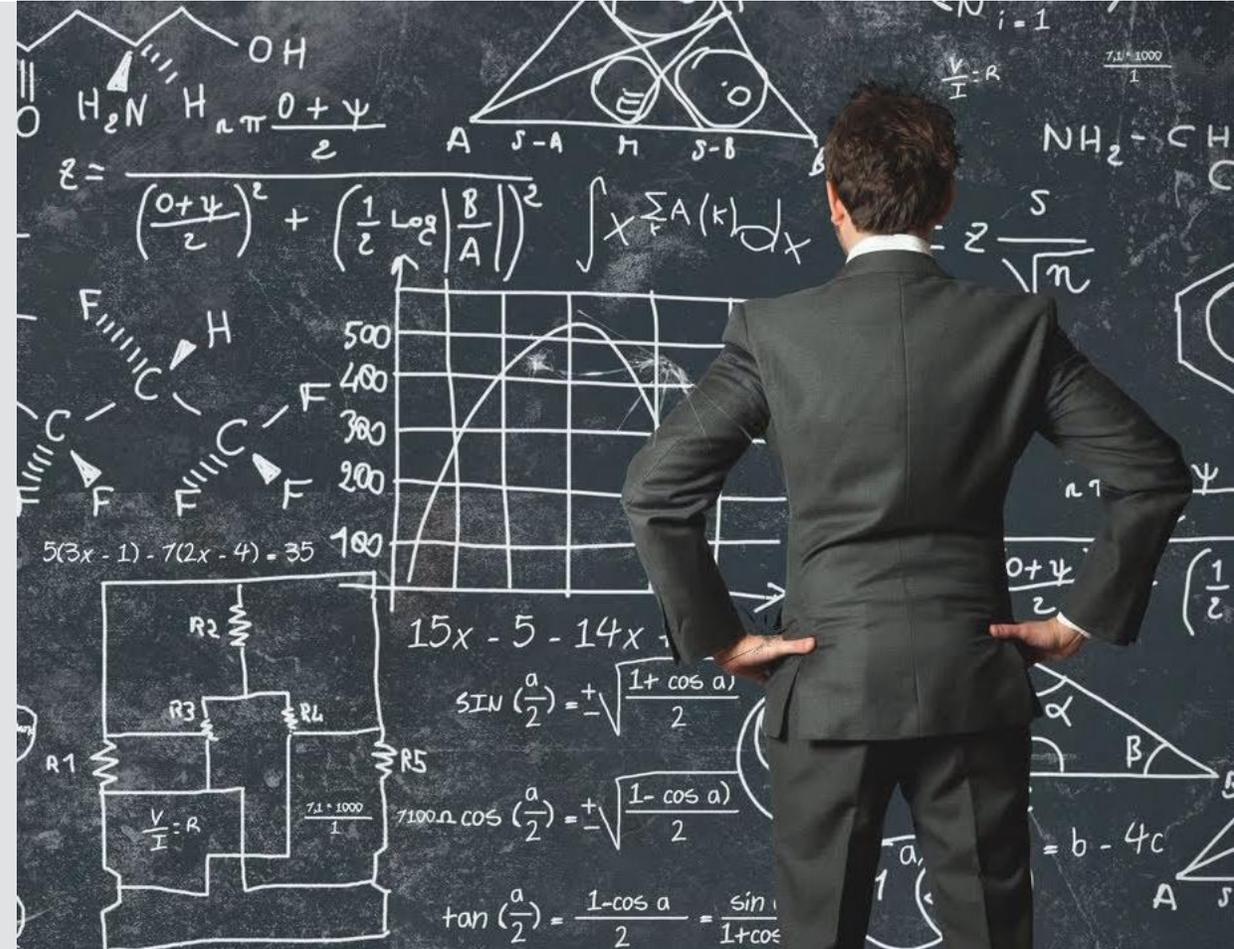
“ A company’s ability to manage environmental, social, and governance matters demonstrates the leadership and good governance that is so essential to sustainable growth, which is why we are increasingly integrating these issues into our investment process.”

Larry Fink, CEO, Blackrock

”

This is important – and complicated

- **Uncertainties** around timeframe, magnitude, and location of short and long term impacts makes planning difficult
- Financial **shocks** (from debt and equity cost and availability to insurance and utilities pricing) may come before biggest physical risks materialize.
- Short and medium-term **investment horizons** and owner/tenant **split incentives** may complicate long-term resilience planning
- **Duty to disclose?** Are you more exposed knowing climate risks (and not sharing) or not knowing risks?



People are already starting to evaluate your climate risk and resilience



Getting started with a climate risk analysis

- What geographic locations present the highest risk?
- Risk is physical and transitional
 - Financial impact of extreme weather event
 - Ability to sell asset at end of hold cycle
- What else is in my risk assessment?
 - Ability and cost of asset to reduce risk through resilient design/retrofit
 - Likelihood public sector will invest in resilience to reduce my event risk
 - Likelihood that insurance will change during my hold cycle



Assessment and mitigation? **Don't** do this

- **Over-react:**

- Leave all coasts immediately
- Invest in hardening assets at any cost
- Pull back on real estate investment altogether

- **Under-react:**

- Avoid assessing risk because its “not material” during your hold cycle
- Avoid talking with insurers and other stakeholders because you are worried they will over-react

- **Think about the following:**

- Better to do this alone (then share with stakeholders) or do it together?
- Better to be quiet (assess, mitigate, engage) or loud (alert, work to get public sector and markets to price it better, then fix it)?

Climate Risk and Real Estate Investment Decision-Making

Laura Craft, Senior Vice President, Global Strategy & Investment ESG

November 2019

HEITMAN

A REAL ESTATE INVESTMENT MANAGEMENT FIRM

Investing today with a focus on tomorrow.

Our investment process is guided by **Environmental, Social and Governance (ESG)** principles. We seek to influence and improve the world in which we live and work, while delivering the investment outcomes our investors require.



\$33.9B
PRIVATE EQUITY



\$2.4B
PRIVATE DEBT



\$5.4B
PUBLIC EQUITY

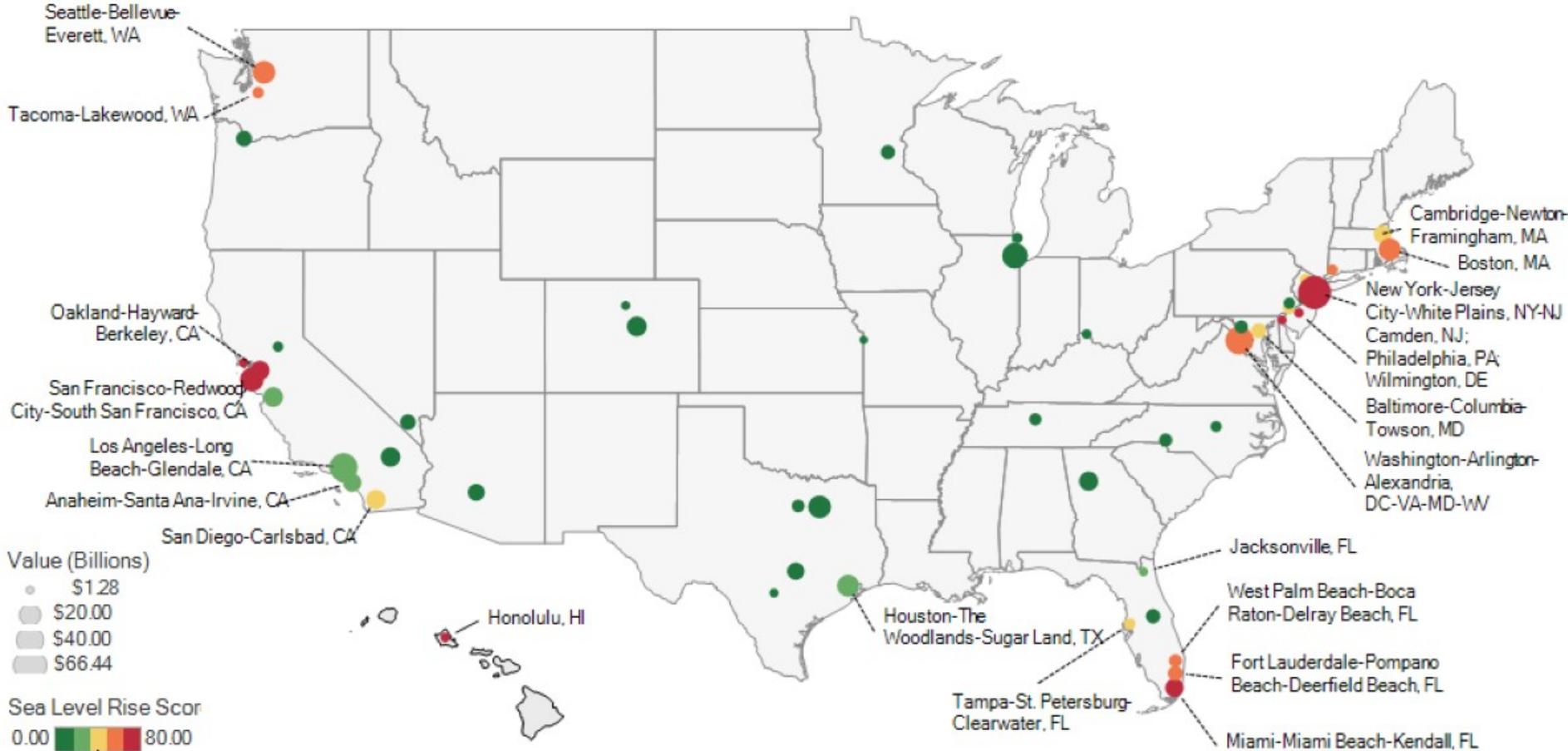


- CHICAGO
- LOS ANGELES
- LONDON
- FRANKFURT
- LUXEMBOURG
- MUNICH
- HONG KONG
- MELBOURNE
- SEOUL
- TOKYO

Gateway Cities Especially Exposed to Climate Risk



TOP 50 NPI METRO AREAS AND DEGREE OF SEA-LEVEL RISE RISK



67%
of NCREIF Property Index value, or
\$360 billion,
is in metro areas whose primary cities are among the
20% most exposed
to sea-level rise in the United States.

Source: Heitman and ULI, with analytical support from Four Twenty Seven



Sustainability vs. Resiliency



Findings from existing literature, interviews with 25 investors and investment managers, and case studies of a range of practices and activities taking place across the industry.

TYPES OF CLIMATE RISK AND THEIR POTENTIAL IMPACT ON REAL ESTATE

	Category	Potential Impact
Physical risks	Catastrophic events Extreme weather such as hurricanes and wildfires.	<ul style="list-style-type: none"> • Costs to repair or replace damaged or destroyed assets; value impairment • Property downtime and business disruption • Potential for increased insurance costs or reduced/no insurance availability
	Changes in weather patterns Gradual changes in temperature and precipitation—such as higher temperatures, rising sea levels, increasing frequency of heavy rain and wind, and decreased rainfall—which are likely to exaggerate the impact of catastrophic events.	<ul style="list-style-type: none"> • Increased wear and tear on or damage to buildings, leading to increasing maintenance costs • Increased operating costs due to need for more, or alternative resources (energy and/or water) to operate a building • Cost of investment in adaptation measures, such as elevating buildings or incorporating additional cooling methods • Potential for increased damages from catastrophic events • Potential for increased insurance costs or reduced/no insurance availability
Transition risks	Market The possibility that markets vulnerable to climate change will become less desirable over time. Rising capital costs to pay for building and maintaining infrastructure to manage climate risks.	<ul style="list-style-type: none"> • Reduced economic activity in vulnerable markets • Reduced occupier demand for properties • Reduced asset value • Potential for increased real estate taxes
	Policy and regulation Regulations to address climate change—e.g., climate risk disclosure, tougher building standards, carbon pricing, emissions caps, changes to subsidies—as well as changing policies for providing funding for infrastructure or rebuilding after major events.	<ul style="list-style-type: none"> • Increased cost of doing business due to new disclosure requirements and compliance measures • Increased taxes—both those resulting from public policies such as carbon taxes and those for funding adaptation infrastructure • Loss of subsidies or other funding opportunities • Additional capital investment to comply with stricter regulation
	Resource availability Changes in the availability of key resources such as energy and water, including water scarcity.	<ul style="list-style-type: none"> • Increased costs and reduced net operating income due to higher prices for water and energy • Additional capital expenditures to adapt buildings to operate with reduced/alternative resources
	Reputation and market position Growing stakeholder preference to work with companies incorporating climate risk into investment decisions, and consumer preference for real estate products incorporating climate mitigation.	<ul style="list-style-type: none"> • Risk to company brand and reputation if no action taken • Lower liquidity and/or reduced attractiveness of assets that have not incorporated climate mitigation

CLIMATE RISKS

Physical risks

- Catastrophic events
- Changes in weather patterns

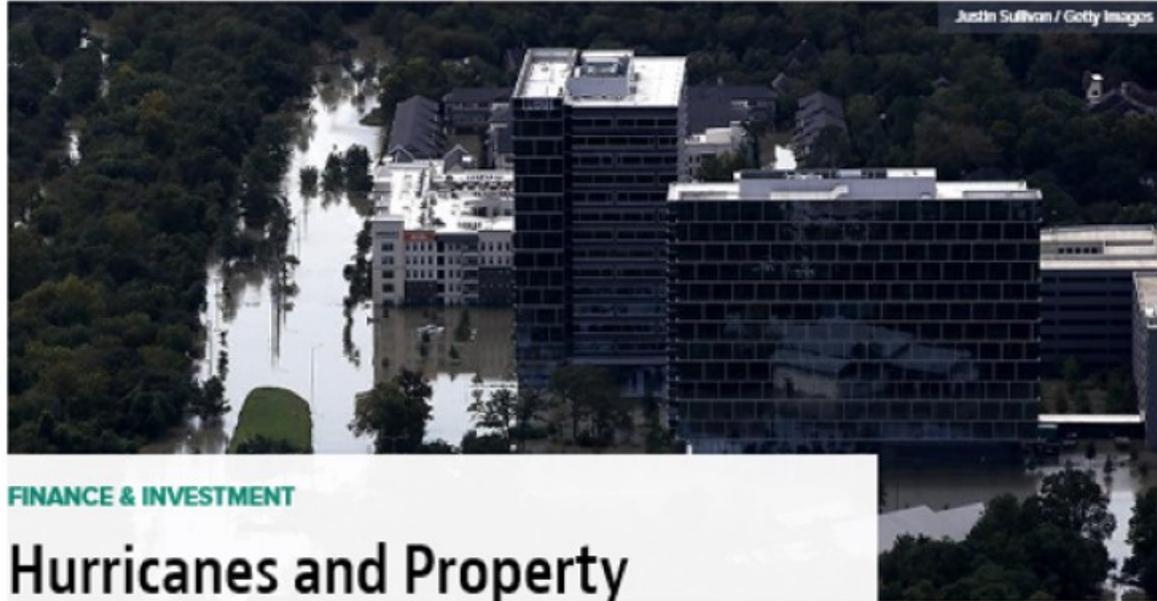
Transition risks

- Market
- Policy and regulation
- Resource availability
- Reputation and market position

Mismatch: 1-year insurance horizon vs. 5- to 20-year investment horizon



VIEWPOINTS



FINANCE & INVESTMENT

Hurricanes and Property Values: The Impact May Be Longer Than You Think

A NCREIF and National Hurricane Center study found that, for all property types, a hurricane **decreased values by almost 6%** one year after the storm hit, and by **10.5% after two years.**

Dangers Range from Event Risks to Long-Term Existential Threats



**PHYSICAL
DAMAGE**



**INSURANCE
PREMIUM
REPRICING**



**TAX INCREASES
TO FUND
INFRASTRUCTURE**



**INVESTMENT
LIQUIDITY
REDUCED**



**ECONOMIC &
DEMOGRAPHIC
DAMAGE**



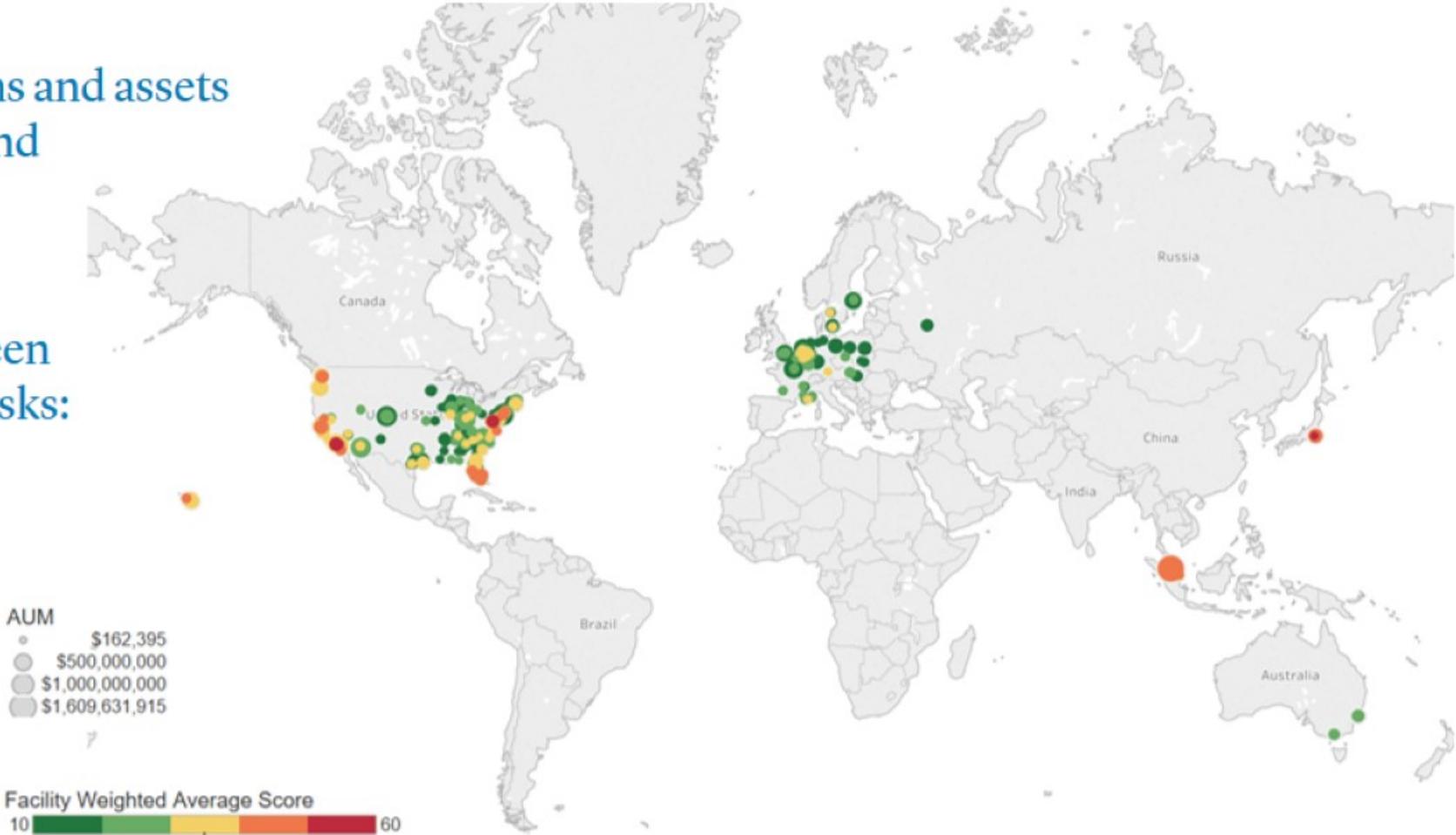
**ABANDONMENT
OF RISKIEST/
LEAST-RESILIENT
LOCATIONS**

PROPERTY RISK SCREENING

Heitman screens new acquisitions and assets under management on climate and environmental locational risks through Four Twenty Seven

Each asset receives a score between 0-100 for each of the following risks:

- Flood
- Hurricanes / Typhoons
- Sea-level rise
- Water stress
- Heat stress
- Earthquakes
- Wildfires (2019)





Initial Review

Identify climate risk exposure, insurance premiums, and real estate taxes



Due Diligence

For high risk, additional climate analysis and property assessment for capital expenses



Residual Value / Disposition

Higher sensitivity for at-risk properties, and upon exit, potentially a limited buyer pool/less demand

Climate risks can cause increased investment by landlord and potentially decreased demand from investors and tenants

PHYSICAL RISKS <ul style="list-style-type: none">- Earthquake- Hurricane- Flood- Wildfires- Storm surge/sea-level rise- Heat stress- Water stress	TRANSITION RISKS <p>Capital Markets</p> <ul style="list-style-type: none">- Reduced investor interest <p>Rental Revenue</p> <ul style="list-style-type: none">- Reduced occupier demand <p>Operating Expenses</p> <ul style="list-style-type: none">- Increased operating expenses (maintenance and resource costs)- Increased insurance- Increased real estate taxes <p>Capital Improvements</p> <ul style="list-style-type: none">- Increased capital expenditures
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APARTMENT FINANCIALS

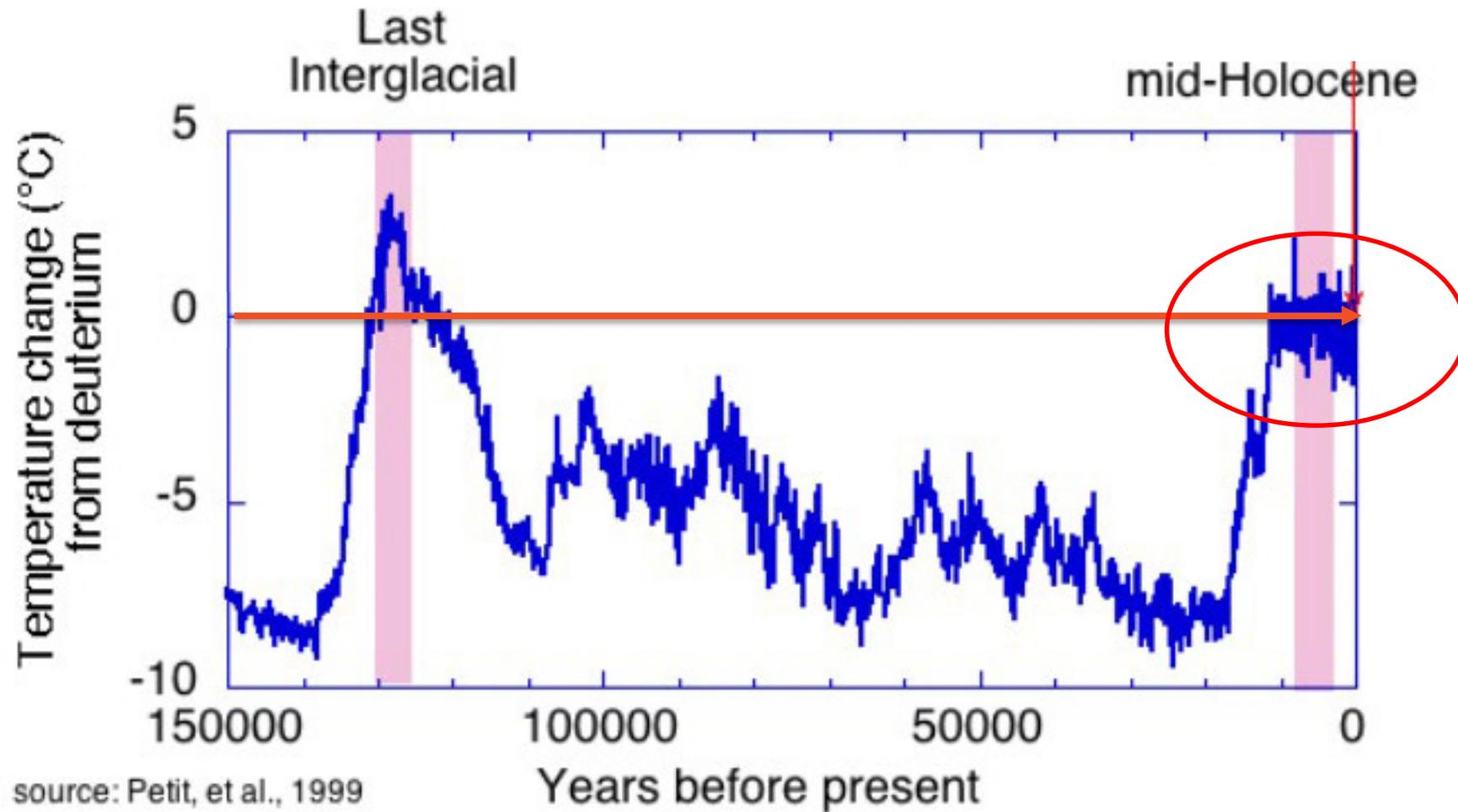


Climate Change Considerations for Real Estate

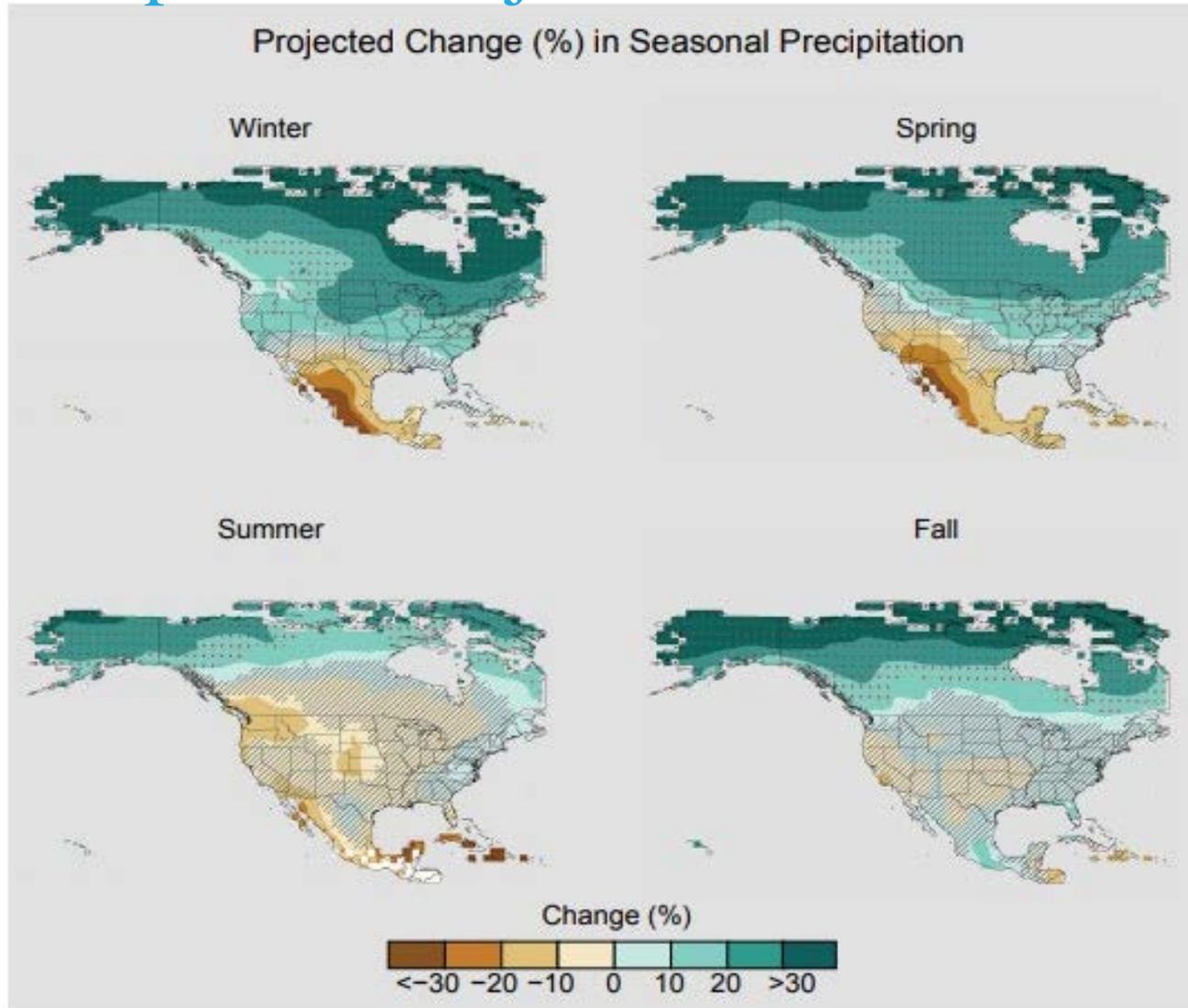


Lisa Dickson, PG
Resilience Leader, Americas

The 10,000 Year Hall Pass



Precipitation Projections



In general:

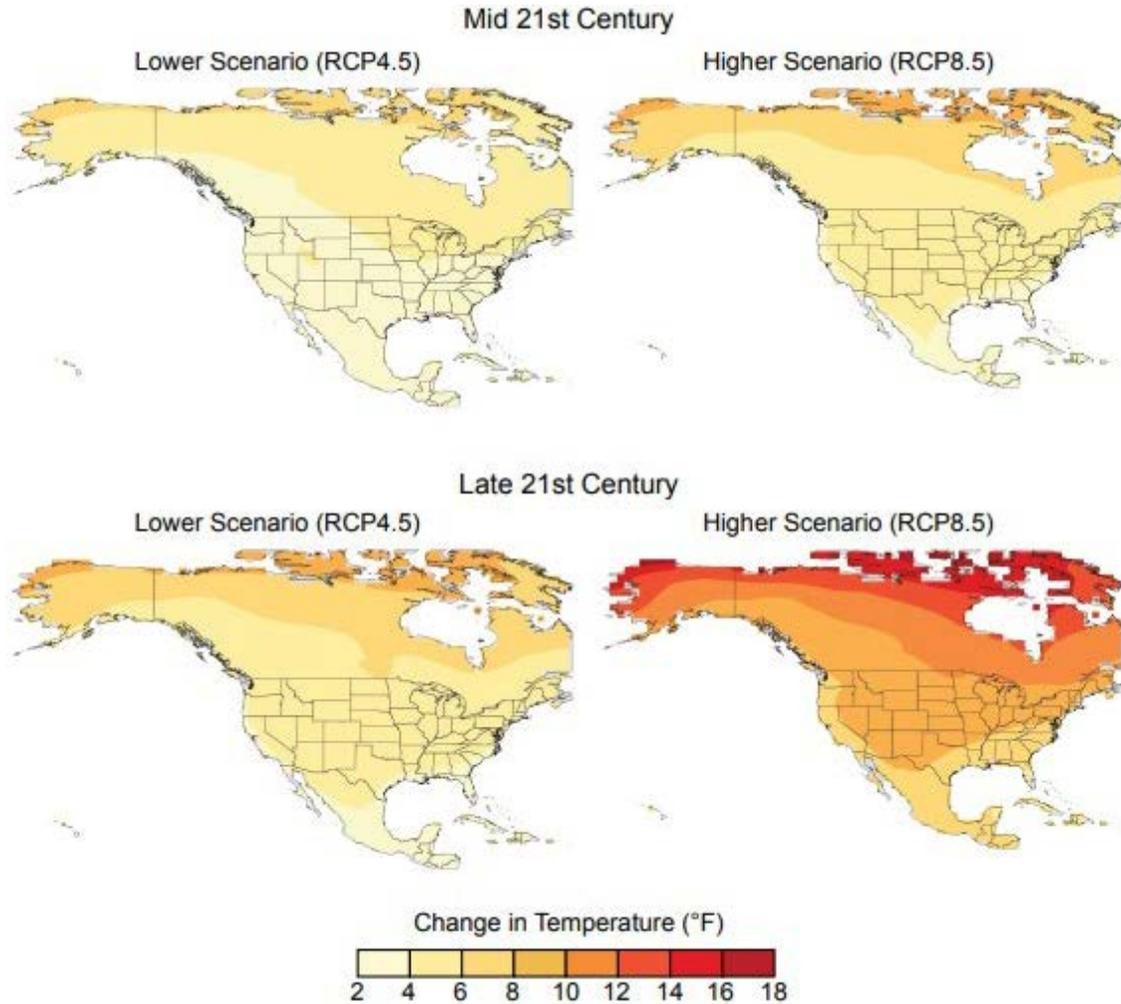
Wet places get wetter and dry places get drier

BUT

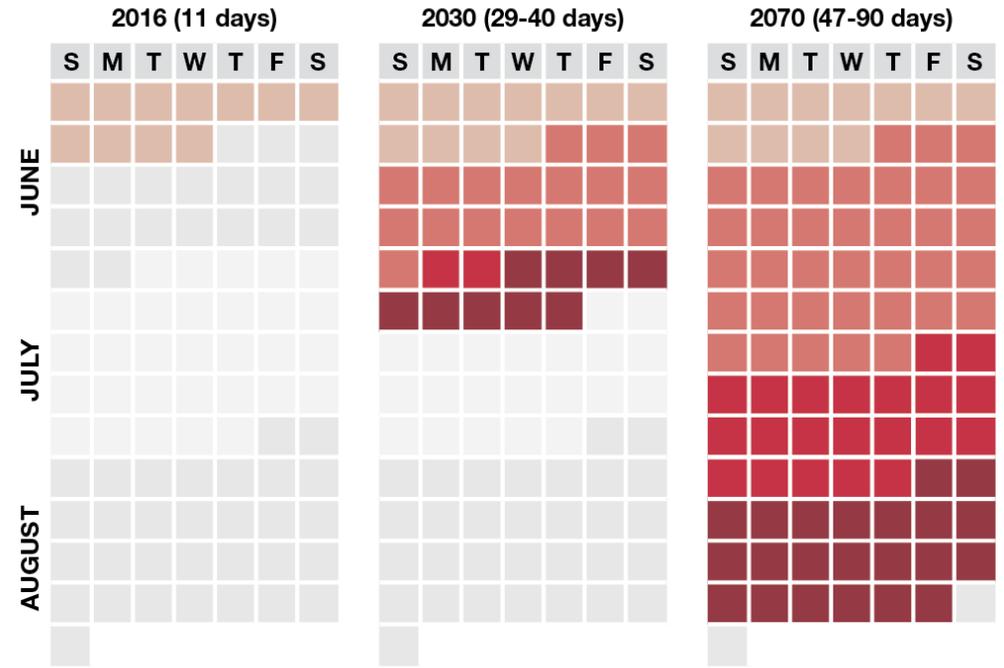
Not evenly throughout the year...

From NCA 2018

Temperature Projections



From NCA 2018

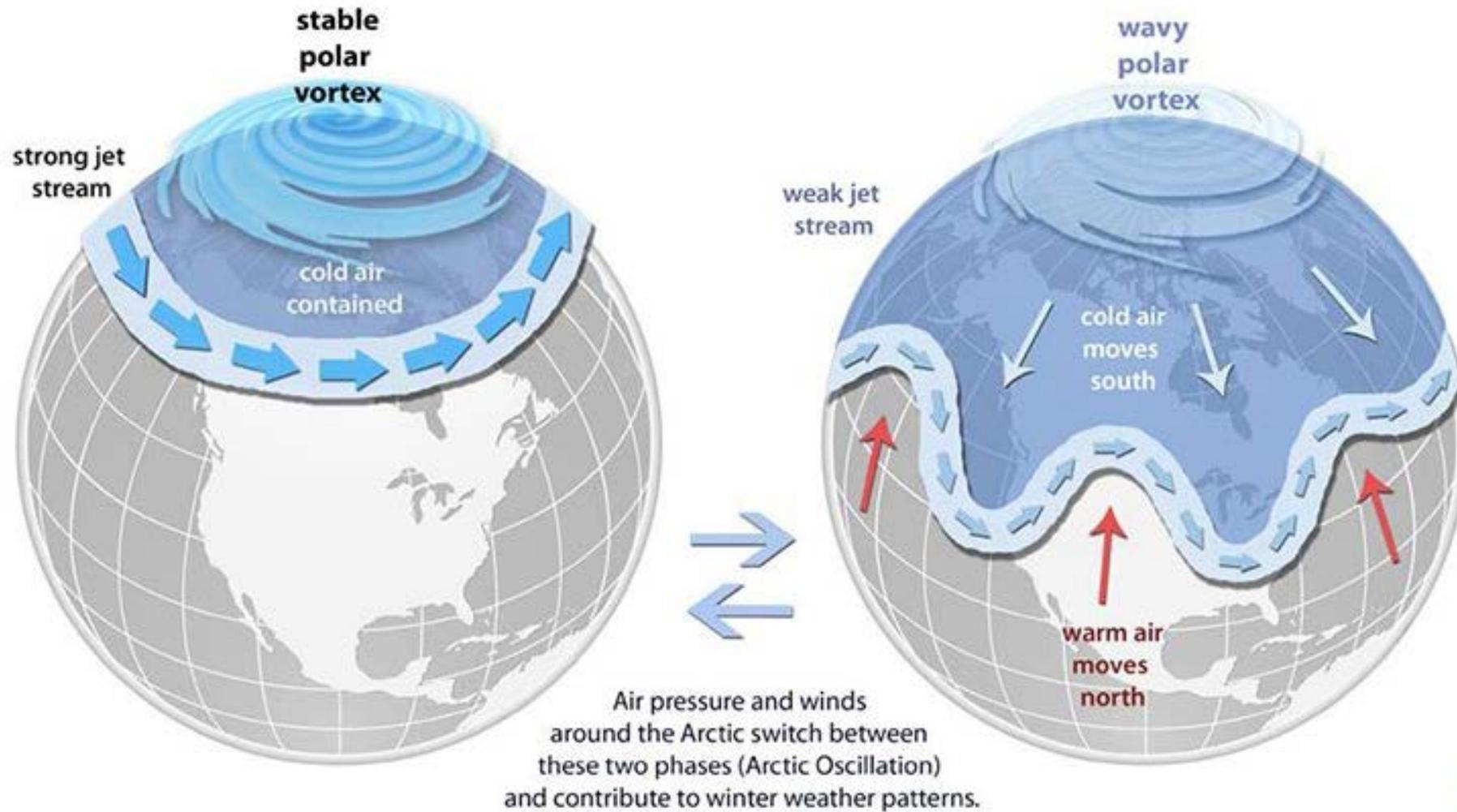


Days Above 90° F

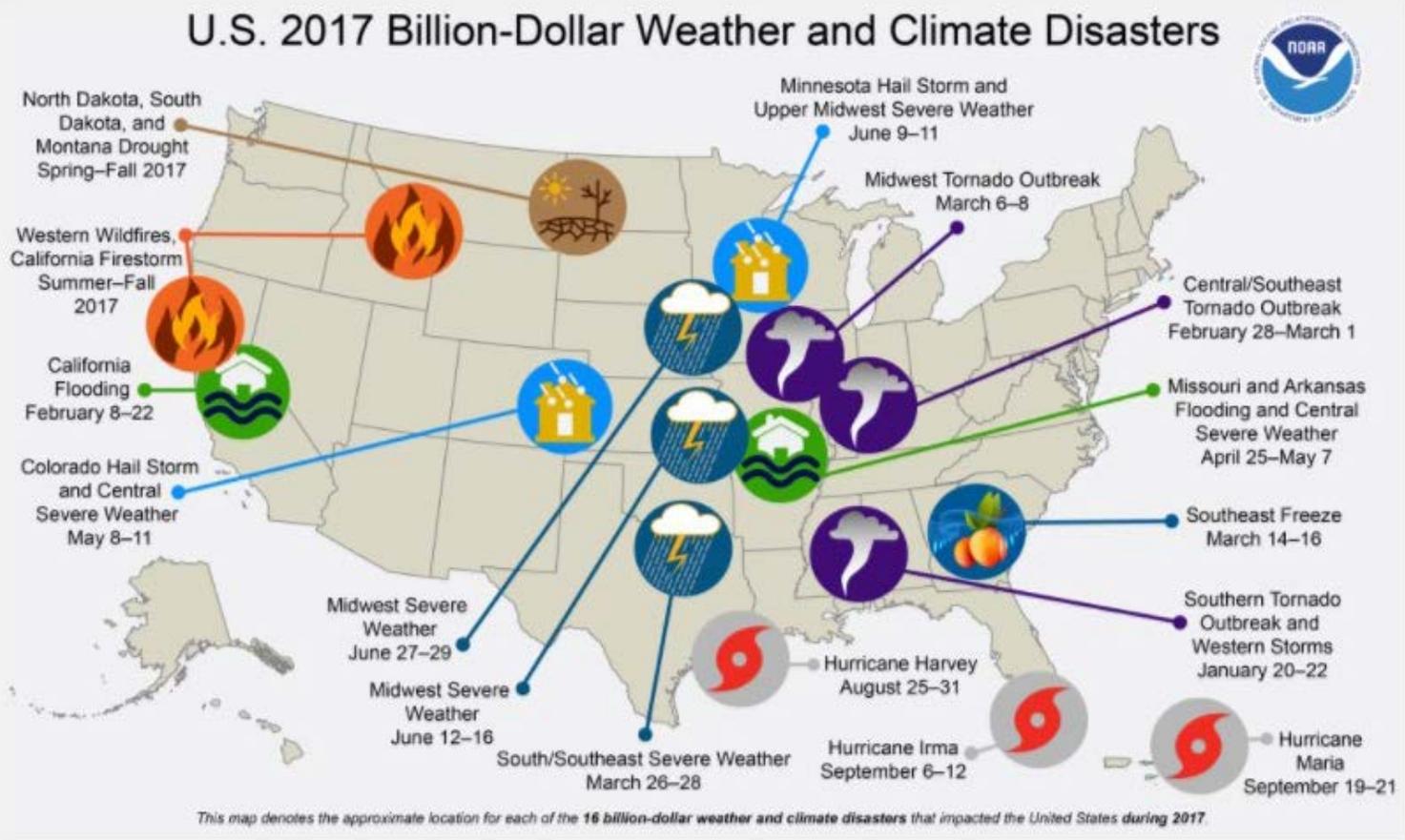
- [Lightest] Current Day
- [Light Red] Low Emissions Scenario (Hayhoe)
- [Medium Red] High Emissions Scenario (Hayhoe)
- [Dark Red] High Emissions Scenario (Rossi)

Sources: Arup; Climate Ready Boston 2016 & Weathershift

Polar Vortex – Extreme Cold



The Economics of Climate Change



Cost to US GDP
\$3.9
trillion by 2025

Lost Business Sales
\$7
trillion by 2025

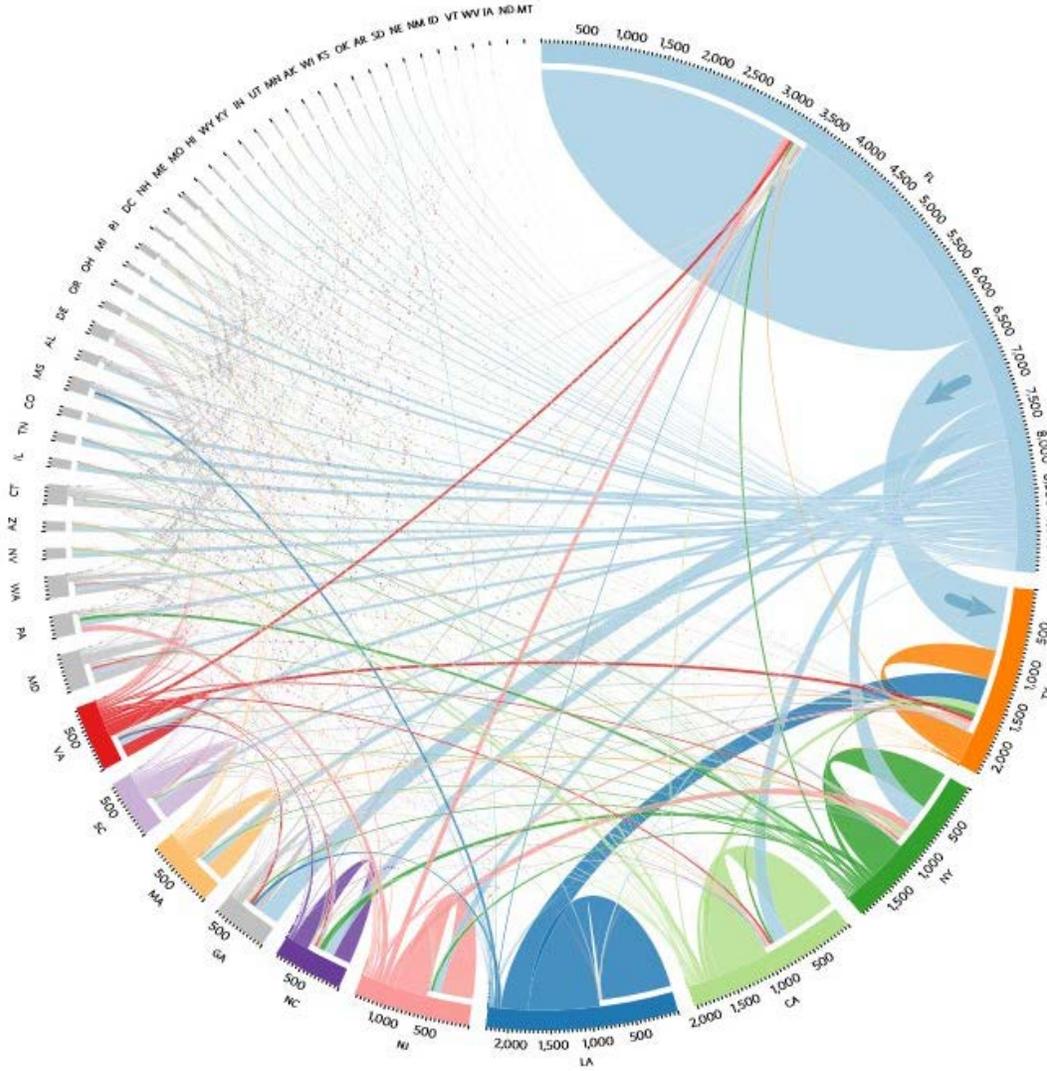
Lost Jobs
2.5
million jobs in 2025

Cost to Families
\$3,400
per year

Globally:
\$54 trillion
in
damages
as early as
2040

Sources: NOAA; ASCE; IPCC

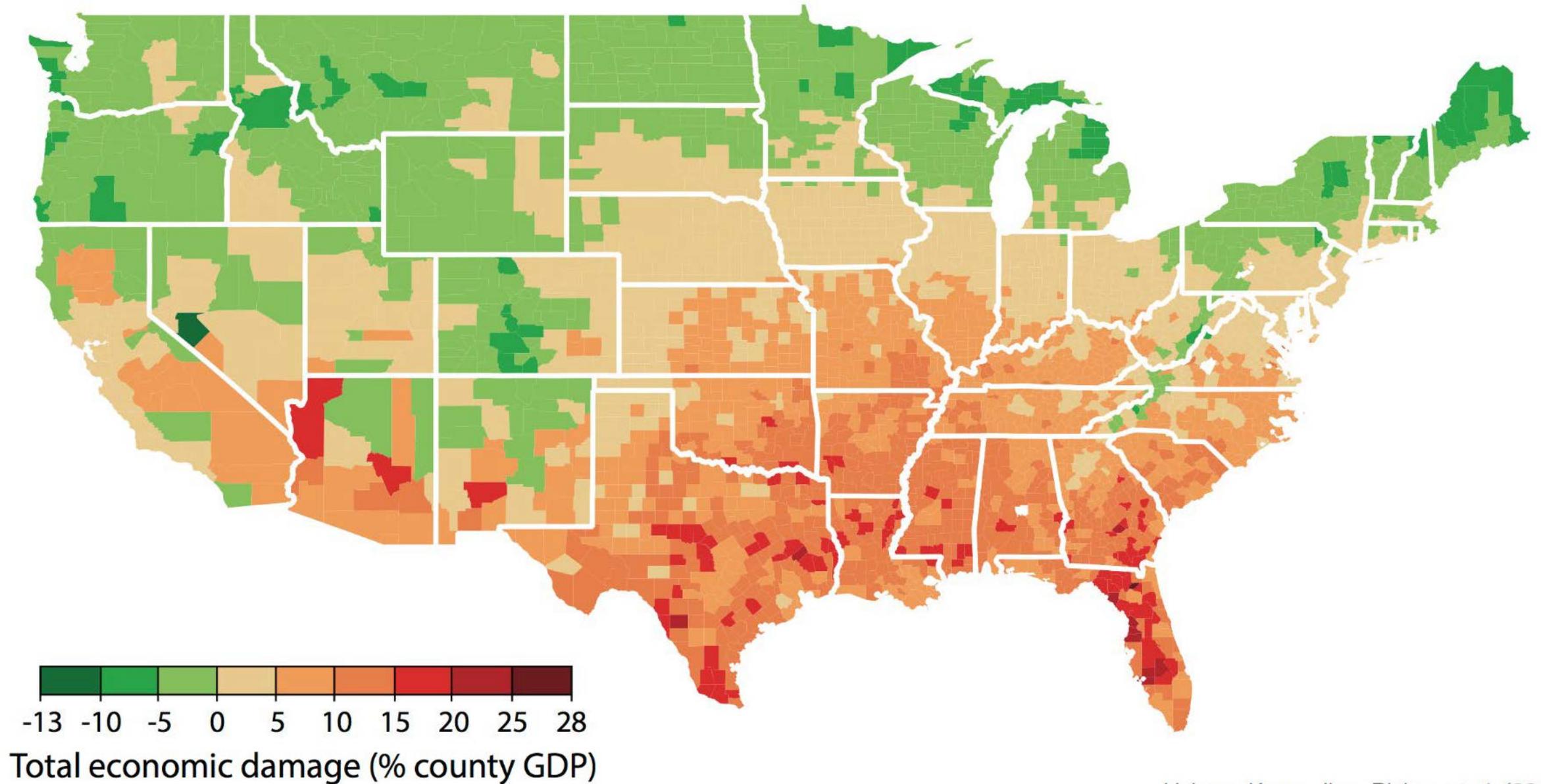
Projected Climate Migration within the US by 2100



Top ten **outflow** states

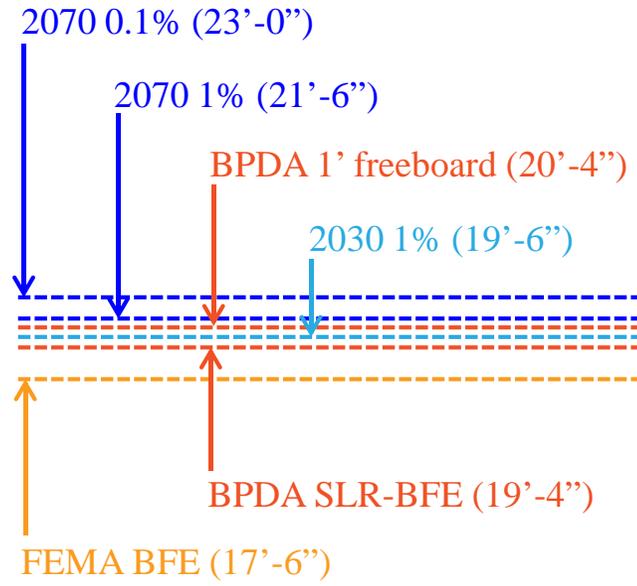
- Florida
- Texas
- New York
- California
- Louisiana
- New Jersey
- North Carolina
- Georgia
- Massachusetts
- South Carolina
- Virginia

Economic Impacts of Climate Change (2080-2099)

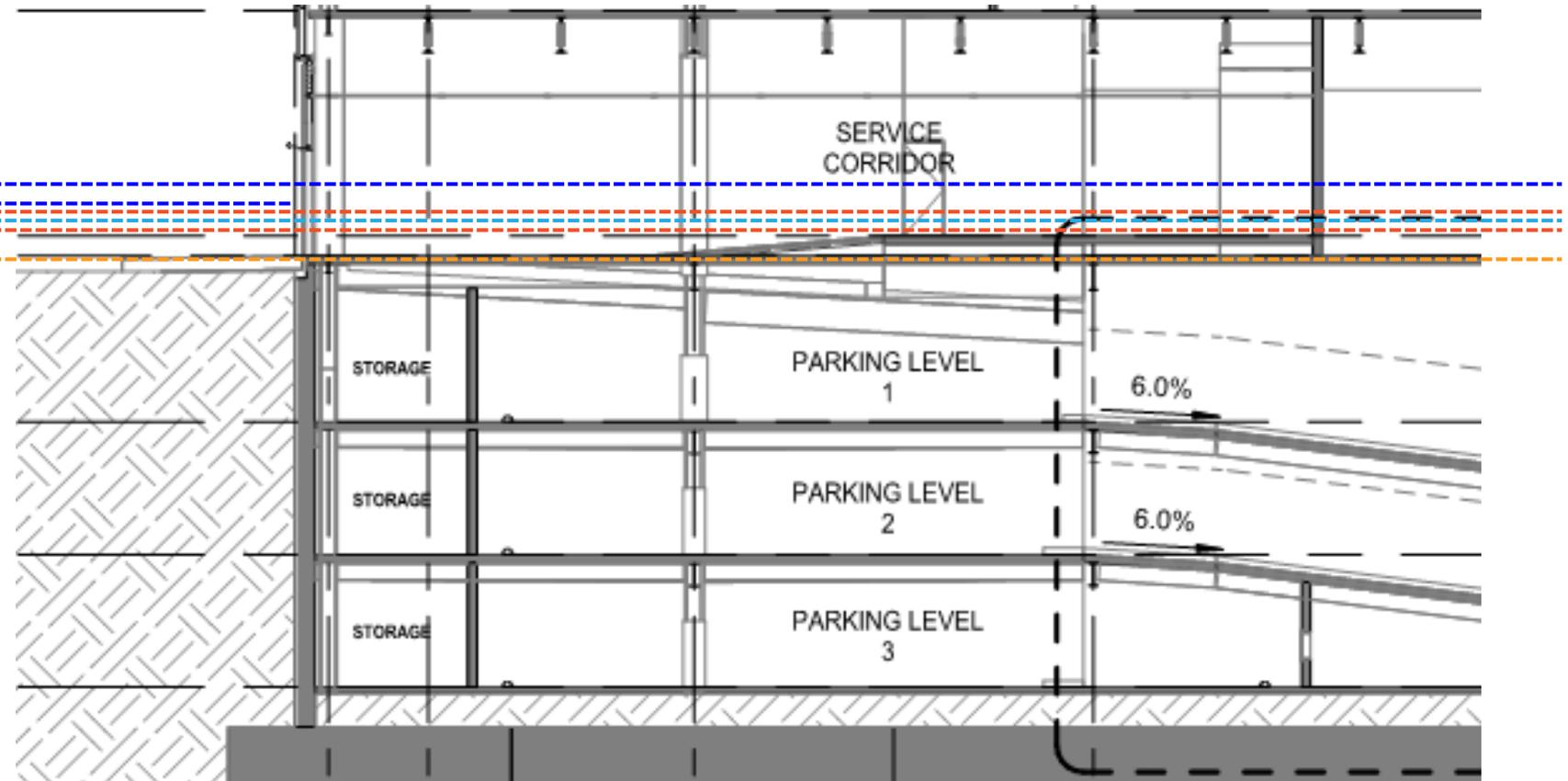




Direct Physical Impacts



Include recent flood events

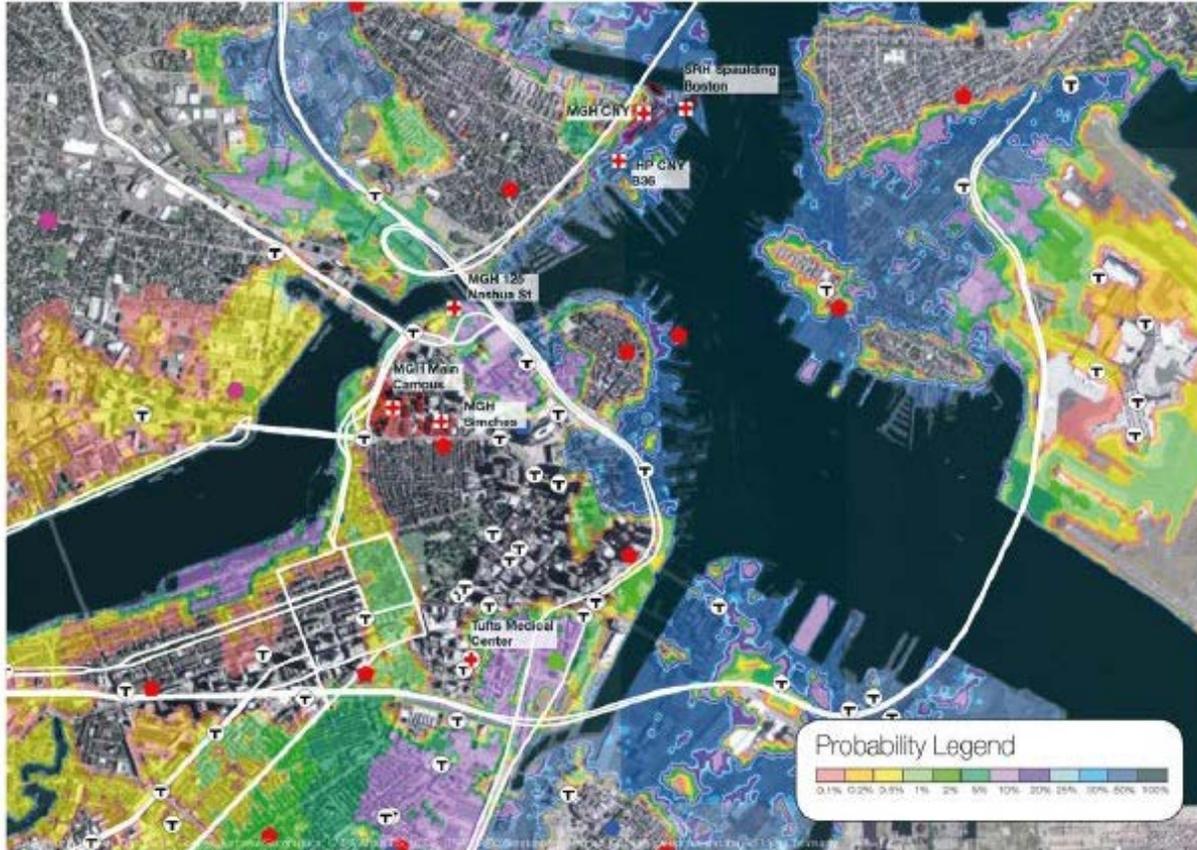


All elevations are assumed to be in Boston City

Base

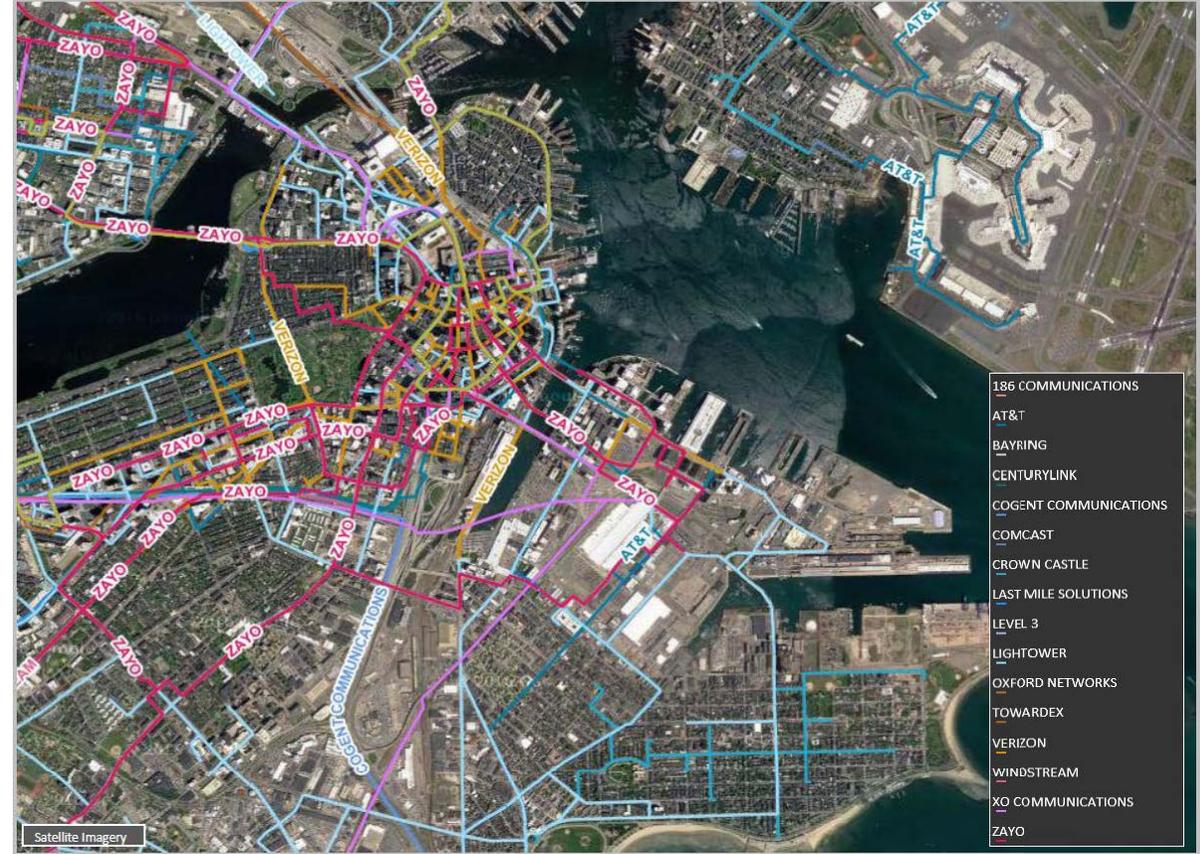
“Outside the Fence” Vulnerabilities

Flooding and Transportation Systems



Telecommunications

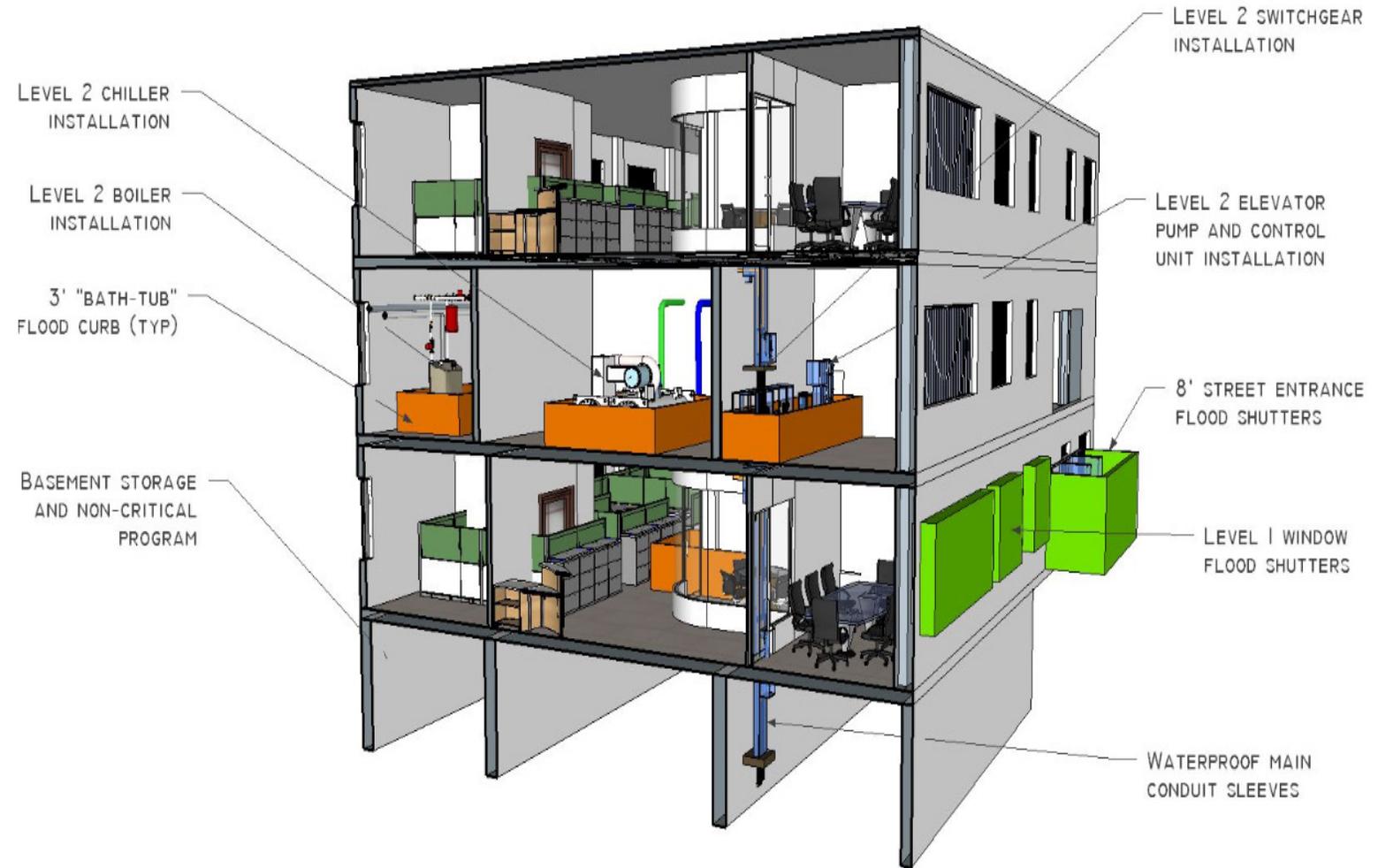
Boston “2 Mile” View – Carrier Fiber Routes



GEOTEL

What is the ROI of preparing for extreme weather?

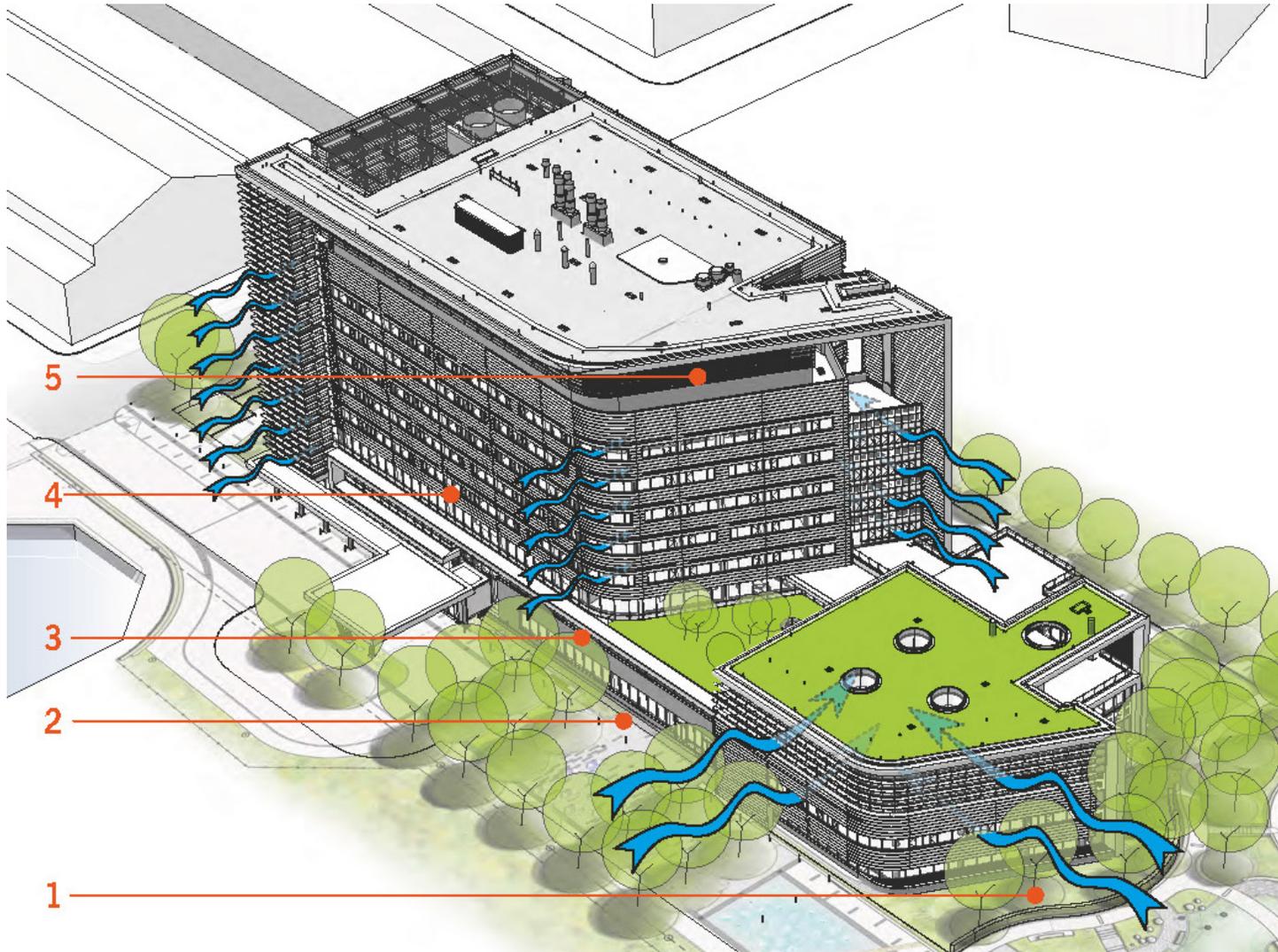
- \$1 invested in building resilience and reducing exposure saves \$4 in disaster response and recovery
- \$1 invested in resilience saves \$4-7 in response and \$5-10 in avoided economic losses
- \$1 on disaster risk reduction saves \$7 in response activities
- \$1 on disaster preparedness saves \$7-10 on response



• \$1 in preparedness is worth \$15 in disaster relief

Overall ROI equals \$3-15 per dollar invested over a 30 year period.

The upfront costs of resilience



1. Planting and retaining walls act as protective reef against storm surge
2. Ground floor and top of parking set at 19'-0", above high flood level
3. Critical patient programs located above ground floor
4. Operable windows keyed open in event of systems failure
5. Mechanical, electrical and emergency services located within enclosed penthouse out of harm's way.

Credit: Perkins + Will and Partners Healthcare

Climate gentrification and the role of flood insurance in South Florida

CCIM-ULI Webinar

John W. Rollins, FCAS, MAA
Consulting Actuary, Milliman



What is “climate gentrification”?

And what does it mean for local economies, families, and community leaders?

- Potential migration from low-lying but socioeconomically affluent areas to areas of higher elevation but greater socioeconomic challenges
- Homeowners make long-term commitments to property ownership to raise families, build wealth, and set social roots
- But the same homeowners are increasingly aware of climate-related changes in physical hazard, such as sea level rise and increased tropical storm precipitation, that manifest in unpredictable increases in flood and storm surge risk in South Florida
- Key questions for leaders and planners:
 1. *How might hazard increases affect the desirability of living in various communities in a metropolitan area?*
 2. *Does insurance play a role, and what incentives does it create?*
 3. *How do we manage the socioeconomic impact of these trends?*

Defining the risk

South Florida is one of many “climate crucibles” in the U.S.

Multiple challenges set up the region for potential gentrification

Key elements of a climate crucible:

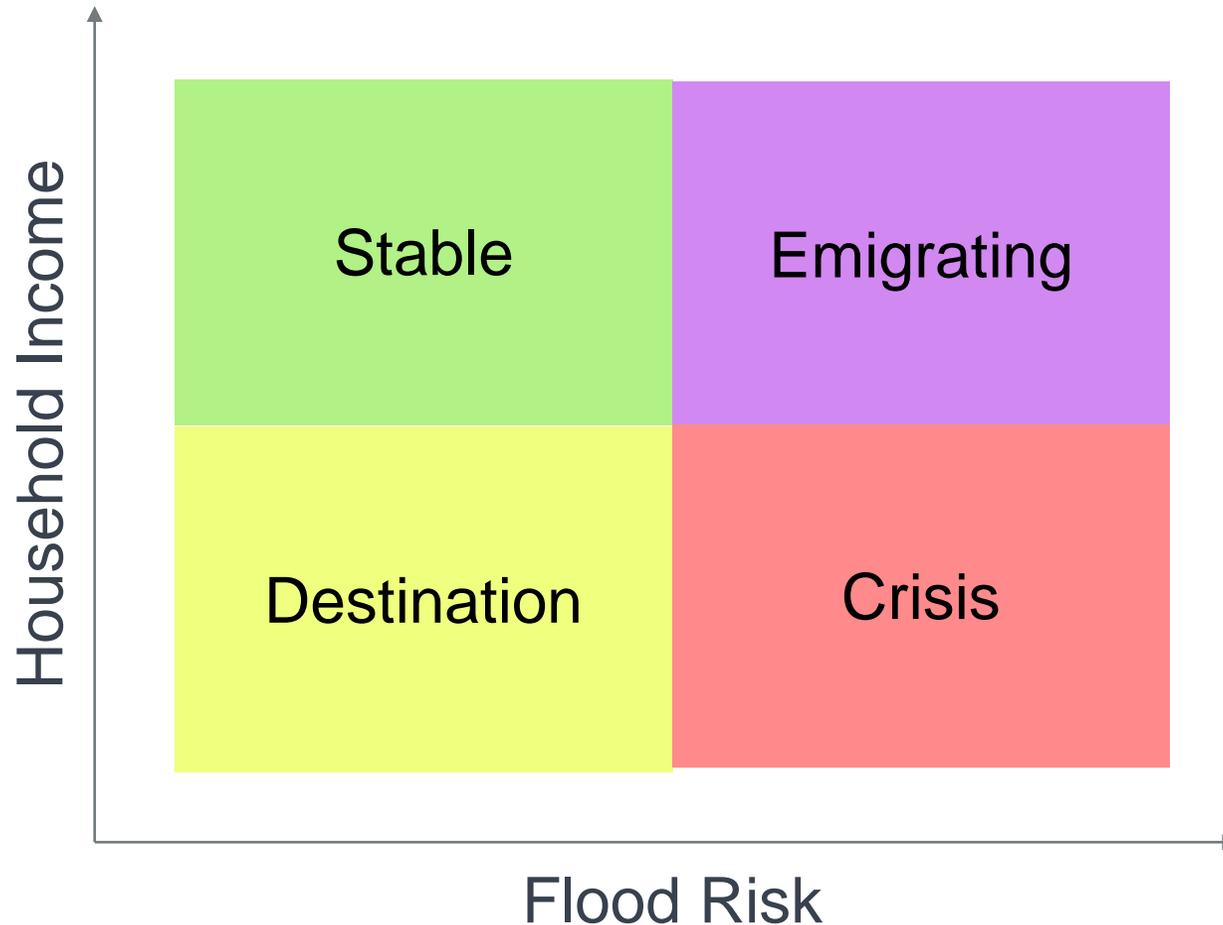
- A mostly urban, highly populated area
- A wide range of income levels
- An area with well-mapped local hazards (e.g. floods from rainfall and storm surge)
- An area seeing a documented increase in hazard due to climate (e.g. sea level rise)

Climate-adjusted hazard risk is a huge problem, so leaders should systematically define and prioritize the crucibles, says Milliman in <http://www.milliman.com/insight/2019/Climate-gentrification-and--the-role-of-flood-insurance/>



How variable are regional socioeconomics and flood risk?

A quadrant framework helps think about the various household risk profiles



Four approximate profiles defined by Milliman:

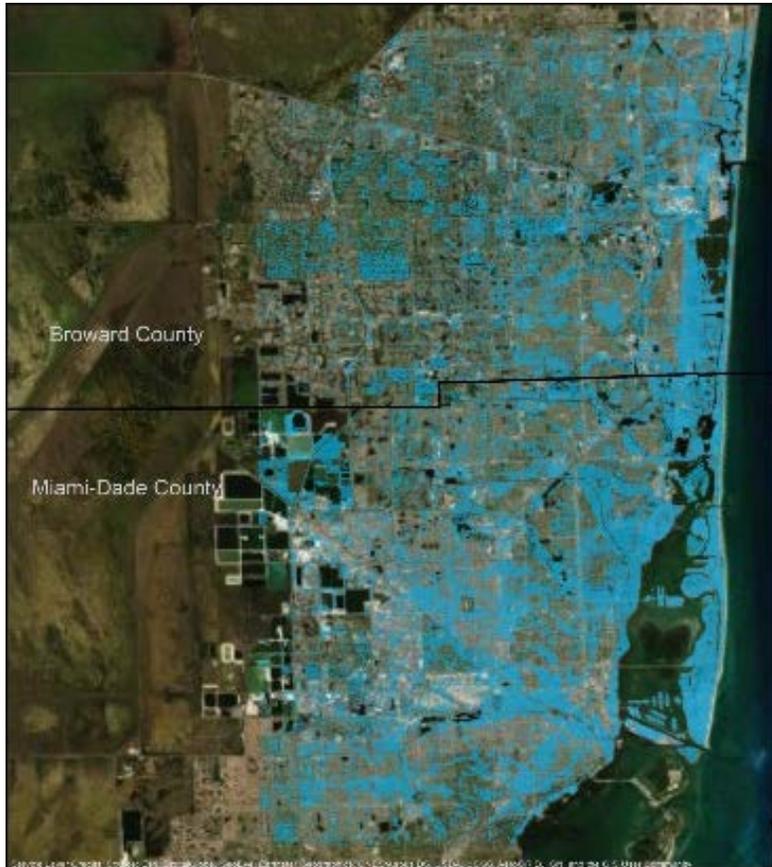
- **Stable** areas are Census Block Groups that are not in the bottom 25% of household income for the region, and do not have the majority of land area inundated in a flood with a 1% annual chance in a scientifically plausible sea level risk scenario for the year 2050, as defined by our collaborator*.
- **Emigrating** areas have higher incomes like the Stable areas, but will be inundated in the same climate-adjusted flood scenario.
- **Destination** areas stay dry in the climate-adjusted flood, but have incomes in the bottom 25%.
- **Crisis** areas will be inundated in the climate-adjusted flood scenario, AND have lower incomes.

* We worked with **Jupiter Intelligence** on this project.

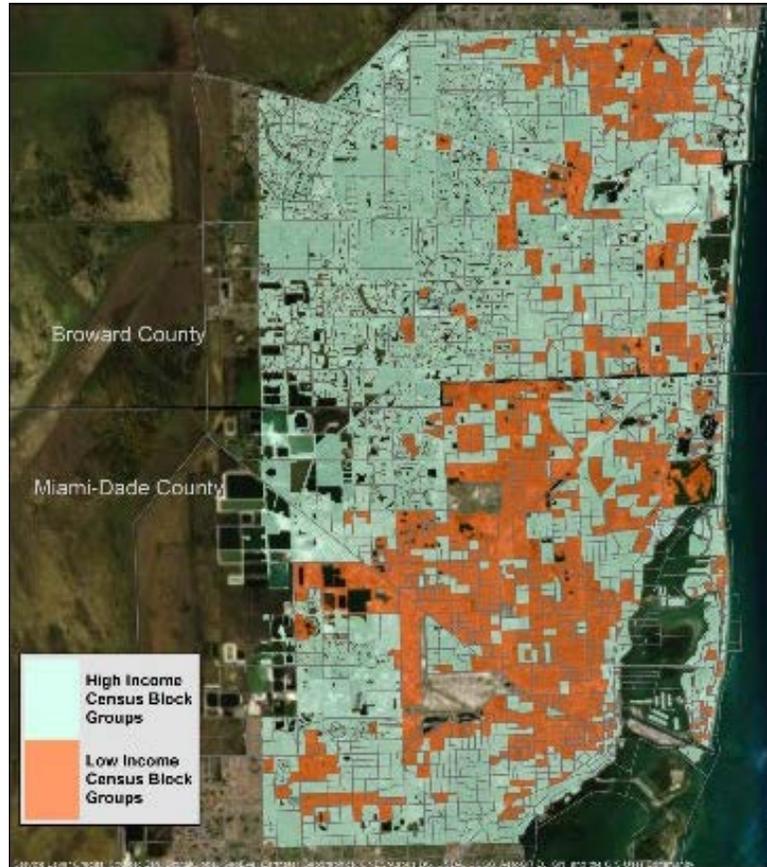
Examining the risk profile of South Florida

Building the quadrants and study data sets

Inundation and income were combined, then assets were placed in quadrants



Climate-adjusted future inundation from 1% annual flood

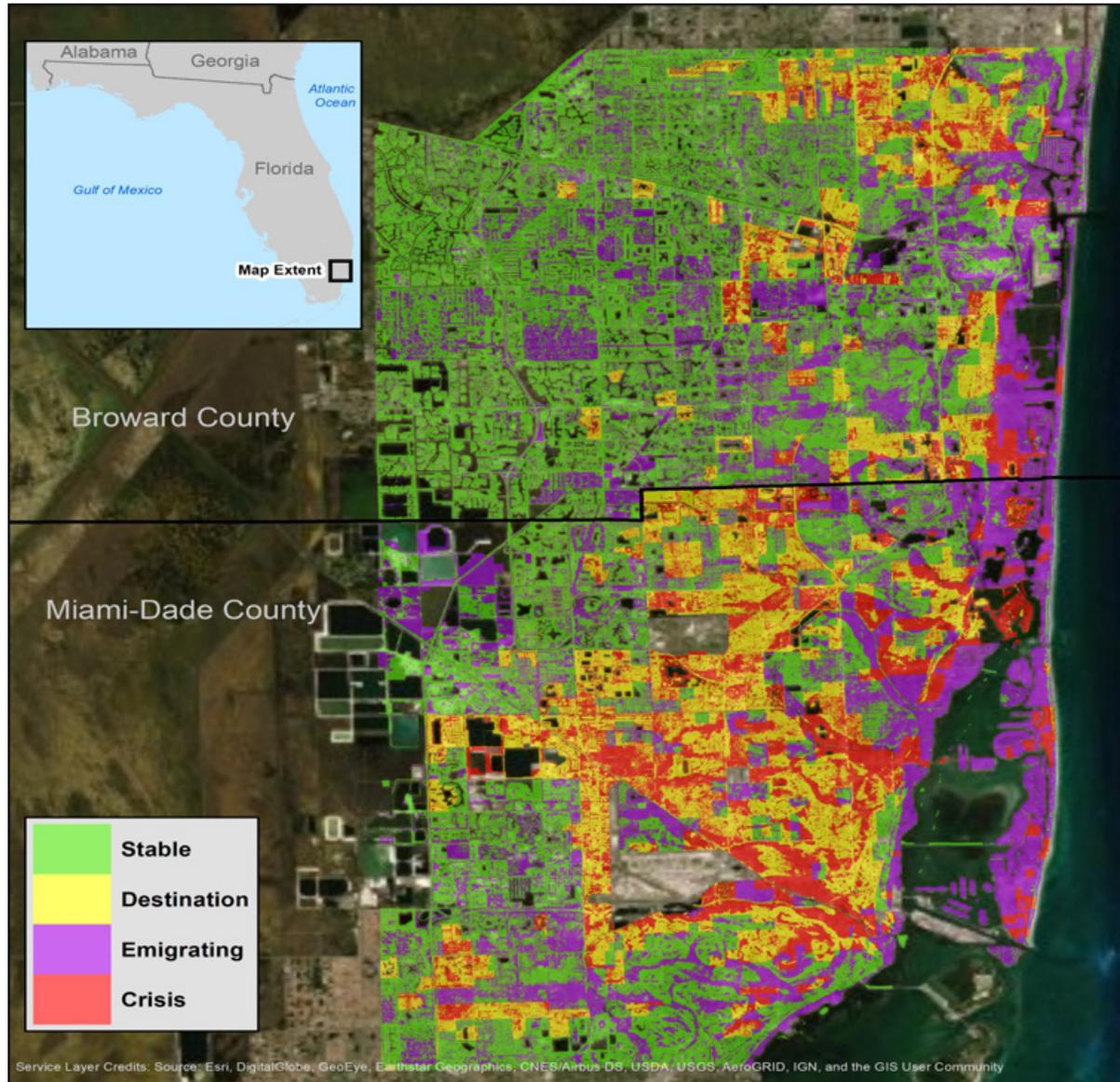


Census block groups with incomes in bottom/other quartiles



Milliman Market Basket with 10% sample of insurable homes

How scattered are regional future hazard risk and impacts?



- A large swath of coastal, upscale communities and suburban neighborhoods may face incentives to migrate to more urban land closer to city centers.
- A collar of outer suburban communities are likely to be less affected.
- Several distinct pockets across the region are most at-risk and yet least able to adapt given their resources.

Implications for insurable value at risk

How many households and what assets are affected?

Milliman's Market Baskets and Florida Hurricane Catastrophe Fund data help us estimate

QUADRANT	OWNER-OCCUPIED HOUSEHOLDS	% OWNER-OCCUPIED HOUSEHOLDS	TOTAL INSURABLE VALUE AT RISK (BILLIONS)	% TOTAL INSURABLE VALUE
Stable	153,718	45.8%	\$33.232	48.0%
Emigrating	91,630	27.3%	\$19.568	28.2%
Destination	50,654	15.1%	\$9.189	13.3%
Crisis	39,444	11.8%	\$7.314	10.6%

- **Stable** areas are a plurality but not majority of both households and insurable home value.
- **Emigrating** areas are a significant population that may want to migrate either within the region or out of it altogether. They would likely migrate toward the Destination areas – how would that change those neighborhoods?
- **Destination** areas constitute a significant population and would need to adjust to the influx of residents.
- **Crisis** areas hold over 10% of the population, a large constituency in need of consideration by emergency managers, urban planners and community leaders.

Flood insurance costs and migration incentives

Would flood insurance costs affect incentives to migrate?

Milliman's Market Baskets and Federal flood insurance (NFIP) rating plans can provide insight

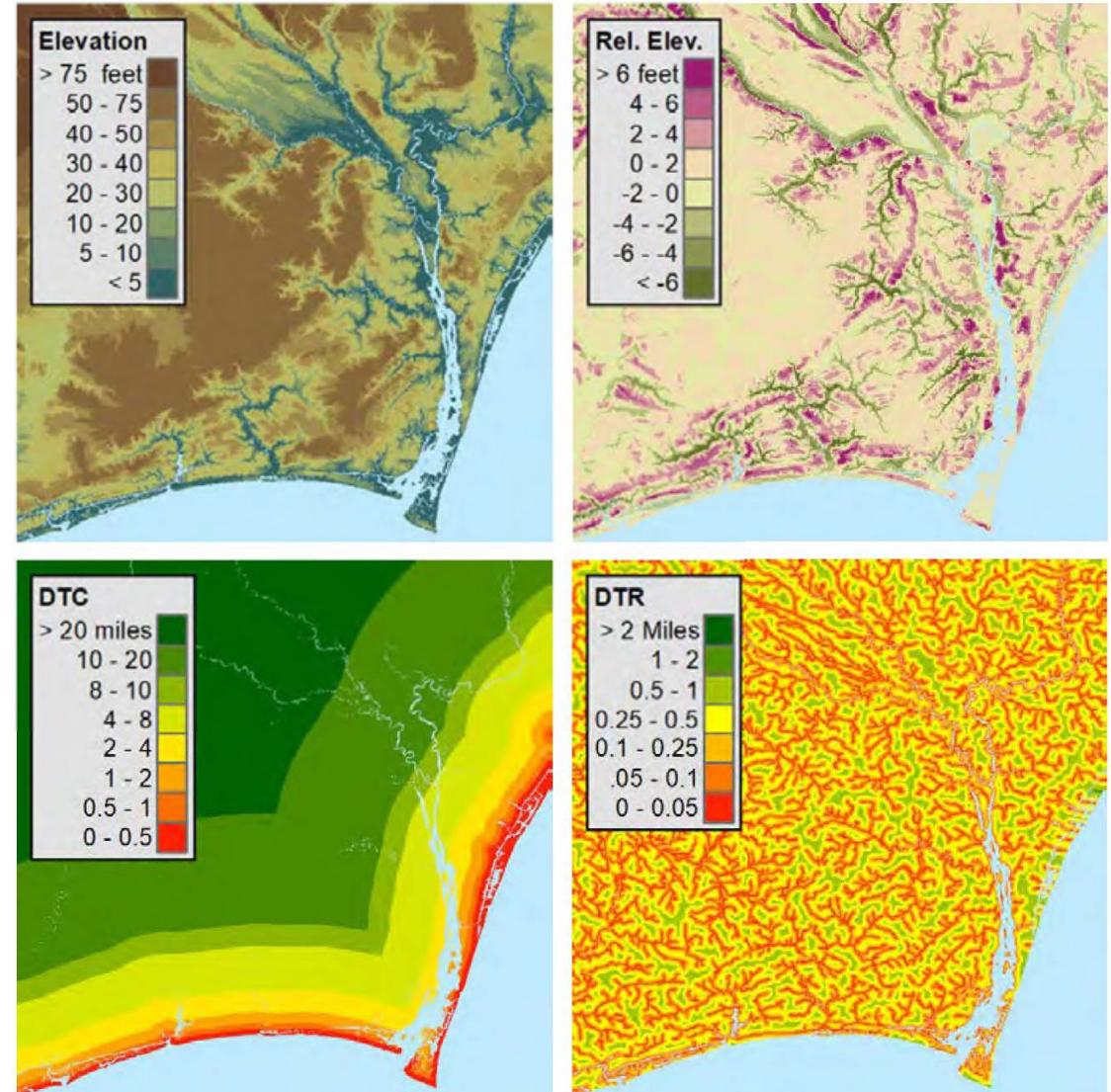
QUADRANT	OWNER- OCCUPIED HOUSEHOLDS	% OWNER- OCCUPIED HOUSEHOLDS	TOTAL INSURABLE VALUE AT RISK (BILLIONS)	% TIV	AVERAGE NFIP RATE (PER \$1,000)	AVERAGE NFIP RATE LIMITED (PER \$1,000)
Stable	153,718	45.8%	\$33.232	48.0%	2.12	2.69
Emigrating	91,630	27.3%	\$19.568	28.2%	2.43	3.61
Destination	50,654	15.1%	\$9.189	13.3%	3.02	3.15
Crisis	39,444	11.8%	\$7.314	10.6%	3.82	4.20

- **Stable** areas have the lowest Federal flood insurance rates, not surprisingly.
- **Emigrating** areas have higher rates than Destination areas when limited to the maximum \$250,000 of Federal flood coverage (\$3.61 > \$3.15)
- *But relative to total home value, the relationship is reversed (\$2.43 < \$3.02). Could the current NFIP rating plan, which does not consider insurance-to-value, provide the wrong incentives to high-income folks in risky areas in future climates?*
- **Destination** areas pay on average more per unit of value for Federal flood insurance, even though they are in lower-risk areas under a future climate than the Emigrating quadrant.
- **Crisis** areas pay the highest rates for Federal flood insurance, which reflects the risk – but adds pressure to those with already limited incomes, who may struggle to invest in mitigation or migration to adapt to a potentially changing climate.

Going forward

Technology is bringing climate science directly to consumers

- “Insurtechs” are targeting individual buying decisions with climate-adjusted risk data – will real estate follow?
 - Risk maps, current and climate-adjusted, being delivered by Jupiter and other firms on demand
 - Property risk data developed by algorithm (e.g. first floor height from street view imagery) being delivered for individual smartphone quotes
 - Milliman PinPoint™ is assimilating customized, relevant geographic data for underwriters and insurtechs at point of quote
- Public leaders must adapt to a world where homeowners know more than ever about current and future hazard



Q & A



Thank You

Presenters' Information:

- Billy Grayson, Executive Director for the ULI Center for Sustainability and Economic Performance: billy.grayson@uli.org
- Laura Craft, Sr. Vice President of Global ESG and Strategy at Heitman: Laura.Craft@heitman.com
- Lisa Dickson, Associate Principal and Director of Resilience at Arup: Lisa.Dickson@arup.com
- John Rollins, Consulting Actuary at Milliman: John.Rollins@Milliman.com

