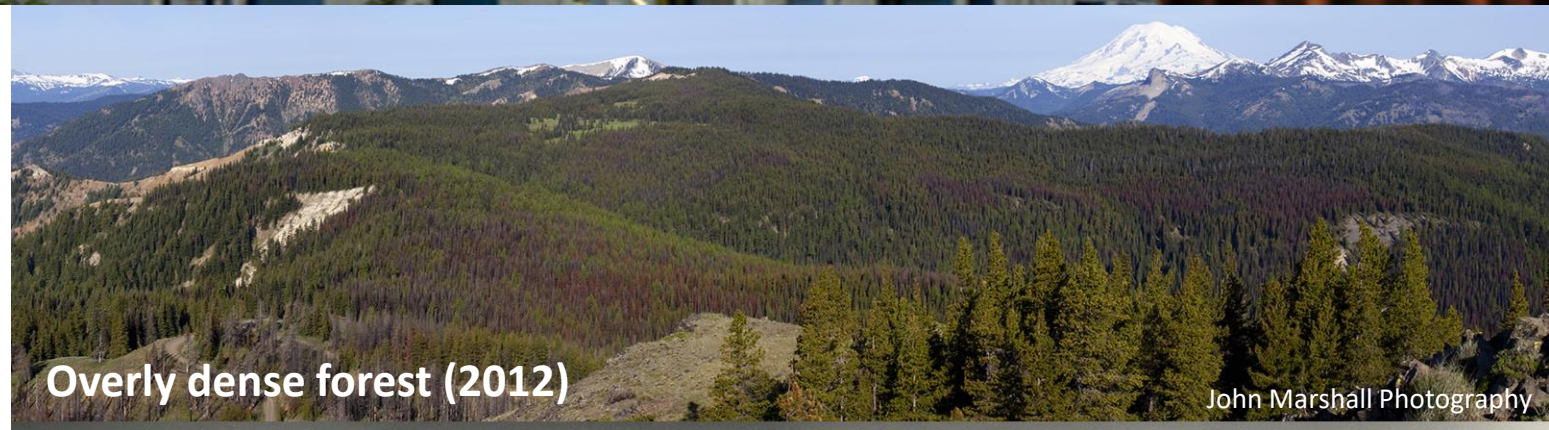

David Wakely

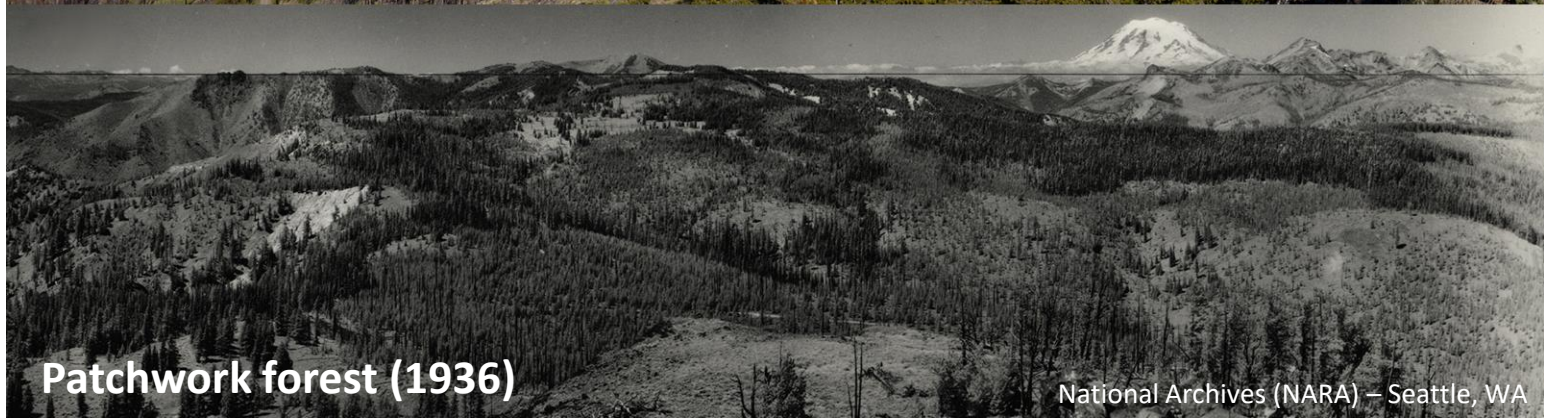
The Business Case for Mass Timber and Wildfire Resilience: Creating Value & Reducing Fuels

December 2, 2022

Urban Land Institute

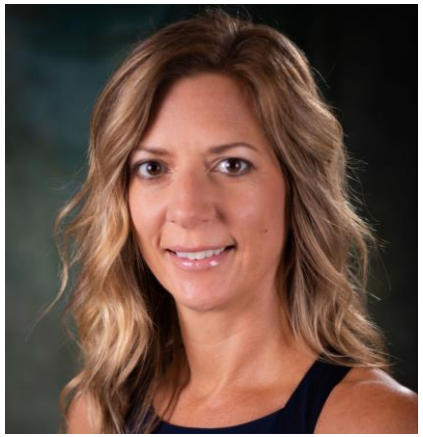

Overly dense forest (2012)

John Marshall Photography


Patchwork forest (1936)

National Archives (NARA) – Seattle, WA

MODERATOR



Melissa Kroskey, AIA, SE
Technical Director

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SPEAKERS

Molly McCabe
CEO & Founder

HAYDEN+TANNER
STRATEGIES FOR THE COMMONS

Paul F. Hessburg
Senior Research Ecologist

FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE

Noel Johnson
Developer

CONRAD
INVESTMENT MANAGEMENT

As a ULI Greenprint Innovation Partner, WoodWorks offers free project assistance

for Developers & Design Teams

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PROJECT SUPPORT · EDUCATION · RESOURCES

- Commercial & Multifamily Buildings
- Innovative Mass Timber Applications
- New Tall Wood Code Provisions
- Maximizing Heights/ Areas
- Find Experienced Designers & Builders
- Environmental Performance
- Structural & Other Systems

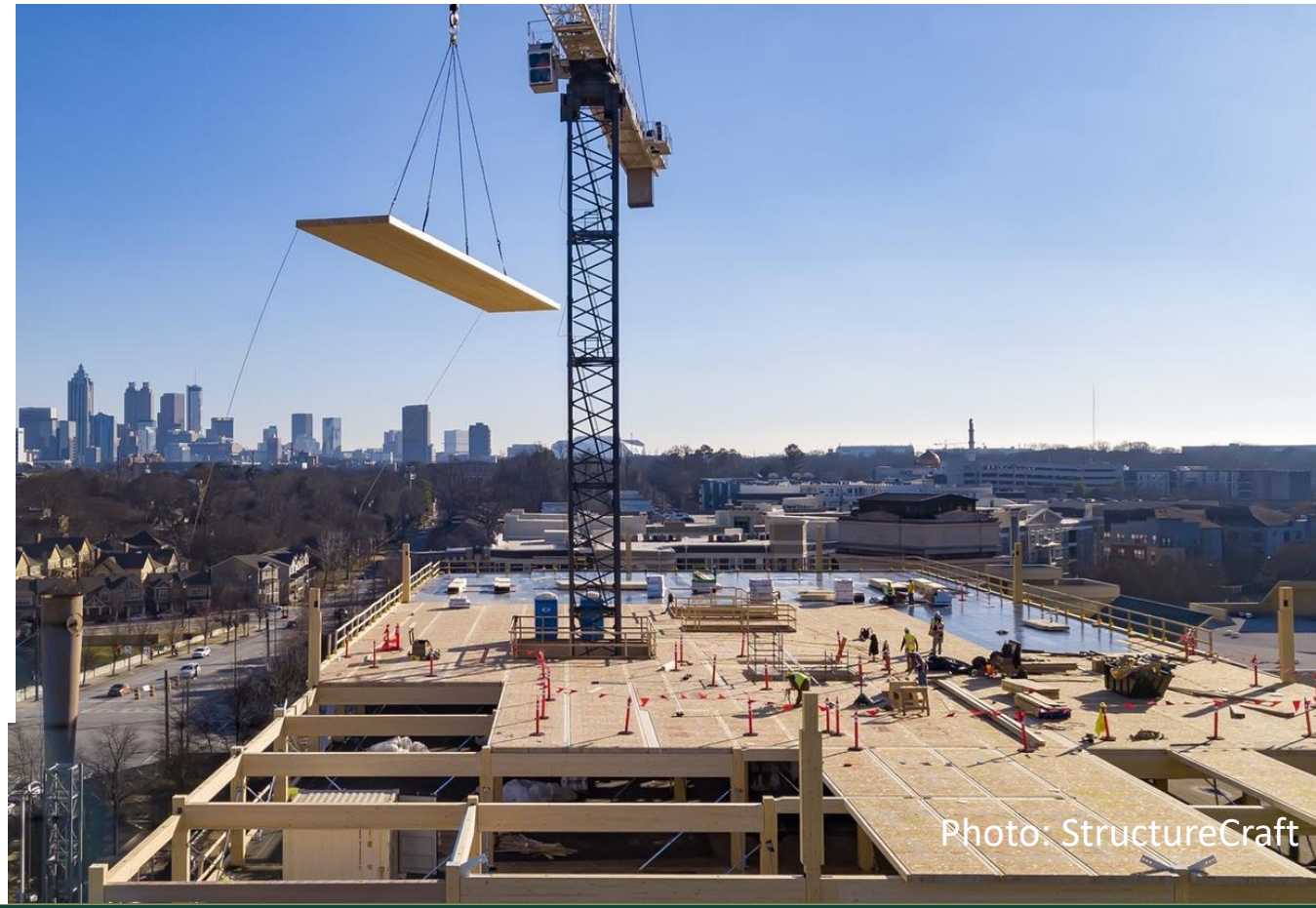


Photo: StructureCraft

help@woodworks.org

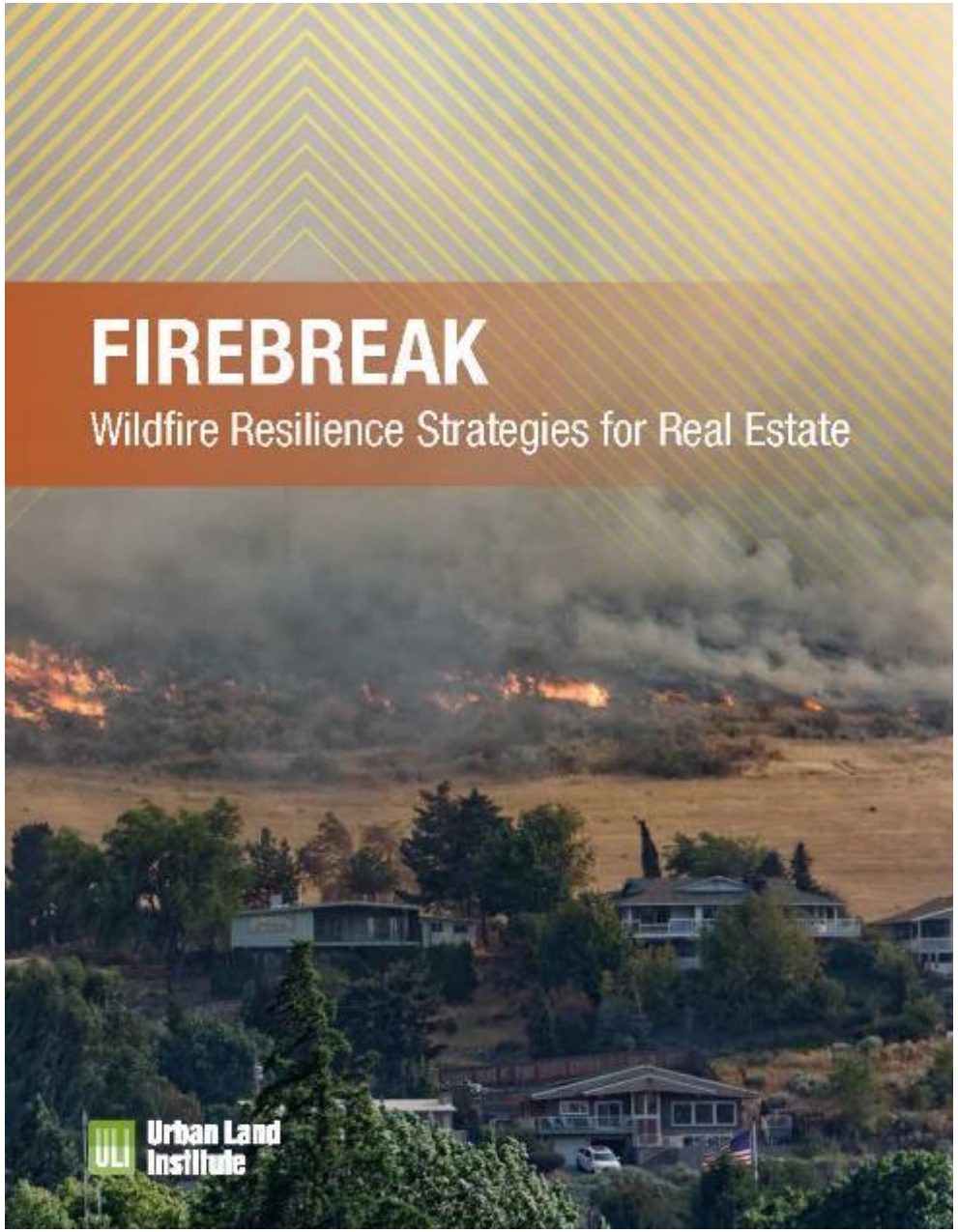
Multi-family/ Mixed-Use · Education · Office · Retail · Industrial · Civic · Institutional

Assessing Wildfire Risk at Market Scale

MOLLY MCCABE
CEO/FOUNDER - HAYDEN TANNER

DECEMBER 2022

Credit: Patrick Perkins, Unsplash

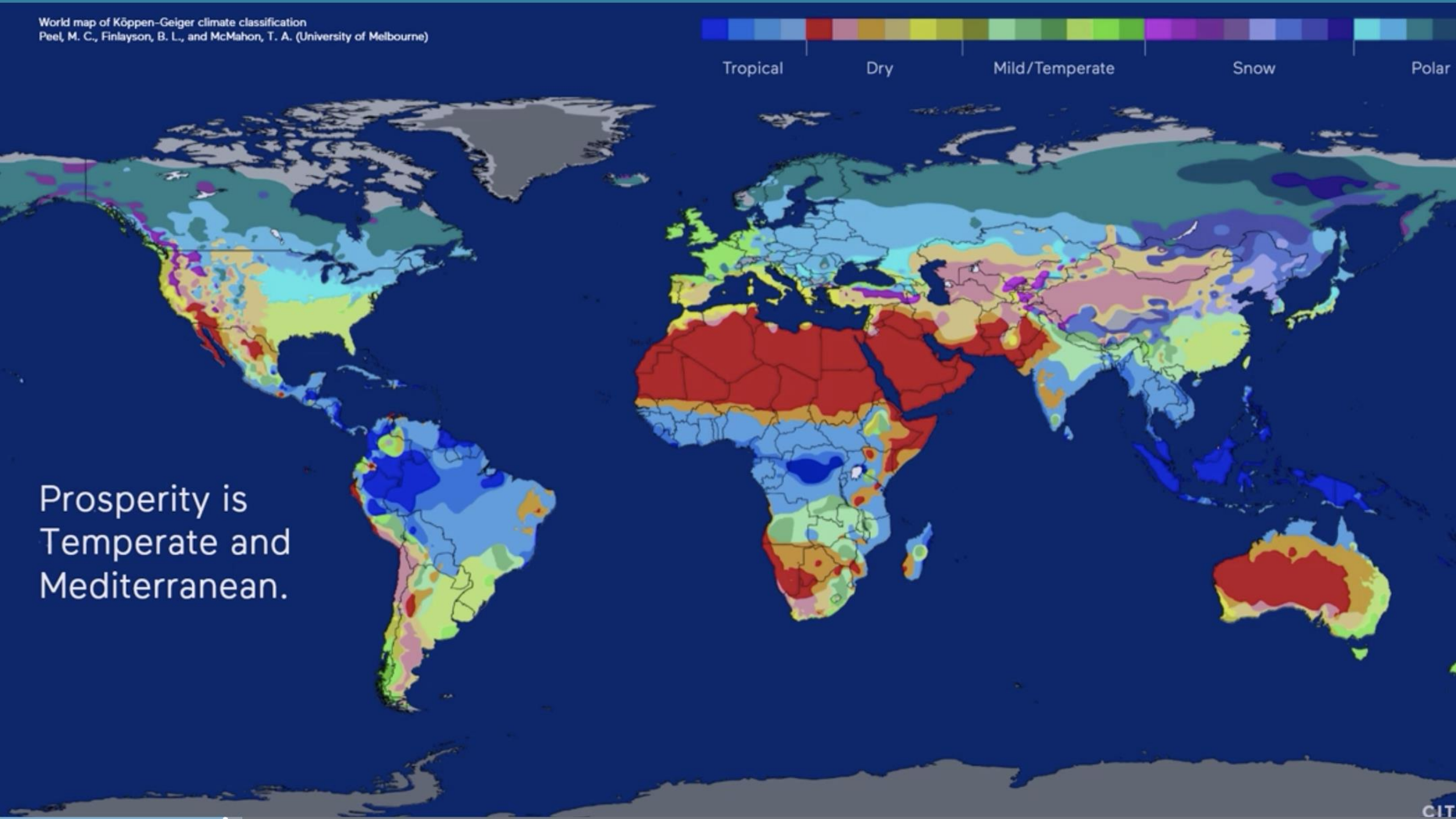


ULI's Urban Resilience Program and Wildfire Research

Firebreak: Wildfire Resilience Strategies for Real Estate

- Available at: uli.org/wildfires
- The report details:
  - Wildfire risk
  - Community and industry impacts
  - Best practices at the site scale
  - District-scale solutions
  - Case studies in wildfire resilience
- Over 50 experts from ULI's membership and beyond contributed to this report
- Sonoma County Advisory Services Panel (April 2021)
- RiskFactor Pro – ULI advised First Street Foundation

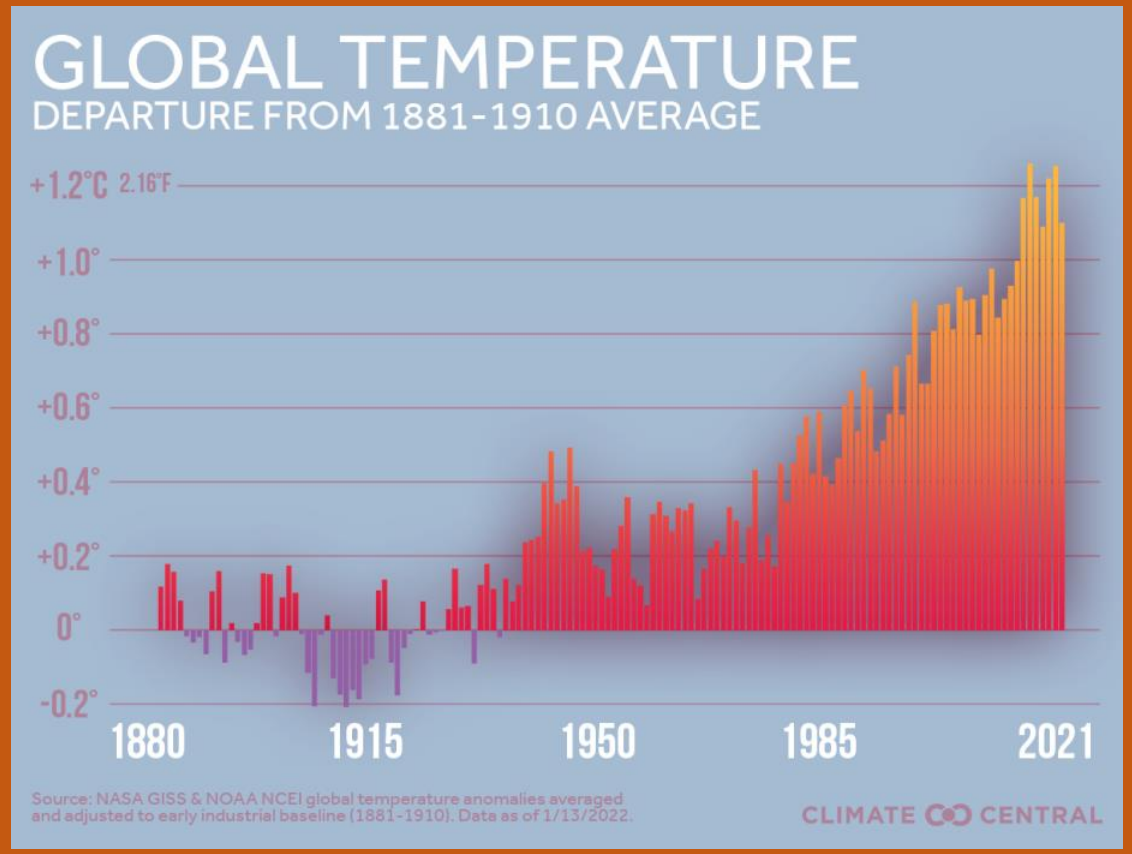
ULI is grateful to the Kresge Foundation for its support of the *Firebreak* research and the Urban Resilience Program. https://developingresilience.uli.org


World map of Köppen-Geiger climate classification
Peel, M. C., Finlayson, B. L., and McMahon, T. A. (University of Melbourne)
Tropical
Dry
Mild/Temperate
Snow
Polar
Prosperity is
Temperate and
Mediterranean.

A stable climate is the core.

It is the foundation of a stable, thriving and healthy world

-Credit: Adle Payman, Soledad, CA, Unsplash



"Whatever we might want to believe about our future, there are limits, and we are up against them."

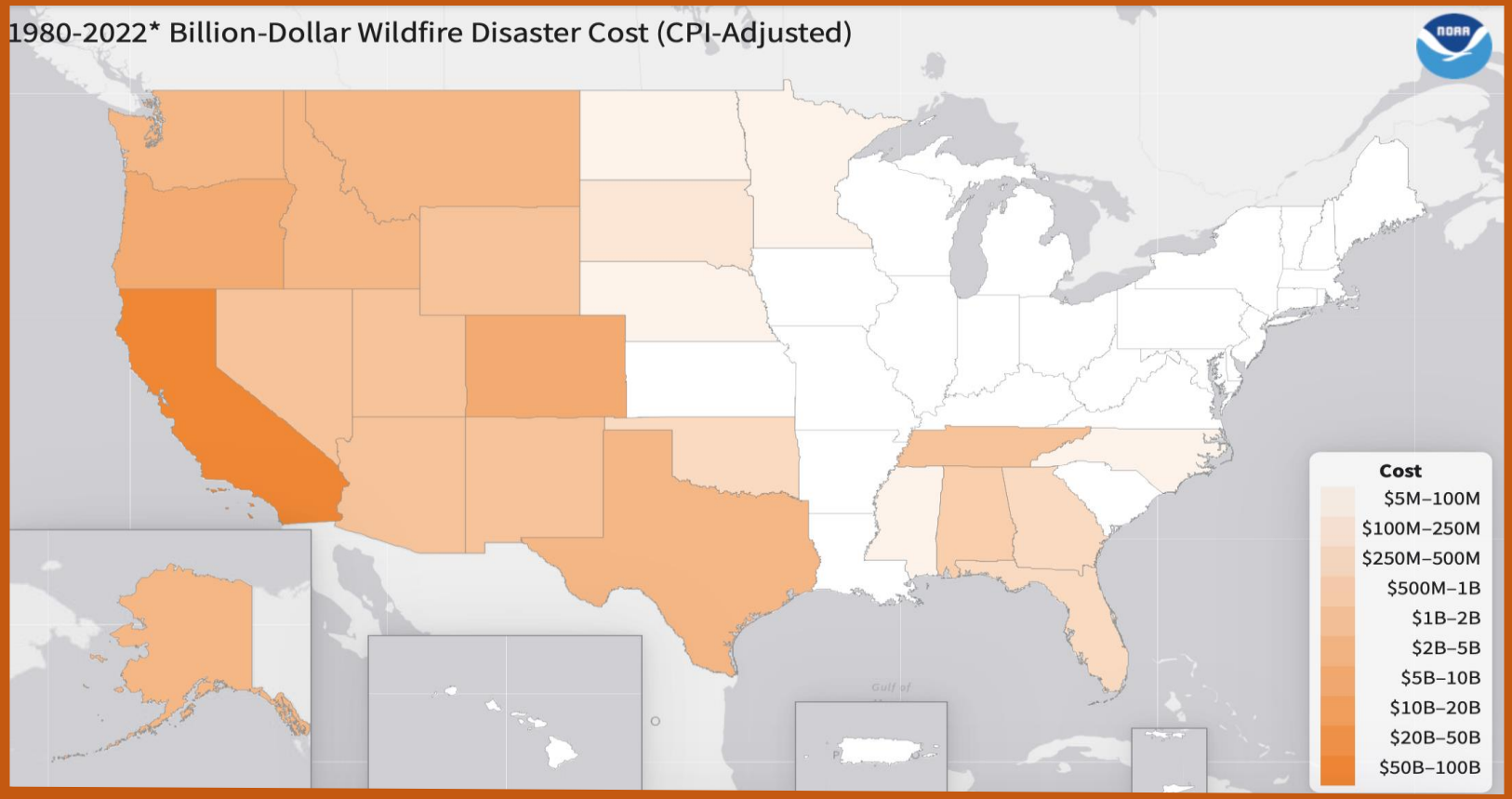
- Elizabeth Kolbert

CLIMATE CHANGE FROM A TO Z

The stories we tell ourselves about the future.

-Credit: Adle Payman, Soledad, CA, Unsplash

Wildfires Pose Broad Risk to Real Estate Investment, Economic and Social Health



"It's not a question of if wildfires are going to burn. All the land here burned at one time or another.

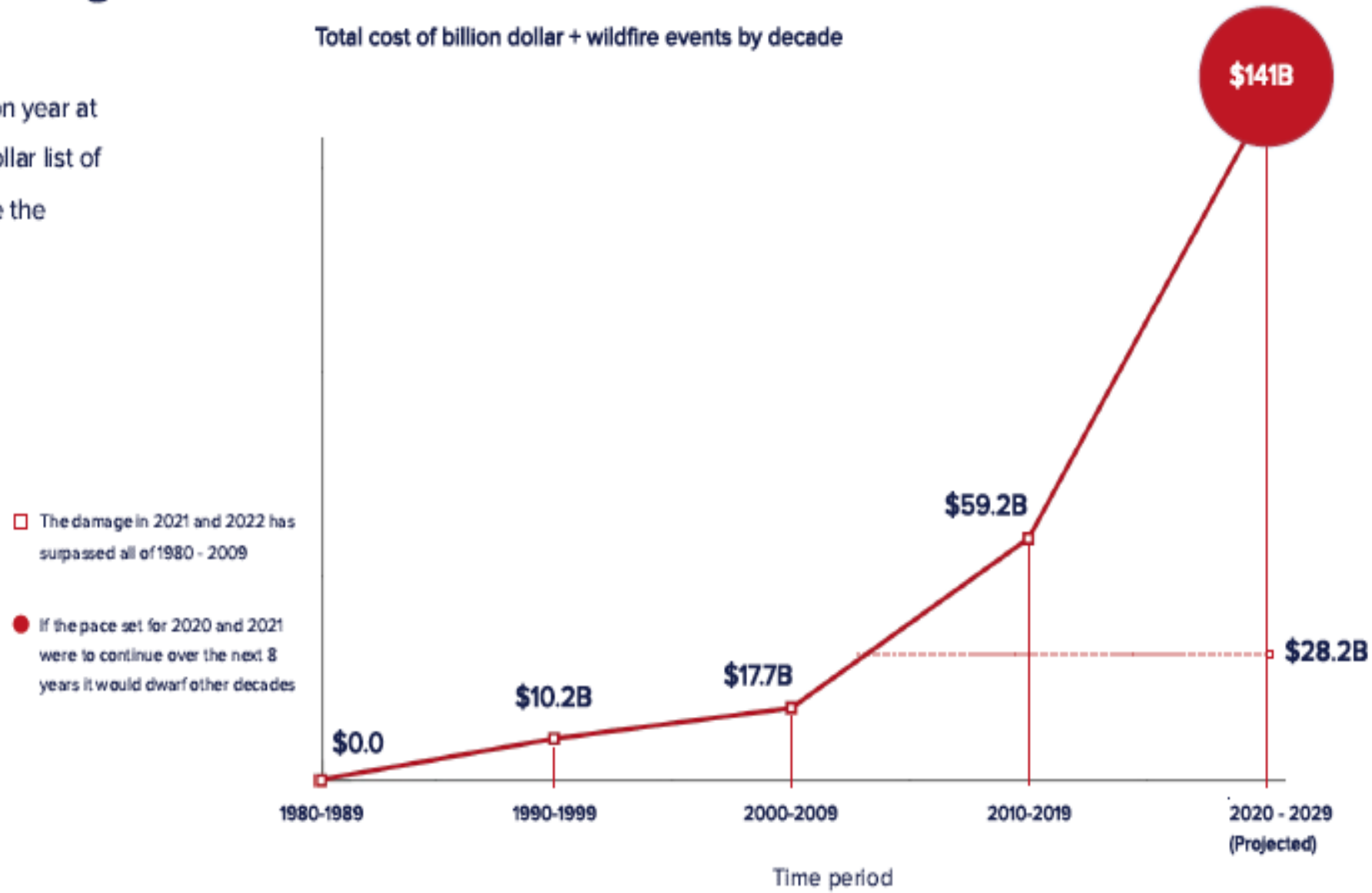
We just have to minimize that risk."

- Developer, Idaho

wildfires are the fastest growing economic climate risk.

Wildfire damages have continued to grow year on year at an accelerated rate. Looking at NOAA's billion dollar list of natural disasters that began in 1980, you can see the dramatic increase over time.

Source: NOAA



https://www.ncei.noaa.gov/access/billions/mapping

The Day the Sky Turned Orange

When should wildfire risk affect investors' market decisions?

Credit: Patrick Perkins, Unsplash
Mid-day in San Francisco,
September 9, 2020

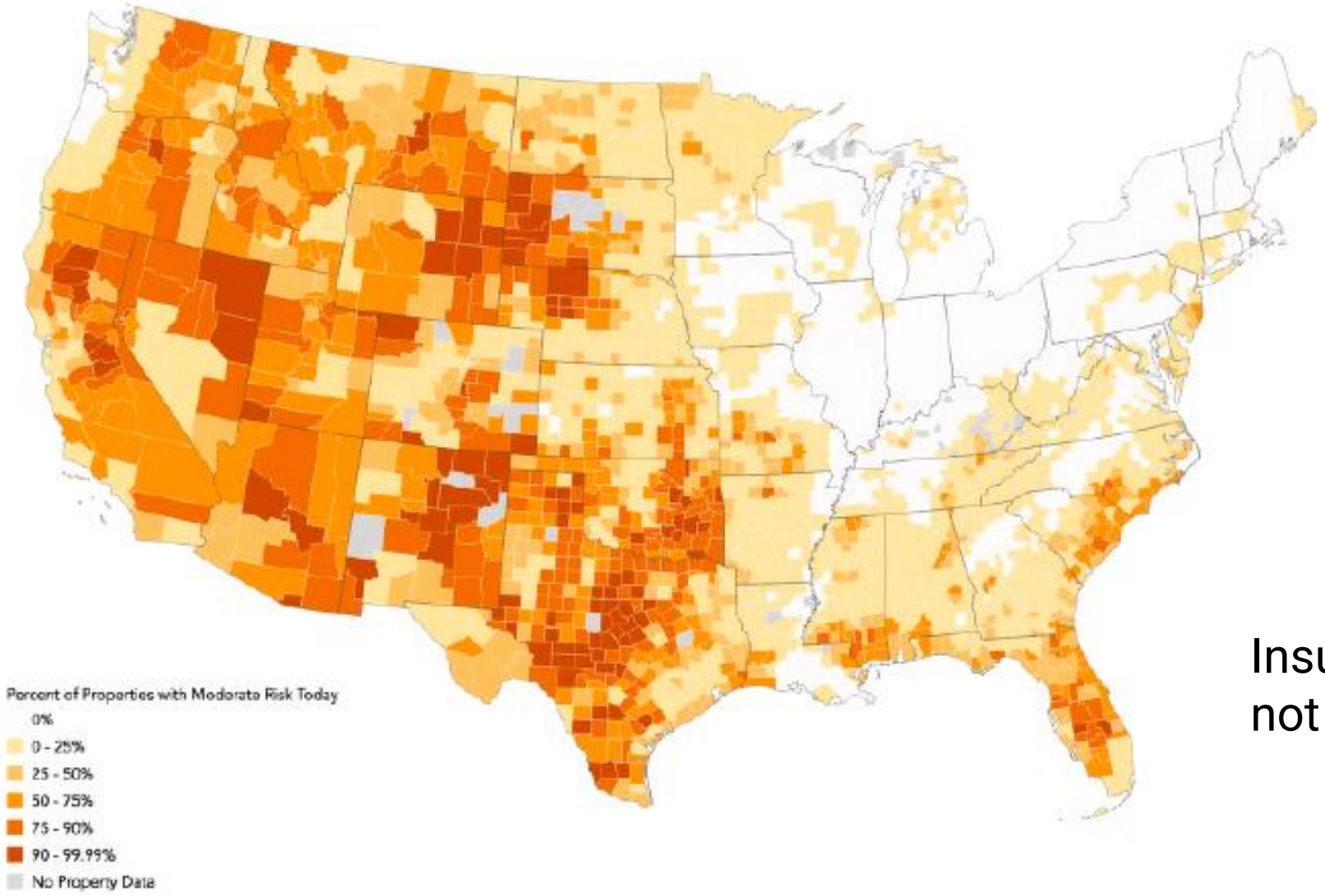
Credit: Mike Newbry, Unsplash

"Some of the metro areas that have been doing very well have fundamental, existential threats from climate risk."

Institutional Investor

Climate Risk and Real Estate Investment Decision Making, Heitman/ULI 2019

Today



79 million

homes have wildfire risk

4.2 million

Have cumulative burn probabilities >26%

1 in 4

of these homes will burn over the lifetime of their mortgage.

Insurance, even if available, will not cover the full cost to rebuild.

So, who is really at risk?

We are investing in increasingly risky places and in increasingly risky assets

The risk to real estate

$1.3 trillion of property value resides in the WUI

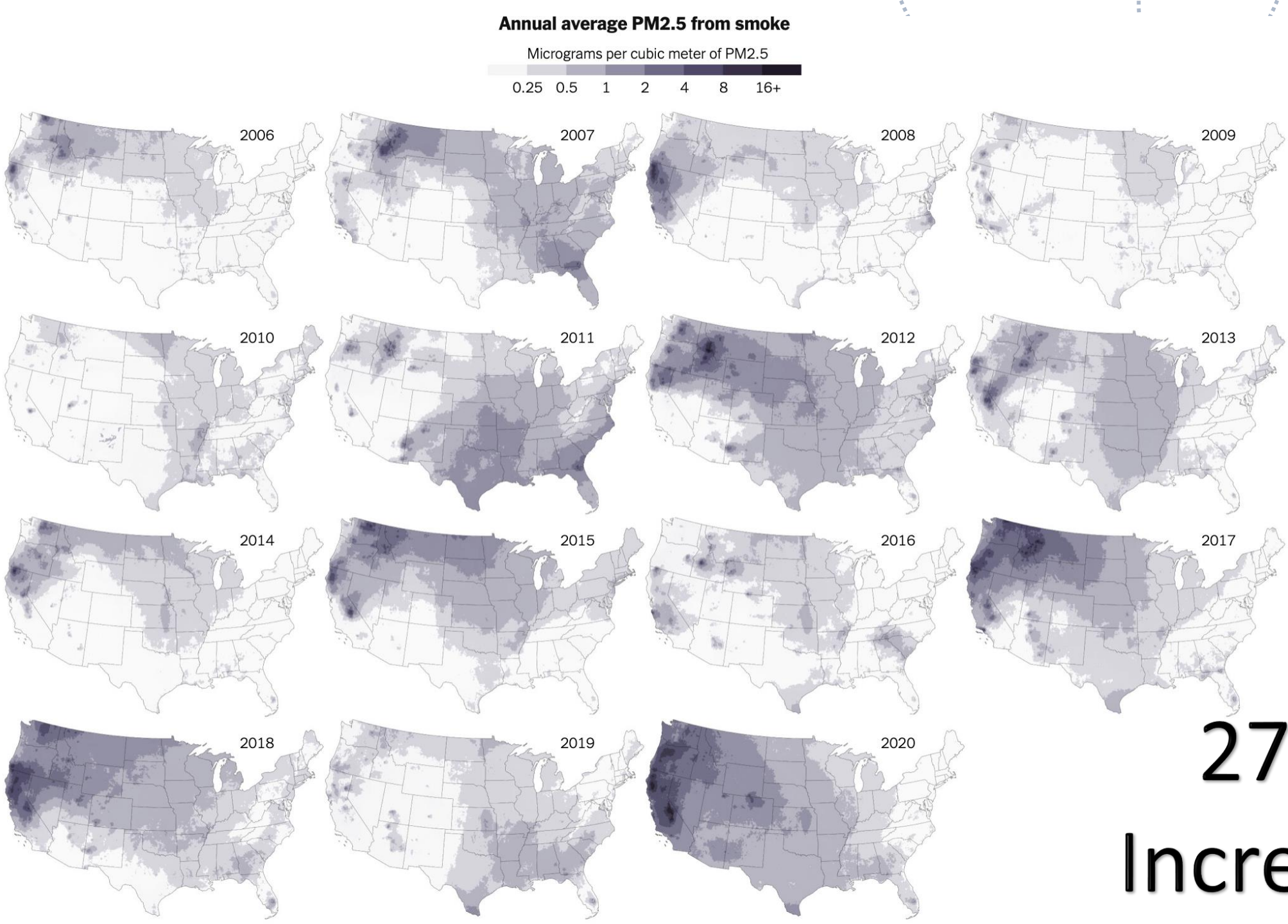
- Business interruptions
- Construction delays
- Increased costs for asset features
  - Air filtration technology to address harmful air quality
  - Back up power systems to account for Public Saftey Power Shutoffs (PSPS)
- Increased insurance premiums
- Lack of insurance availability
- Risk of long-term or permanent population shifts and depressed real estate value
- Compromise climate mitigation goals

Credit: Derick Dailey, Sept. 2020, Unsplash

Societal and Socioeconomic Risk

Cascade effects

- Community and market disruption
  - Lost wages
  - Productivity
  - Tax base
  - Community dislocation
- Impact on nearby property markets
- Sprawl/housing affordability
- Watersheds/municipal water supply
- Energy
- Cost of fighting fires
- Competition for resources – financial and otherwise
- Air quality & health (including mental health)



27x Increase

“Climate Change is a threat multiplier.”

- Climate Scientist, Katharine Hayhoe

"The clearest path to reducing future losses…

is building better"

-- California’s Climate Insurance Working Group

Credit: Daniel Lorentzen, Unsplash

21ST CENTURY WESTERN US FORESTS:
CHANGING WILDFIRE AND CLIMATE REGIMES

Paul Hessburg, Senior Research Ecologist
USDA-FS, PNW Research Station, UW, OSU

Primary Change Agents

Pre-1850 → 2022

Fire exclusion – loss of Indigenous burning, livestock grazing, development-built environment, fire suppression

Timber harvest – logging Lg-old fire-tolerant trees, many shade loving, fire-intolerant trees replaced them

Climate change – warmer, drier, windier, escalating, year-round fire season in CA, 40-80 days longer elsewhere

Smoke management – unsustainable air quality, increases severe fire & poor air quality, wildland interface & urban areas

Fuel provides the energy for burn severity

FREQUENT
FIRE FORESTS

1934

2010

High connectivity provides the means for large, severe fires

MODERATELY FREQUENT FIRE FORESTS

INFREQUENT FIRE FORESTS

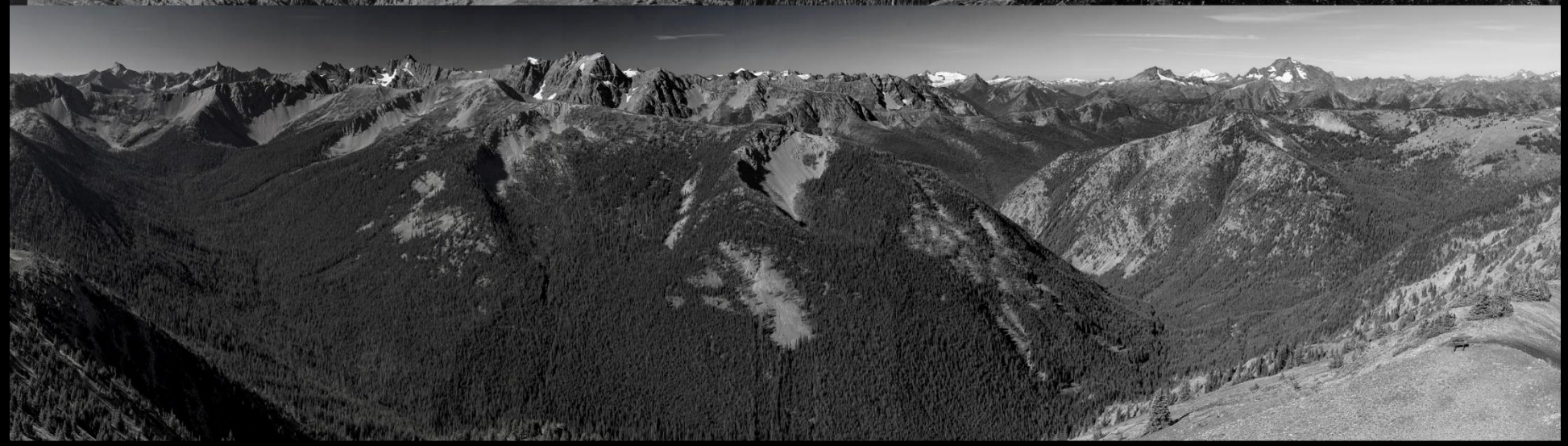
180 degrees
I

Slate Peak

300 degrees
I

1934

2013



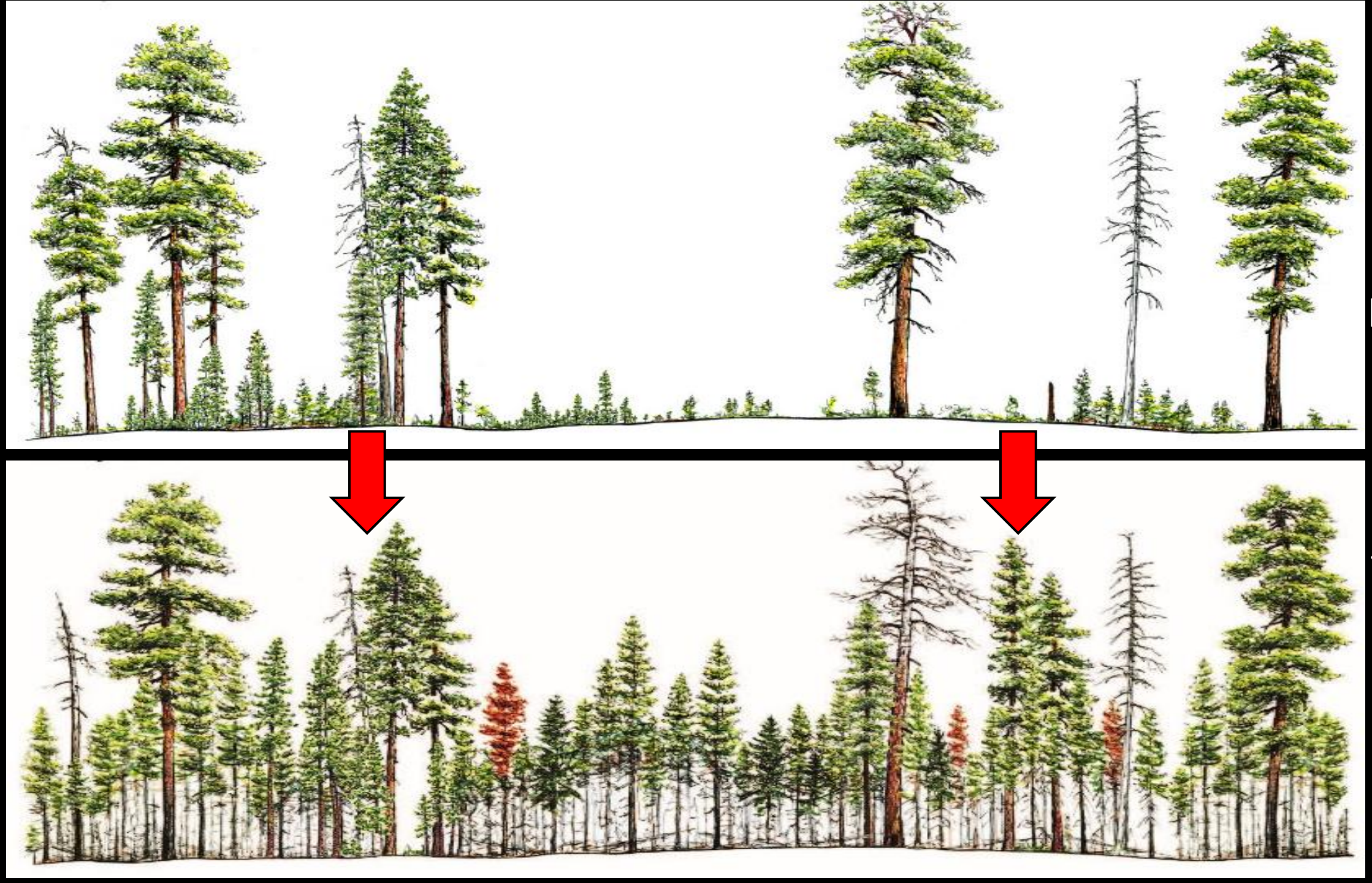
George B. Clisby USFS September 2, 1934
From National Archives and Records Administration, Seattle, WA

16 miles NW of Mazama, WA
Slate Creek drainage

John F Marshall for USFS August 31, 2013

Locally, more frequent fires continually thinned forest patches, reducing density & fuels

A STABILIZING LOCAL FEEDBACK



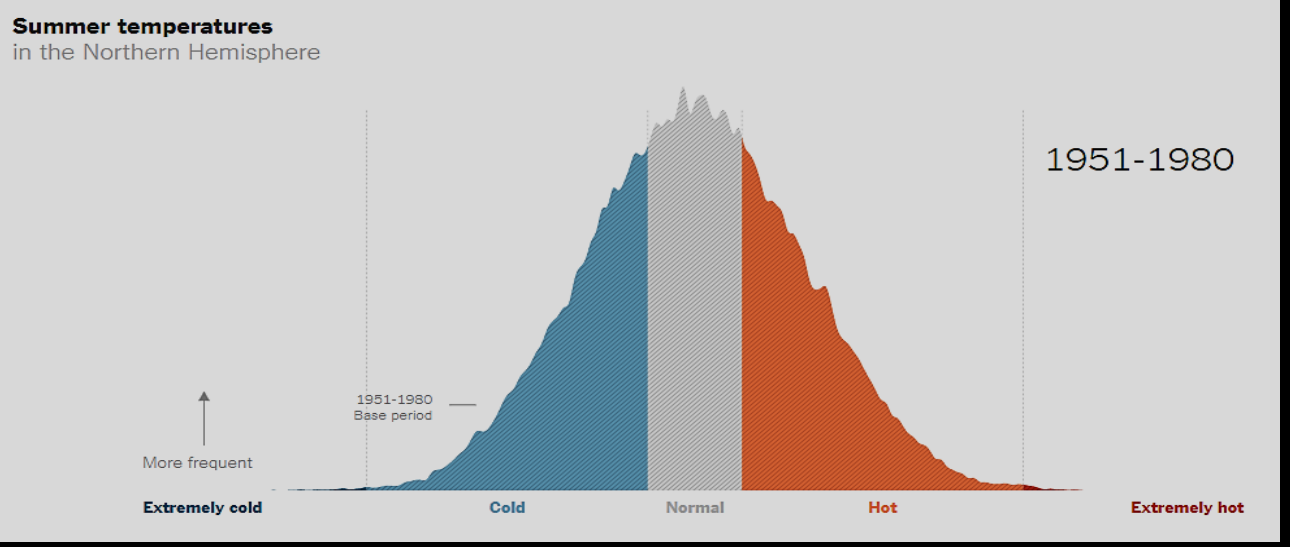
Locally, more frequent fires continually thinned forest patches, reducing density & fuels

A STABILIZING LOCAL FEEDBACK

Less frequent higher severity fires created patchworks of meadows, prairies, shrublands, young, middle-aged and older forest, open vs closed canopy conditions, hardwood patches, these patterns spatially regulated future fire size & severity

A LANDSCAPE SCALE STABILIZING FEEDBACK

Summer temperatures
in the Northern Hemisphere



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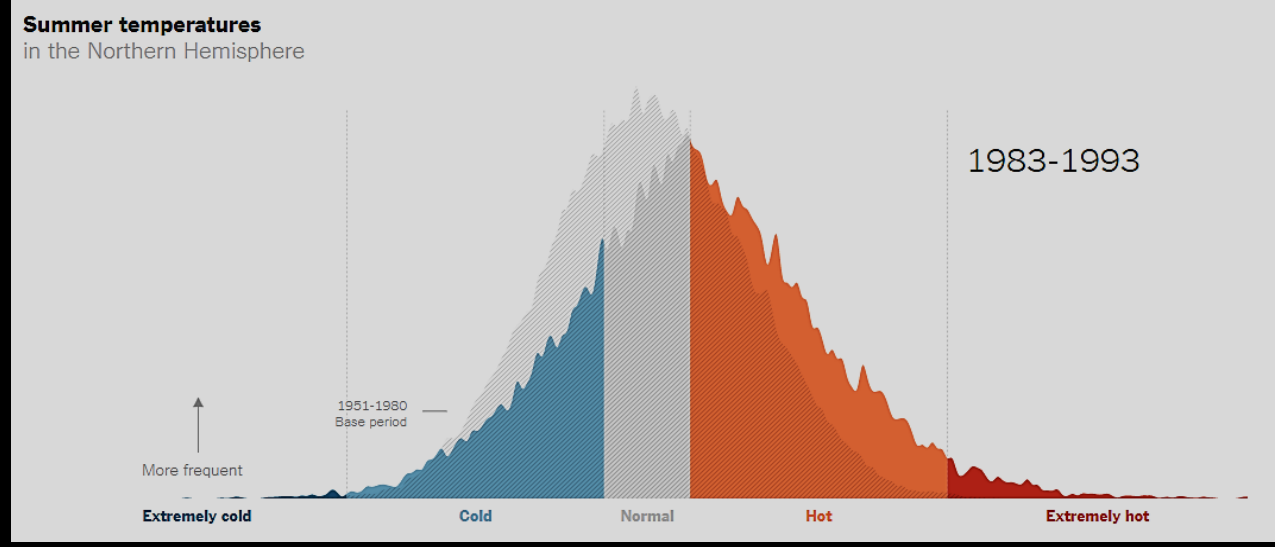

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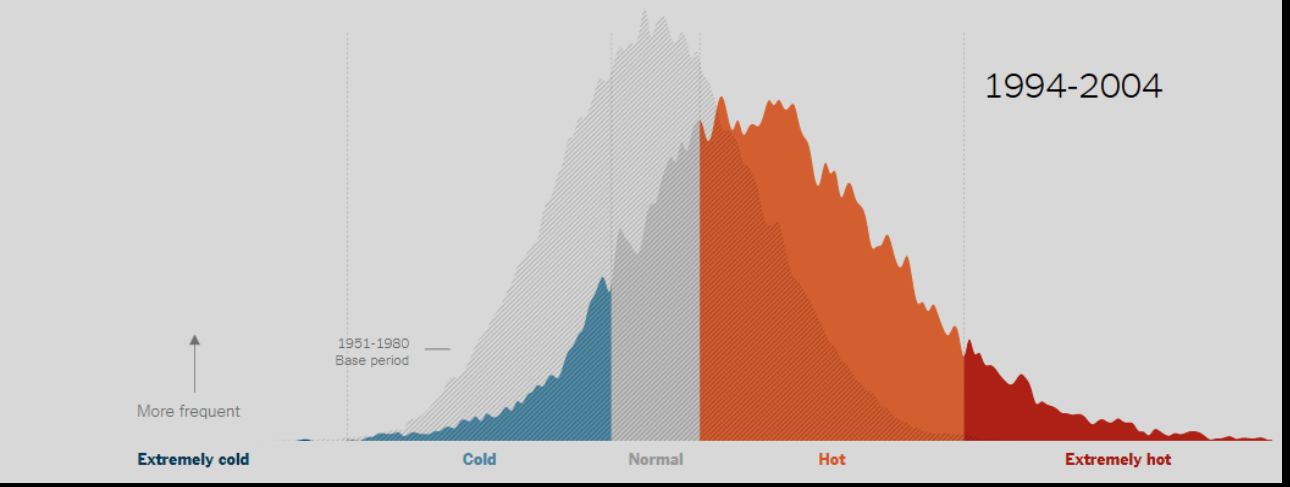

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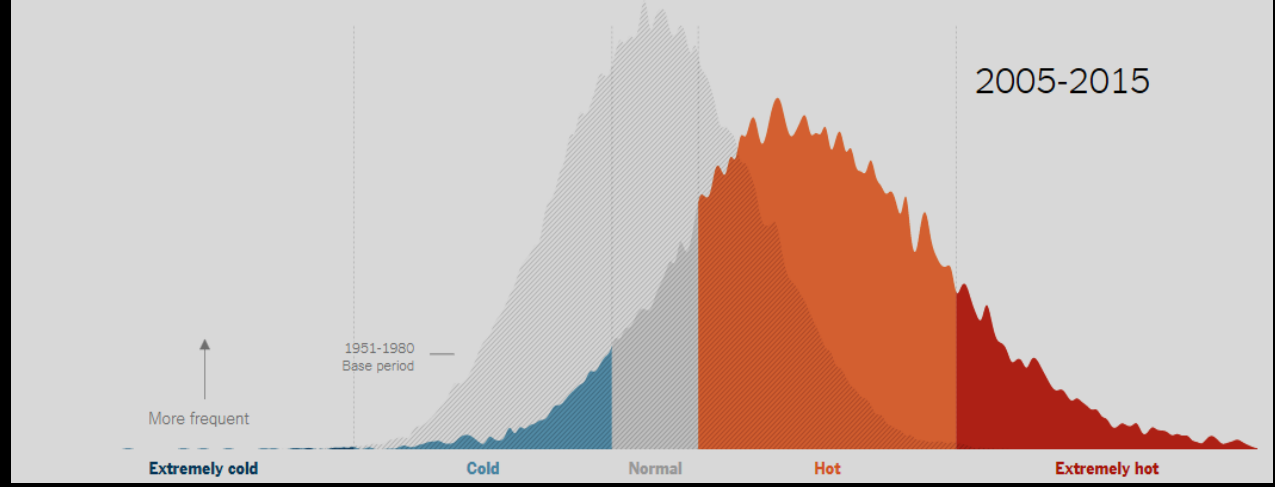
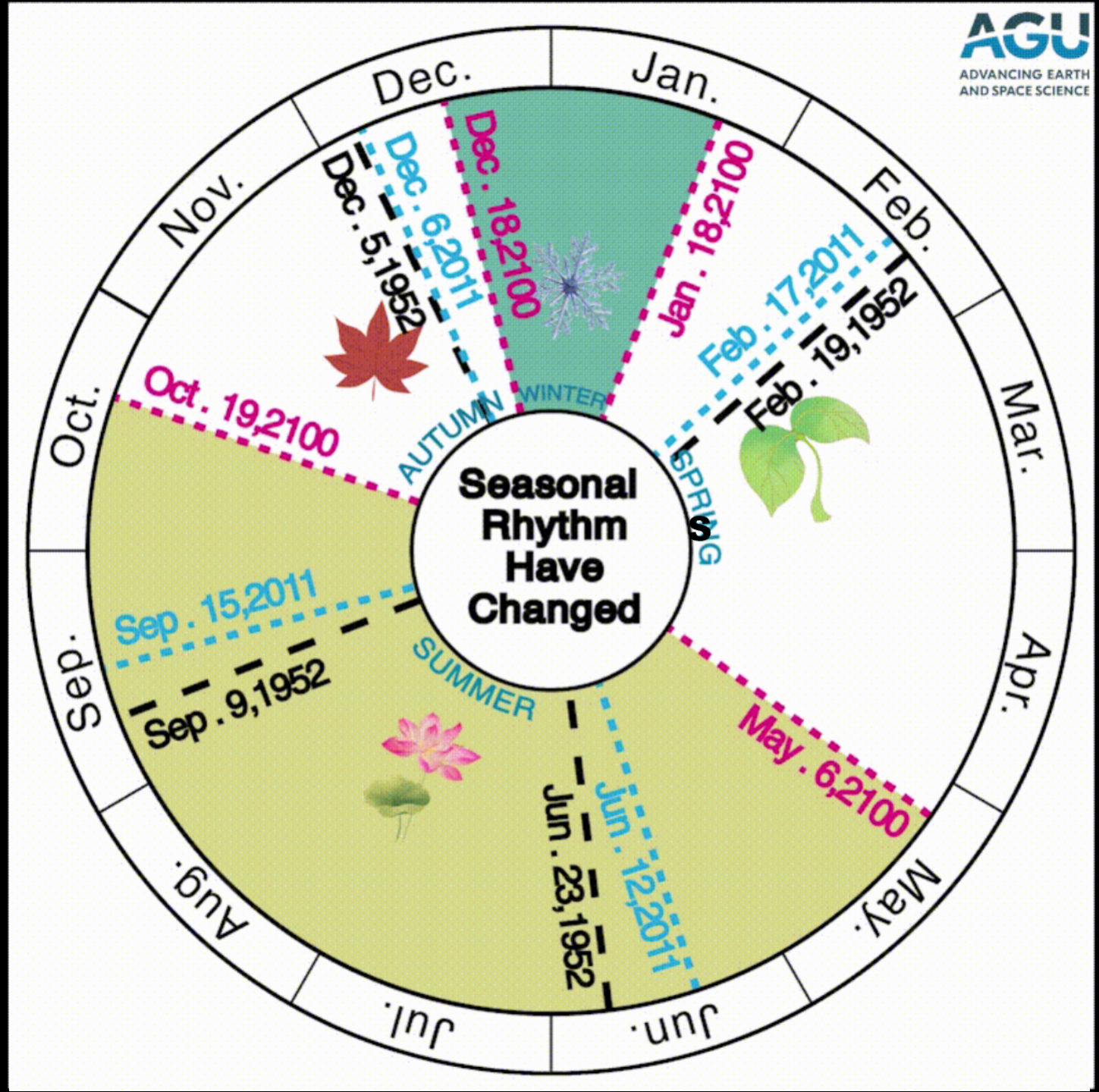
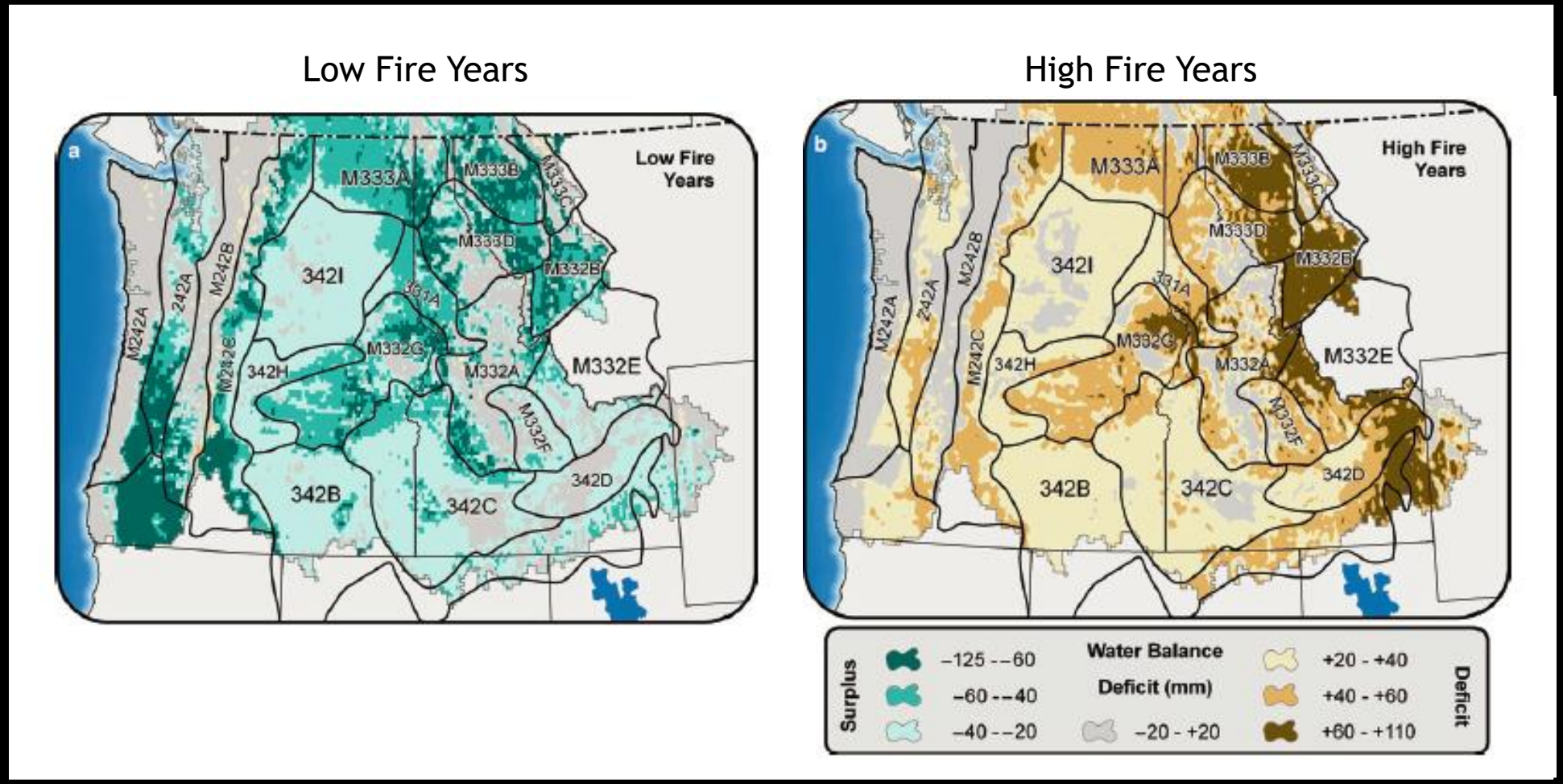




Northern Hemisphere summers projected to last nearly half of the year by 2100!

Western wildfires and regional drought

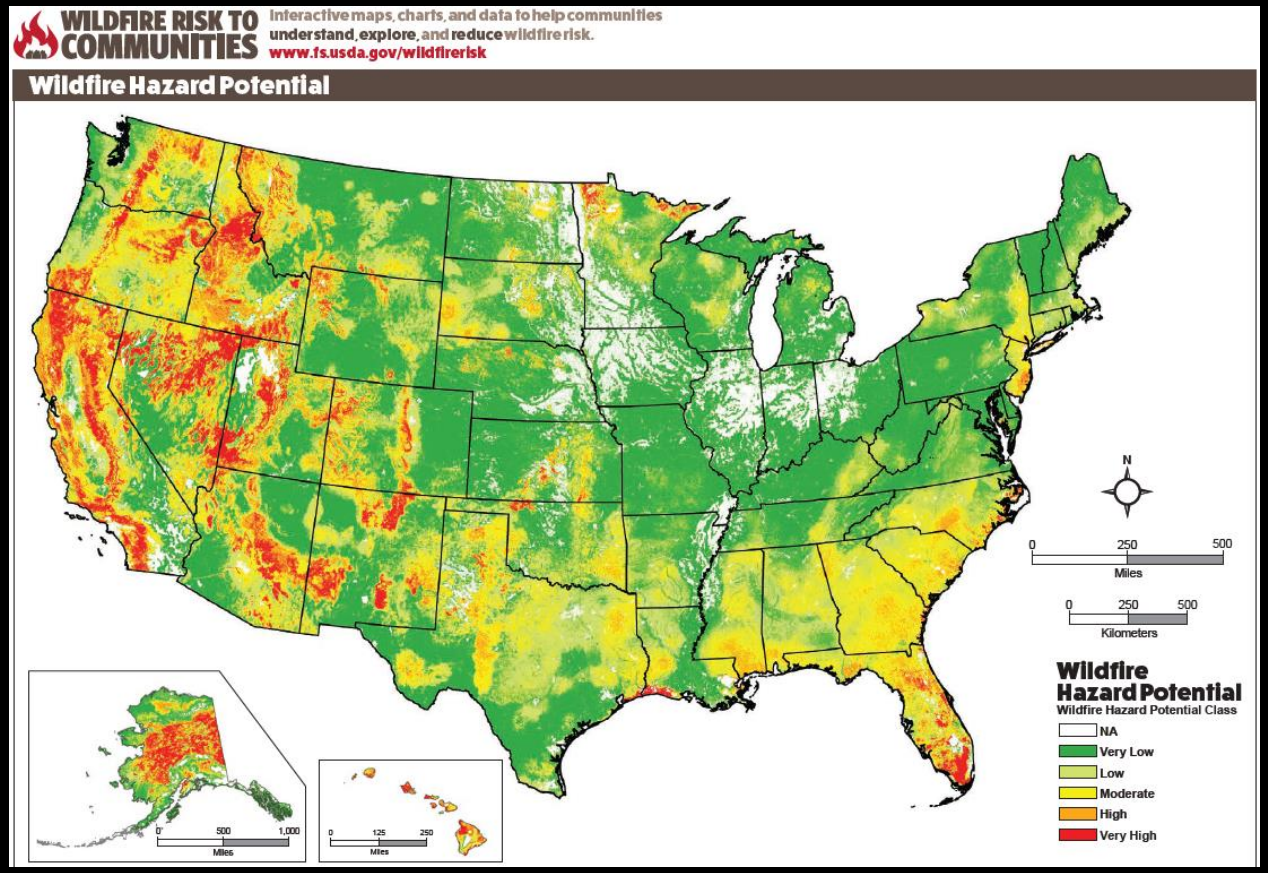


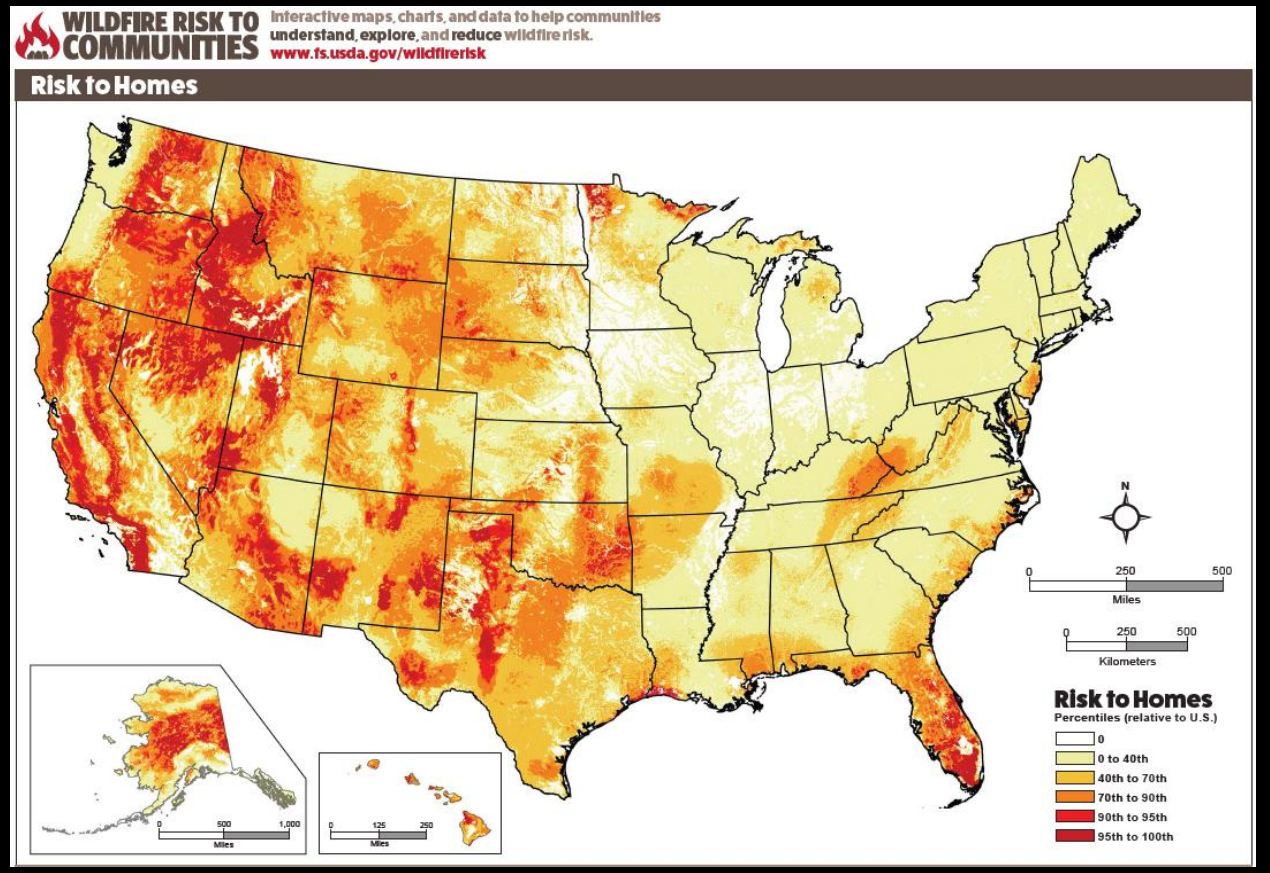
Adapted from Susan Prichard

Littell, J.S. and Gwozdz, R.B. 2009. Climatic water balance and regional fire years in the Pacific Northwest, USA. In The Landscape Ecology of Fire. Ecological Studies 213: 117-139.

Adapted from Susan Prichard

US wildfire hazard potential + risk to homes





Hazardous fuels + likelihood of containment

Consequence of escaped wildfires

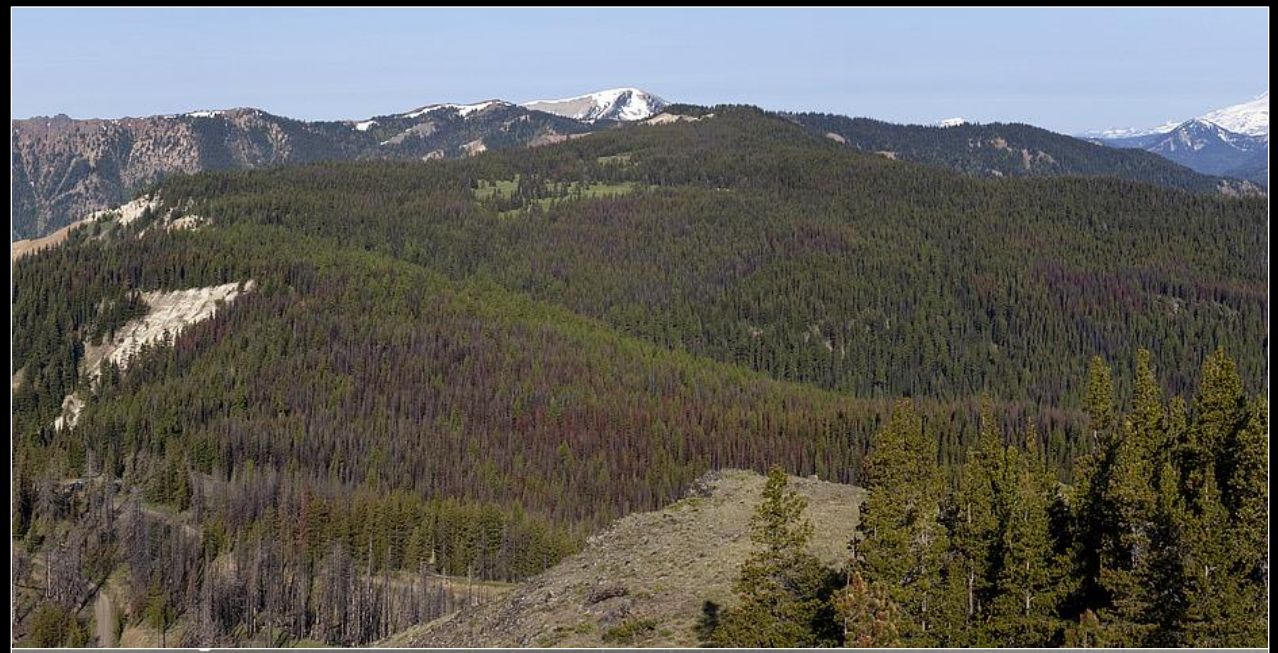
The worst wildfires in the US are ahead of us

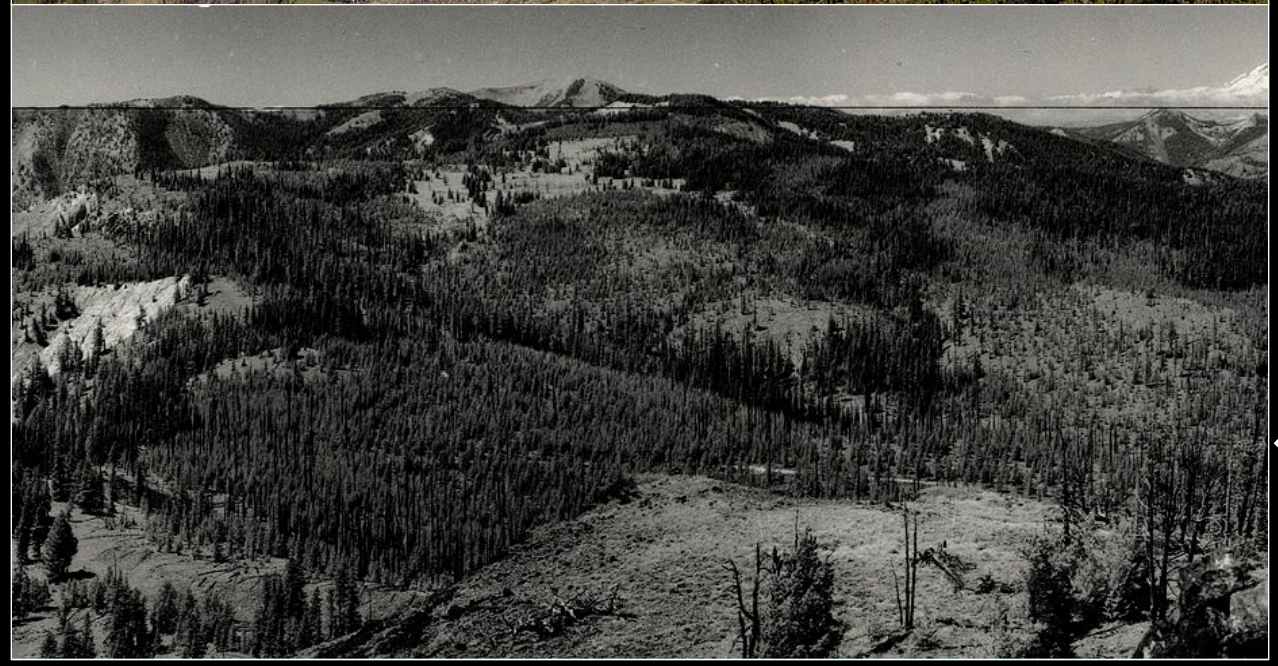
Fire suppression alone cannot solve this

Fire suppression alone won't protect us

https://wildfirerisk.org/download/

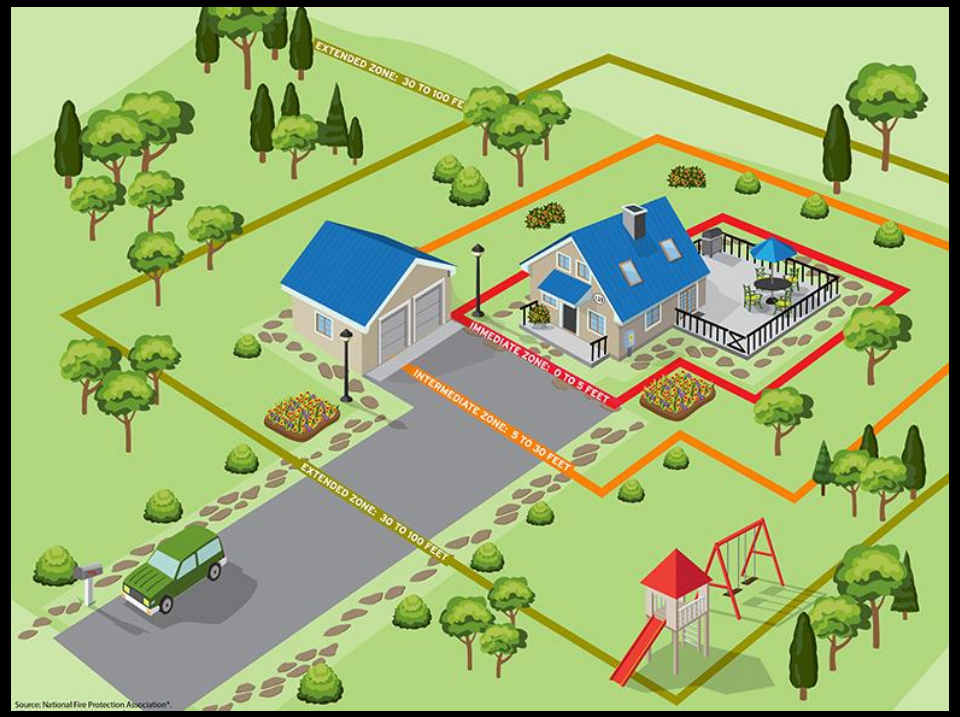
KEY TAKE-AWAYS: FOREST LANDSCAPES





1) Re-create diverse patterns of forest age, density, species composition, hardwoods are important
2) Rebuild patchworks of meadows, prairies, savannahs
3) Rebuild open & closed canopy forest mosaics
4) Promote these adaptation changes

KEY TAKE-AWAYS – BUILT ENVIRONMENTS



PROMOTE:

1) Adopting the WUI (wildland-urban interface) code, all of it
2) Maintaining defensible spaces – Google FIREWISE
3) Rural, maintaining working water storage tanks, hoses, pumps
4) Building with WUI approved building products – Google FIREWISE
5) Living in wood rather than smoke. Thin trees, reduce the smoke
5) Avoiding development in high fire danger areas, build up, not out
6) Appropriate air filtration - office buildings, homes
7) Emergency shelters and EM plans for shut-ins

Time tested methods for resilient landscapes

Promote them

1) Forest thinning & Rx burning –> an open canopy forest is a fire safe forest
2) Rx burning, maintenance treatments –> much reduced smoke vs. wildfire smoke
3) Managed wildfires in backcountry –> allow them to do good work of thinning by fire
4) Work at fast pace and large scale –> the opportunity will have passed next 15-20 years
5) Maintenance thinning and burning work –> an enduring trans-generational commitment
6) Resilience treatments provide a green fiber source for mass timber products
    - An end-to-end win for forests, carbon storage, healthy living environments

Why Mass Timber? –> Interacting Challenges

- Large & severe wildfires
- Drought, insects, diseases
- Protect communities
- Improve local economies
- Issues are cross-boundary
- More sustainable building materials

Mass Timber Strategy & Investments

Education

- WoodWorks Events
- Mass Timber Conferences
- Softwood Lumber Board

Technical Assistance

- WoodWorks Project Assistance
- Regional Wood and Biomass Coordinators

Research & Code

- Forest Products Laboratory (FPL), University, and other Research Partners
- Ad Hoc Committee on Tall Wood Buildings, 2021 IBC

Initiatives

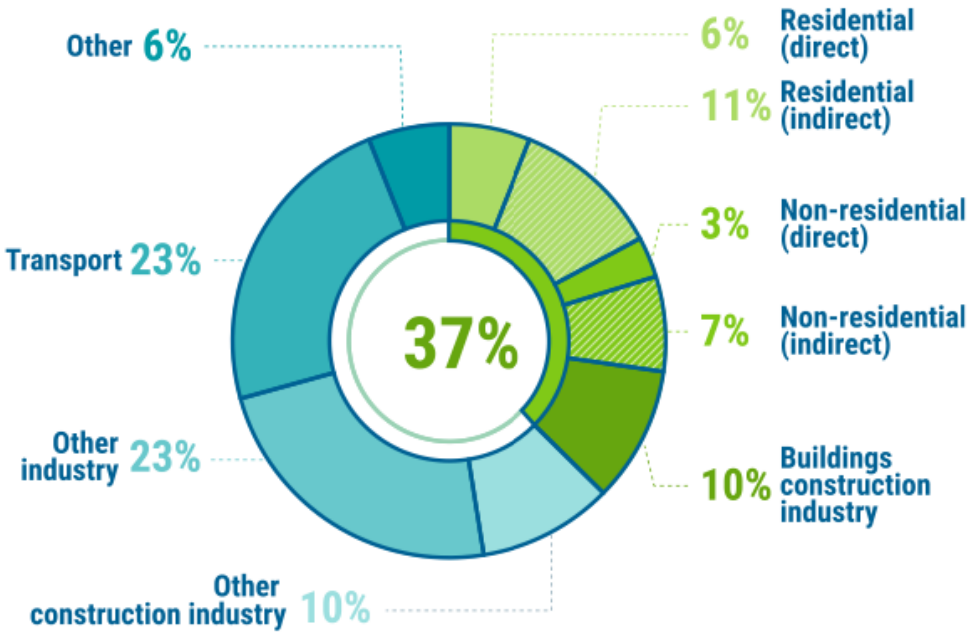
- U.S. Tall Wood Building Competitions (2015 and 2022)
- Wood Innovations, Community Wood Grant Programs
- Communications
- National Building Museum
- Impact Financing Pilot

Over $55 MM invested…

Thank you!

Paul.Hessburg @usda.gov
pfhess@uw.edu

ECONOMICALLY VIABLE REAL ESTATE RESPONSES TO FIRE & CLIMATE



EMISSIONS

Buildings and construction's share of global final energy and energy-related CO_2 emissions, 2020

Note: "Buildings construction industry" is the portion (estimated) of overall industry devoted to manufacturing building construction materials such as steel, cement and glass. Indirect emissions are emissions from power generation for electricity and commercial heat.

Source: IEA 2021a. All rights reserved. Adapted from "Tracking Clean Energy Progress"

Why the North American west is on fire

Climate change and forest-management practices both contribute.
But the worst may be yet to come

NOEL JOHNSON: noel@conradim.com

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CAVEAT: FIRES & CLIMATE JUST ONE OF MANY "BIG" RISKS

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LOCAL AND STUNNING IMPACTS MAKIE IT COMPARATIVELY TOP OF MIND

Santiam Fire of 2020: over 400,000 acres (Scale: 2x NYC, 27x Manhattan)
1,500 buildings lost and 5 persons killed

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FROM DESTRUCTION, BEAUTY AND FUNCTION CAN EMERGE

Wilson Subdivision: fire salvaged timber for building in a housing starved market
NW Neighborhood of Portland, Oregon

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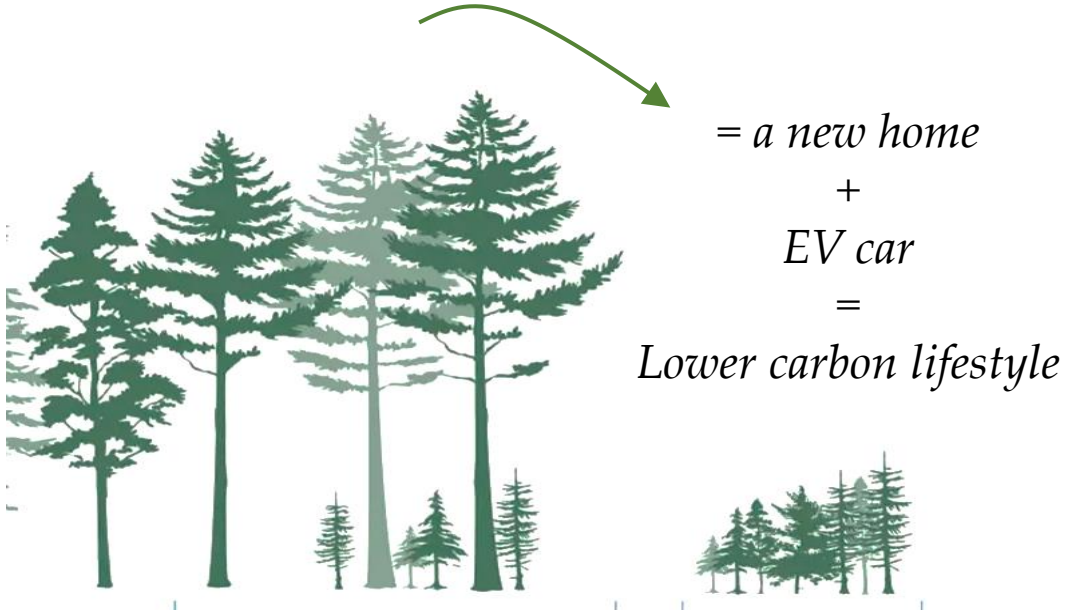
MATERIALS SOURCES

NO FREE LUNCH



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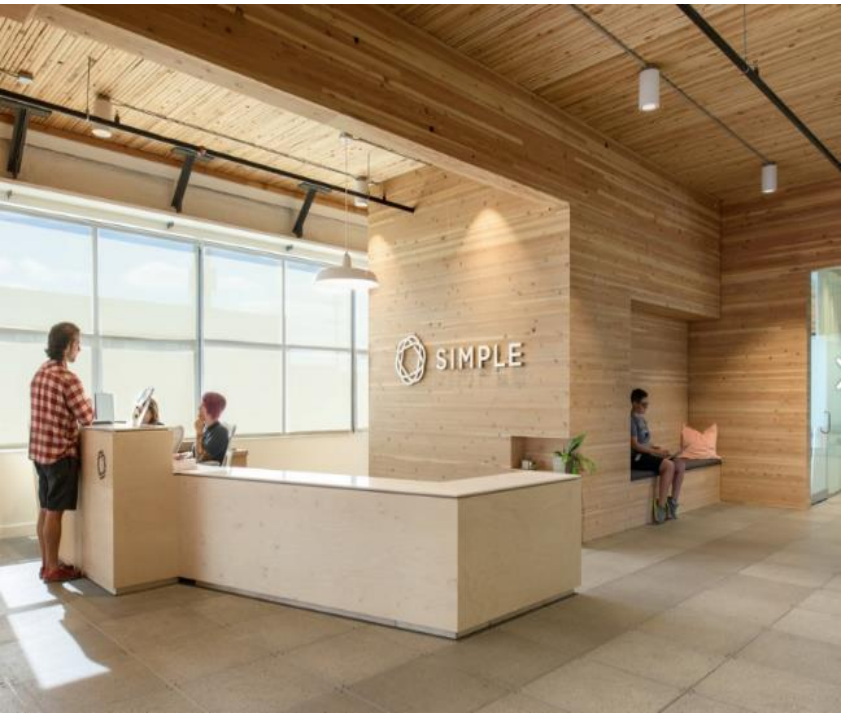
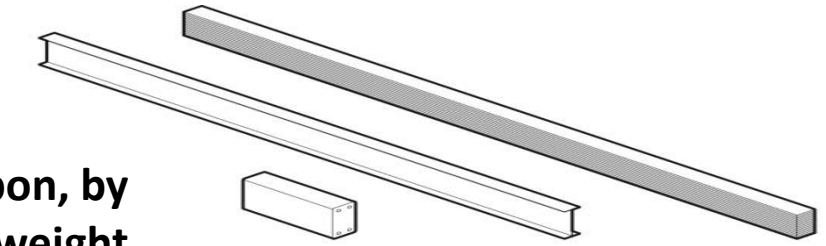
THREE STRUCTURAL OPTIONS EXIST

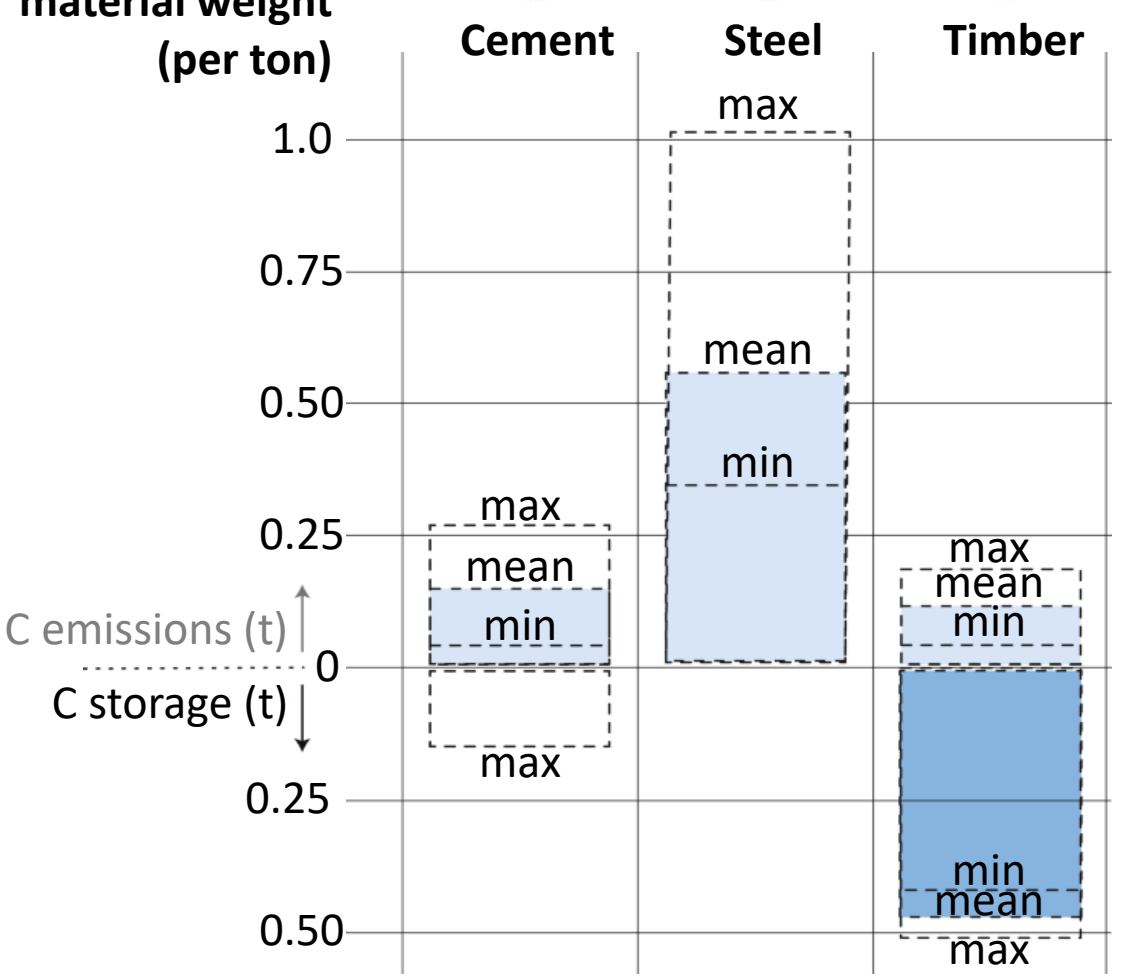
New buildings: they will be created, and will need to satisfy:

A. Occupants will continue to desire socially-responsible, healthy, beautiful **experience**

B. Investors will continue to want ESG, lower-volatility, differentiated cash flowing **assets**







Source: Buildings as a global carbon sink." Nature Sustainability 3, 269-276 (2020)

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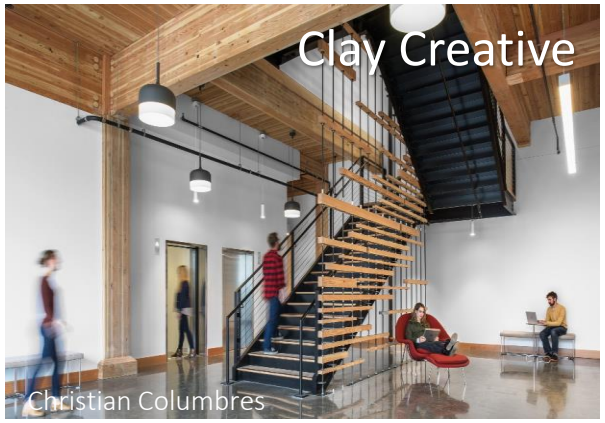
Mass Timber Business Case Studies: Value Creation Trends



Project Details, Costs, Returns
Challenges, Lessons Learned, Successes

Scan code
to download

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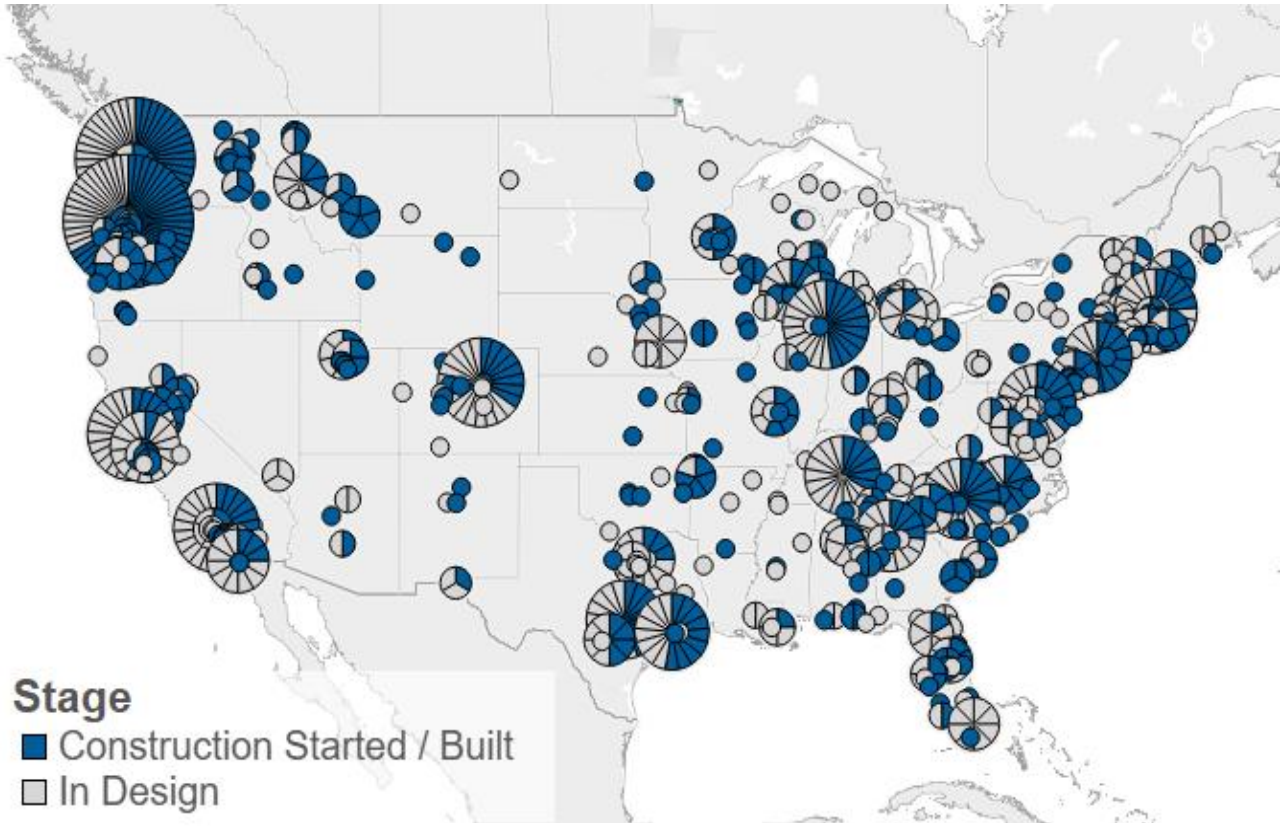
ULI Webinar: December 2022

Study Methodology

Every Mass Timber Project is different!

- Not all will be meaningful or relevant for analysis
- Some have key considerations unrelated to mass timber
- All must align to market rates and industry norms related to:
  - scale
  - impetus
  - location
  - asset class
  - sponsor



738 projects have been completed or started construction as of September 2022

1 De Haro Office Development

SAN FRANCISCO, CA

David Wakely

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Business Case Study

1 De Haro: Project Team

Owner
SKS Partners

Investor Profile
Confidential JV

Lender Profile
Northwestern Mutual Life

Architect
Perkins & Will

Structural Engineer
DCI Engineers

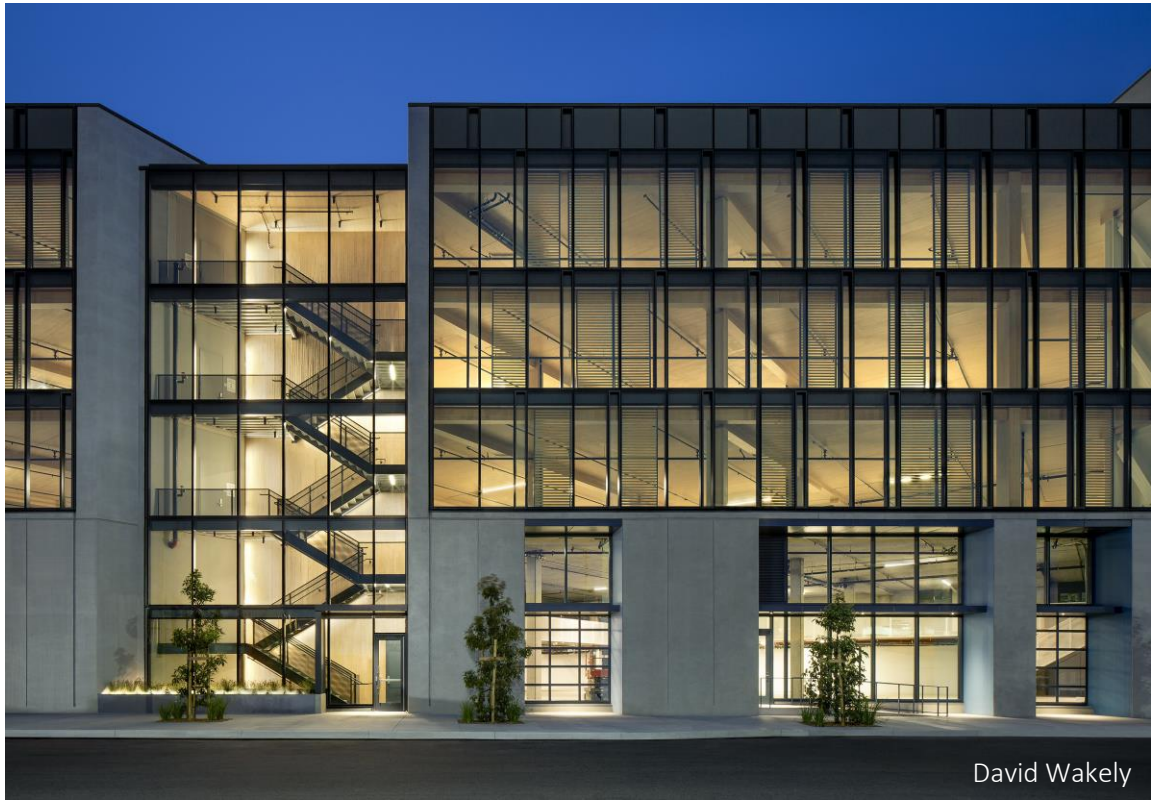
Contractor
Hathaway Dinwiddie


Steelblue, courtesy of SKS

Development Overview

- 58’ tall, 3-stories over concrete podium (4 stories total)
- 1st CLT building in San Francisco & 1st multi-story mass timber building of its type in CA
- Strategy: develop a building for ESG-focused firms and integrate design into submarket context
- Started as speculative office, but leased by the time construction began

Property Information	
Property timing	Completed in 2021
Submarket	SF SOMA + Potrero Hill
Construction Type	4-HT over 1A podium
Site size	43,350 sf
Gross building area	134,000 sf
Net rentable area (total)	122,927 sf


David Wakely

Quantitative Overview

Costs	Market Standard*	Actual	Realized
Construction costs	$385/ GSF	$392 / GSF** $52,500,000	~ 2% higher
Tenant improvement allowance	$100 / RSF	$106 / RSF*** (TIs ongoing)	higher
Broker commissions	$21 / RSF	$22 / RSF	higher

NOI			
Office	**Market**	**Pro Forma****	**Realized**
Office rental rates*	$90.00 /RSF/YR	$90.00 / RSF/YR	$90.00 / RSF/YR
		Multiple backup offers above accepted offer	
Lease structure	IG	IG	IG
Expenses	$16/ RSF/YR	$15/ RSF/YR	$16/ RSF/YR
Load factor	10% - 25%	13%	9%
Lease term (years)	7 years	7 years	10 years
Occupancy (100% leased at opening)	97%	95%	100% Single tenant
Production Distribution & Repair (PDR)	**Market**	**Pro Forma****	**Realized**
PDR rental rates	$66.00 / RSF/YR	$57.00 / RSF/YR	$66.00 / RSF/YR
Rent type (e.g., NNN)	IG	IG	IG
Occupancy (100% leased at opening)	95%	90%	100% Single tenant

**Market standard costs refer to normal cost to build for subject's use, irrespective of structural approach*
***Net add for CLT was $7/SF (material cost more but saved on foundations & schedule); dual designs and cost estimates to compare CLT to concrete structure carried through 100% Schematic Design*
****10,000 SF leased below-market rate to non-profit group for community benefit as part of entitlements; excluded from analysis*
*****Pro forma dated early 2019*

Return Performance (at Stabilization)			
Metric	**Market**	**Pro Forma**	**Realized**
Yield on cost – untrended	7.60%	7.50%	7.60%
Cap rate (mark-to-market if not sold)	5.00%	5.50%	Not yet known
Leverage	60% +	60%	77%
Return on equity, year one	N/A	Not measured	Higher
Gross leveraged equity multiple (deal level)	2.0x	2.5x	Higher

Timeline		
Event	**Date**	**Context/Comment**
Date of conception (first dollar spent)	Q2 2016	Mid to late-cycle
Date underwriting finalized (go/no-go decision)	Q2 2016	Mid to late-cycle
Date equity capital secured	Q2 2016	
Permitting duration	20 months	Equal due to proactive prep w/DBI
GMP in place (vertical)	Q2 2019	Phased GMP; late cycle
Construction start (vertical)	Q2 2019	Late cycle
Duration of construction (barring COVID/PG&E/wildfires)	10 months	Vertical to enclosure
Delays	+2 month +3 months	COVID pandemic PG&E/wildfires/COVID
Duration of vertical construction (w/delays)	15 months	
Construction completed	April 2021	Late-cycle
Tenant improvements	N/A	TI duration & execution currently underway
Date stabilized (100% occupancy at opening)	Oct 2021	

Multiple backup offers above accepted offer

1 De Haro: Qualitative Overview

Desirable, Distinct, Contextual Development

Lessons Learned

- **Lightweight structure:** Foundation costs reduced compared to equivalent concrete building
- **Grids:** 25’x30’ (without secondary beams) for open office flexibility accomplished via custom 7-ply CLT layup

Challenges

- **Delays**: Covid, PG&E, & wildfires delays as PG&E equipment used to service another project in fire region
- **Triangular site & easement**: Challenged timber efficiency while showcasing its versatility & adaptability

Successes

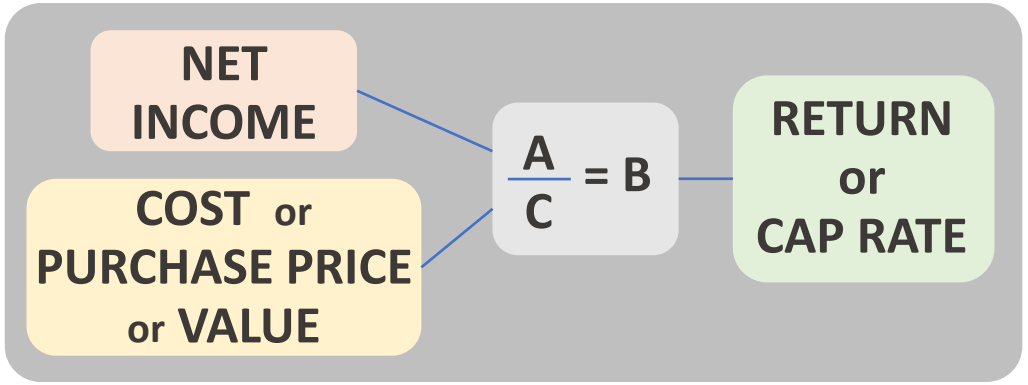
- **Appeal:** Warm aesthetic, biophilic benefits, ESG values
- **Shorter schedule & less noise:** Just-in-time delivery and quiet CLT installation w/ small crew

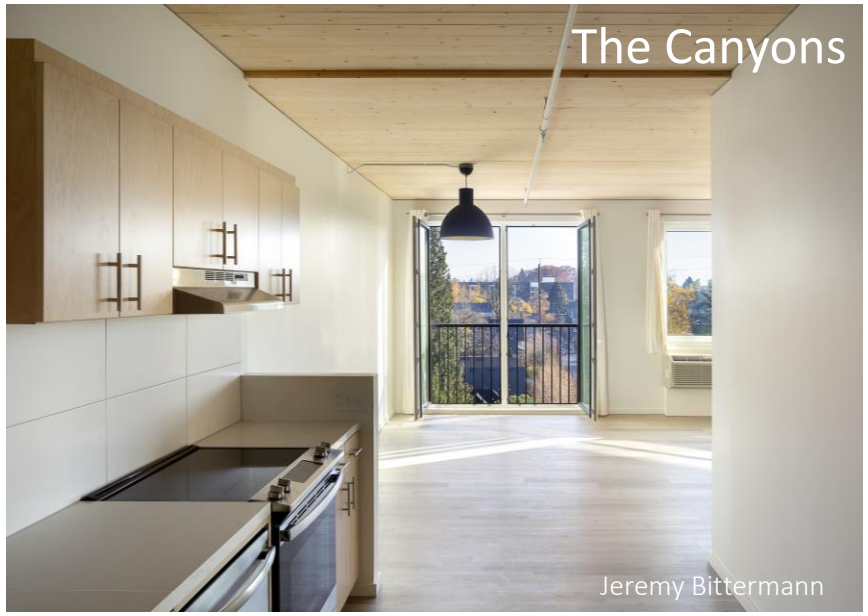
Analysis

The study uses simple, industry standard means of understanding economic viability

- Net Income (cashflows)
- Cost to develop (purchase price)
- Cap rate (initial return, excluding loans)

Levers for Value Creation





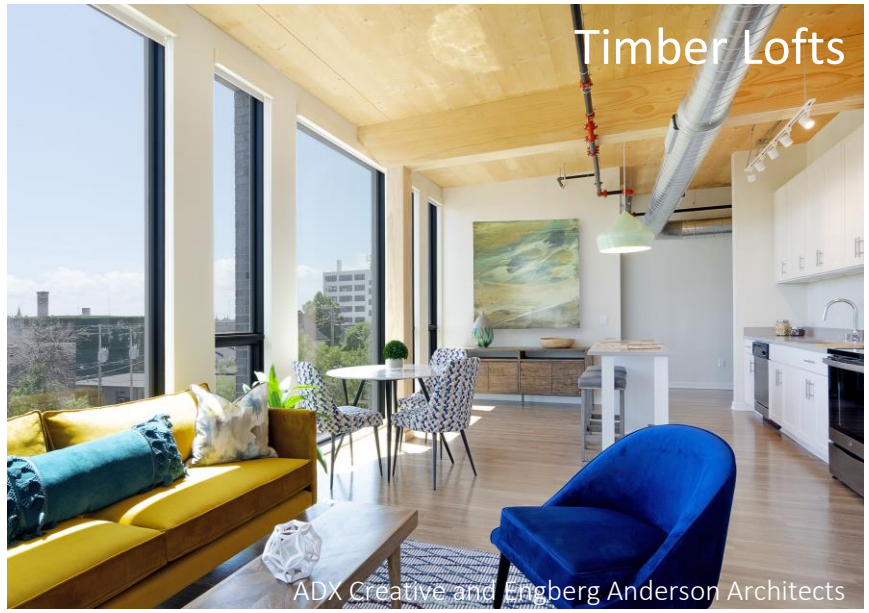
Office & Multifamily Tend to:

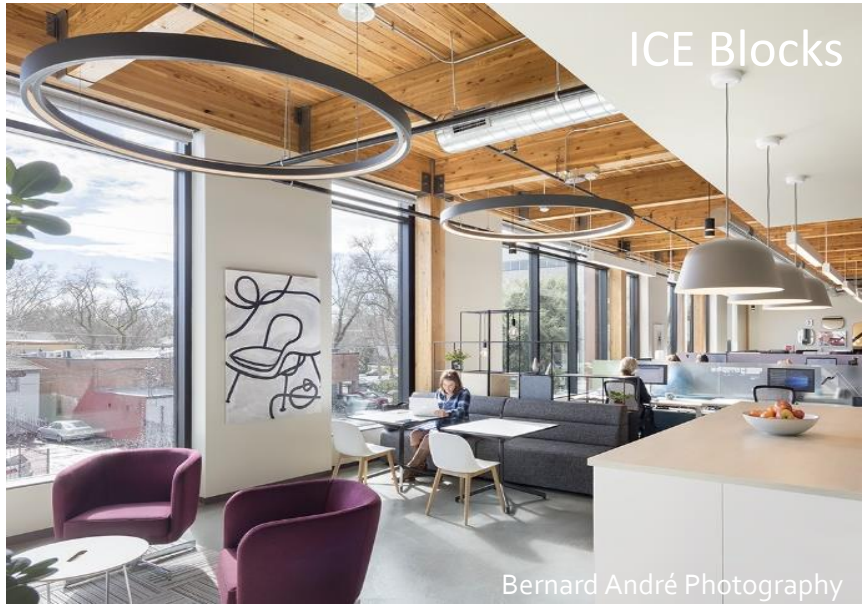
Lease up faster than submarket norms; which translates to:

- Higher net income
- Lower income volatility
- Better IRR
- Lower risk via quicker to refinance/ sell

Attract quality tenants; which translates to:

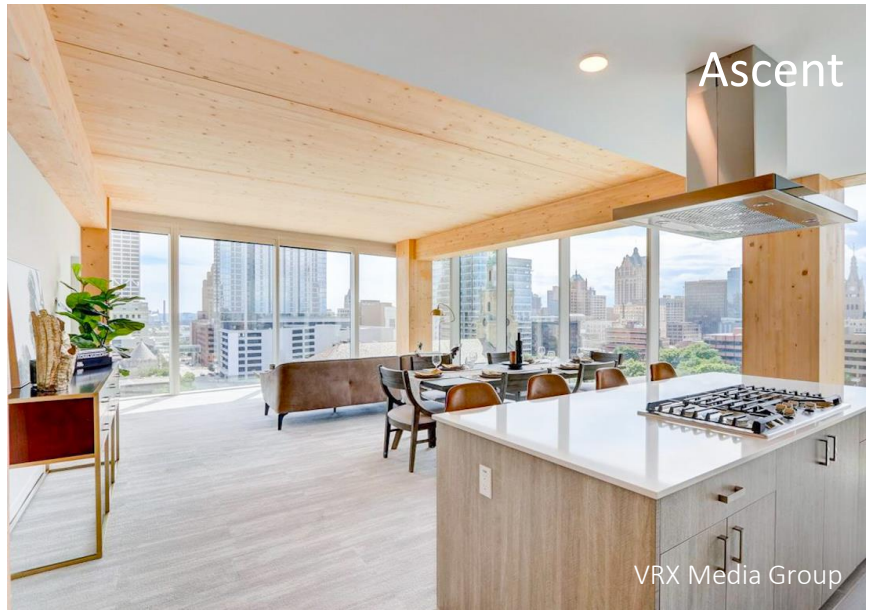
- Better rent collection
- Better (lower) cap rates
- Better (stable) occupancy





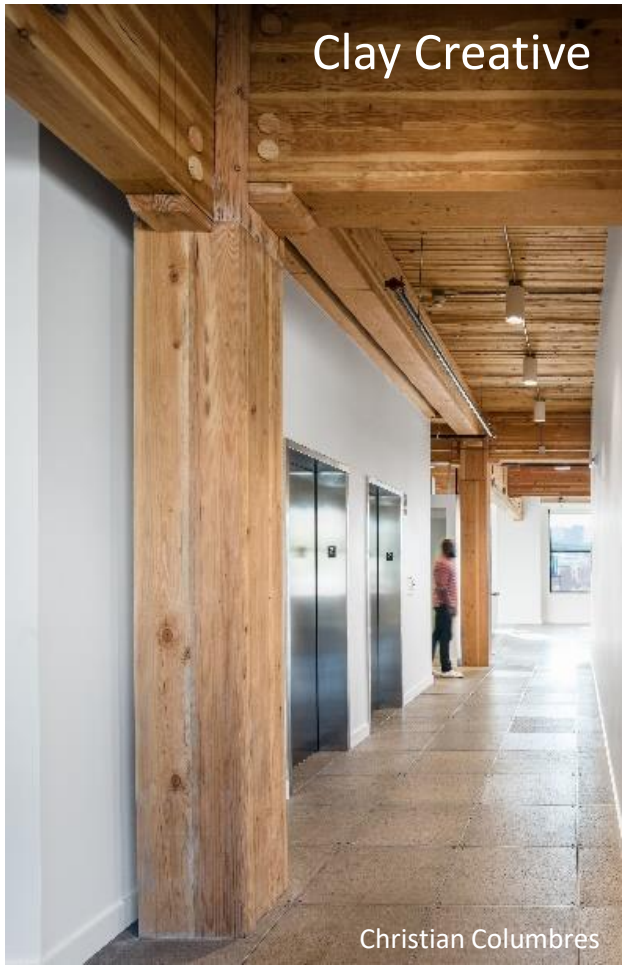
Residents respond to "look & feel"

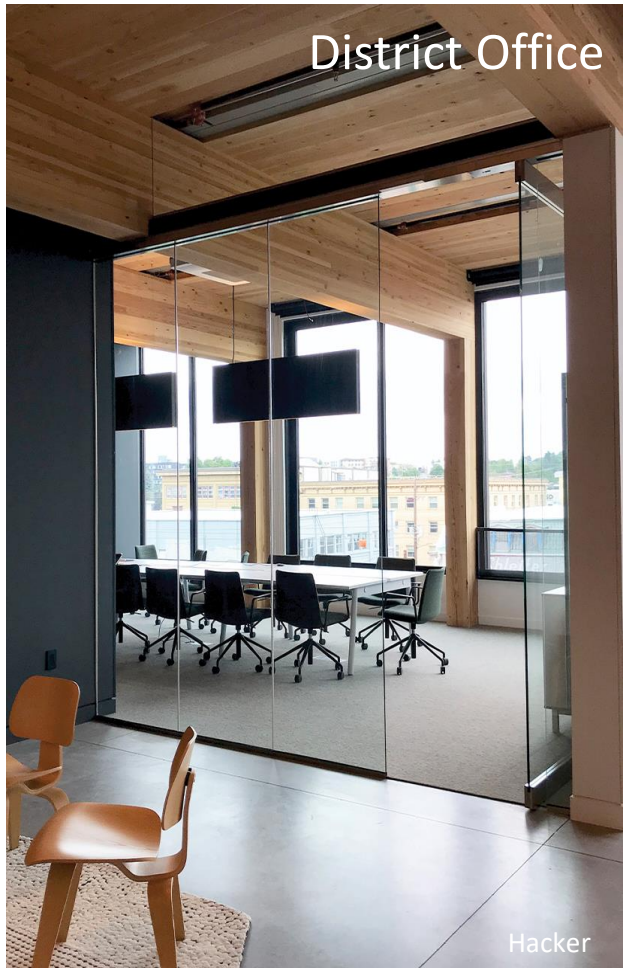
- Aesthetics seem to be broadly appealing; wider target markets = better market demand
- Robust pre-leasing = lower costs & risks
  - More income sooner = lowers operating & interest budgets
  - Faster to stabilization = faster to refinance
- Tangible distinction = mitigates future supply risk
- Tangible realization of desired brand identities



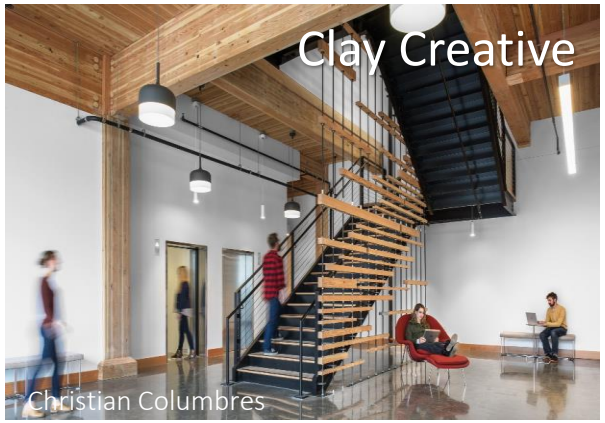
Firms Attracted for Myriad Reasons

- Most tenants are "creditworthy"
- Desire intangible stakeholder benefits
  - Workforce Desires
  - Regulatory Perceptions
  - Brand Position
- Tend to see impressive pre-leasing
  - Enables better construction debt
  - Sets perceptions of desirable development
- Seeing sustained occupancy via subleasing
  - Tested by COVID disruptions





Mass Timber Business Case Studies: Download Online



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