

An update on wildfire activity, modeling and regulation

CAS Annual Meeting 2021
San Diego

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Today's discussion

The California Wildfire scene

- Recent events
- Why is California burning so much?

Tools to address Wildfire risk

- CAT Models
- Mitigations

Impacts

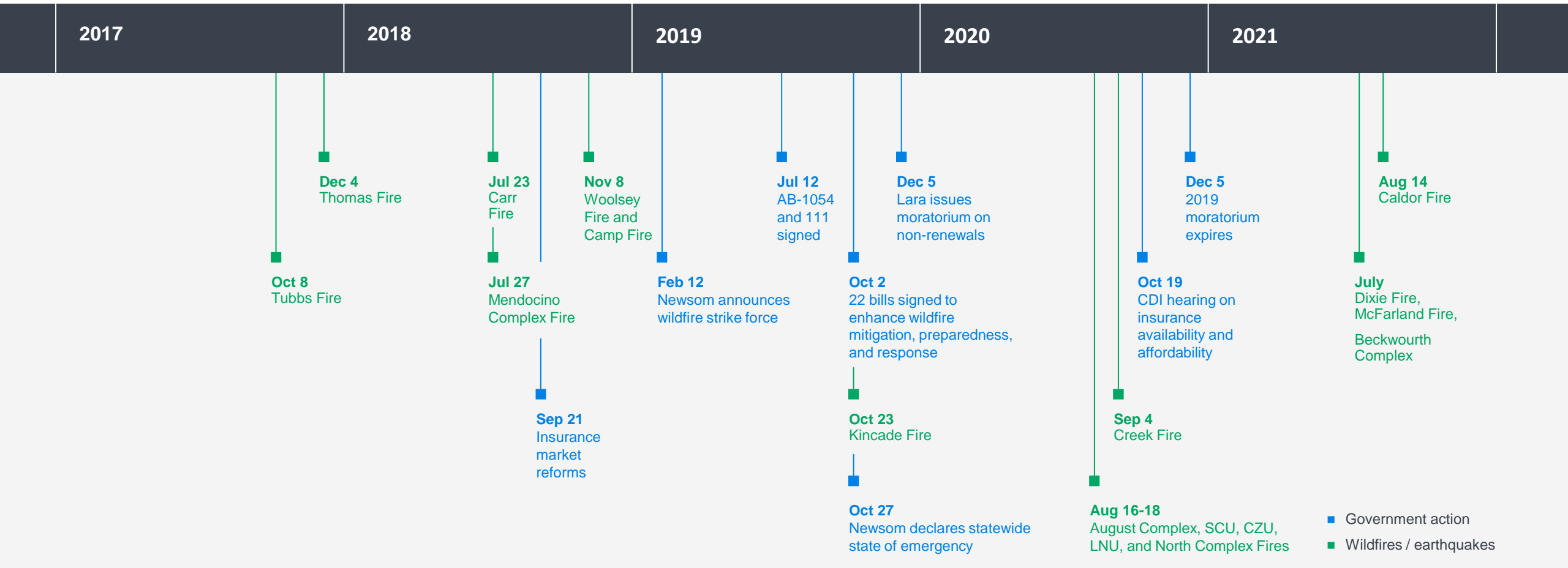
- Regulatory Actions
- Insurance Industry
- The CA Wildfire Fund

What could happen



California Wildfire

2017 and beyond



Top 20 most destructive California wildfires

13 of California's 20 most destructive wildfires have happened since 2017.

Fire name (cause)	Date	County	Acres	Structures	Deaths	Fire name (cause)	Date	County	Acres	Structures	Deaths
1. Camp (Powerlines)	NOV 2018	Butte	153,336	18,804	85	11. LNU Lightning Complex (Lightning/Arson)	AUG 2020	Napa, Solano, Sonoma, Yolo, Lake, & Colusa	363,220	1,491	6
2. Tubbs (Electrical)	OCT 2017	Napa & Sonoma	36,807	5,636	22	12. CZU Lightning Complex (Lightning)	AUG 2020	Santa Cruz, San Mateo	86,509	1,490	1
3. Tunnel – Oakland Hills (Rekindle)	OCT 1991	Alameda	1,600	2,900	25	13. Nuns (Powerlines)	OCT 2017	Sonoma	54,382	1,355	3
4. Cedar (Human related)	OCT 2003	San Diego	273,246	2,820	15	14. Dixie (Under investigation)*	July 2021	Butte, Plumas, Lassen, & Tehama	963,309	1,329	1
5. North Complex (Lightning)	AUG 2020	Butte, Plumas, & Yuba	318,935	2,352	15	15. Thomas (Powerline)	DEC 2017	Ventura & Santa Barbara	281,893	1,063	2
6. Valley (Electrical)	SEP 2015	Lake, Napa, & Sonoma	76,067	1,955	4	16. Caldor (Under investigation)	SEP 2021	Alpine, Amador, & El Dorado	221,775	1,003	1
7. With (Powerlines)	OCT 2007	San Diego	197,990	1,650	2	17. Old (Human related)	OCT 2003	San Bernardino	91,281	1,003	6
8. Woolsey (Electrical)	NOV 2018	Ventura	96,949	1,643	3	18. Jones (Undetermined)	OCT 1999	Shasta	26,200	954	1
9. Carr (Human related)	July 2018	Shasta County, Trinity	229,651	1,614	8	19. August Complex (Lightning)	AUG 2020	Mendocino, Humboldt, Trinity, Tehama, Glenn, Lake, & Colusa	1,032,648	935	1
10. Glass (Undetermined)	SEP 2020	Napa & Sonoma	67,484	1,520	0	20. Butte (Powerlines)	SEP 2015	Amador & Calaveras	70,868	921	2



10/6/2021

"Structures" include homes, outbuildings (barns, garages, sheds, etc.) and commercial properties destroyed. This list does not include fire jurisdiction. These are the Top 20 regardless of whether they were state, federal, or local responsibility. *Numbers not final

California Wildfire

Why is California burning so much?

Climate

Change in temperature and rainfall patterns

- “Anthropogenic climate change accounted for ~55% of observed increases in fuel aridity from 1979 to 2015 across western U.S. forests.”
- Urban development increases air temperatures, as the natural environment is replaced with impervious surfaces, such as roads, sidewalks, and parking lots.

Santa Ana Winds

Dry air from the Great Basin area of the West → Southern California

- Dry out vegetation + move embers around.
- Drives the Oct–Apr CA wildfire season.
- Fires tend to spread three times faster and burn closer to urban areas

Historical Suppression

“10am” Rule: The U.S. Forest Service’s fire management policy stipulated that all wildfires were to be suppressed by 10 am the morning after they were first spotted.

- “10 am” rule enforced from 1935-1978.
- Caused top duff layer (dead leaves and other shed vegetation).
- Allows smoldering of dead fuel for long duration.

Growth in the WUI

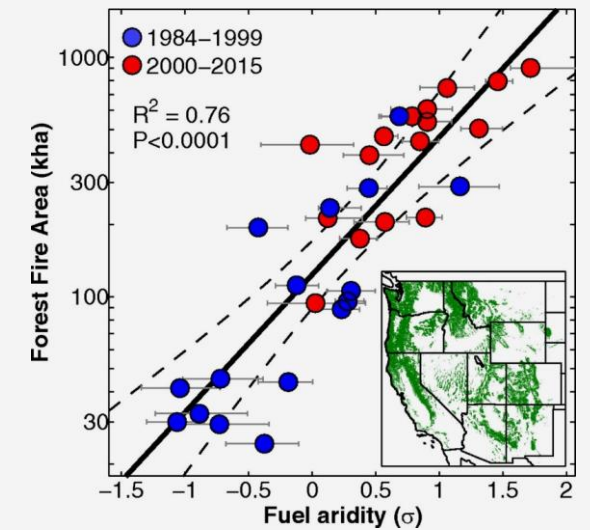
WUI in the U.S. grew rapidly from 1990 to 2010, from 30.8M to 43.4M houses; 41% growth.

- More on the next slide.

Weather Leading Up to 2017

High fuel loads, dry fuels, low humidity, and high temperatures

- 6 years of increasing intense drought.
- Winter/Spring of 2016/2017 had record precipitation in California, spurring new fuel growth.



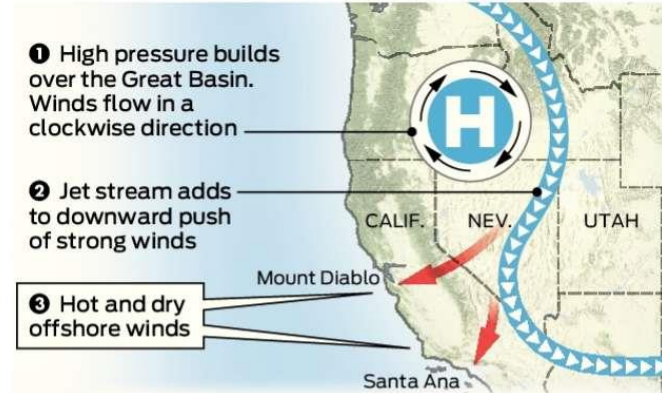
Source: National Academy of Sciences. Abatzoglou and Williams

California Wildfire

The Diablo and Santa Ana Winds

What creates dangerous winds

The Diablo winds that were forecast for Northern California usually come in the fall, but their behavior is hard to predict because mountains, valleys and even cloud formations can alter their speed and direction.

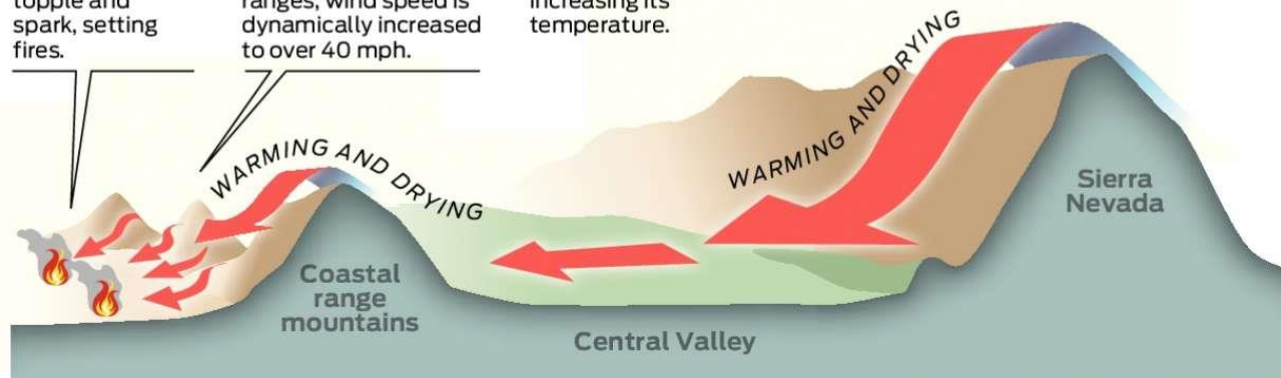


7 The excessive wind can cause power lines to topple and spark, setting fires.

6 Squeezing through canyons and gaps of the coastal mountain ranges, wind speed is dynamically increased to over 40 mph.

5 Winds come into contact with warm Central Valley air, increasing its temperature.

4 High-pressure wind cascades over the Sierra mountains. The air is compressed, increasing temperature and reducing humidity.



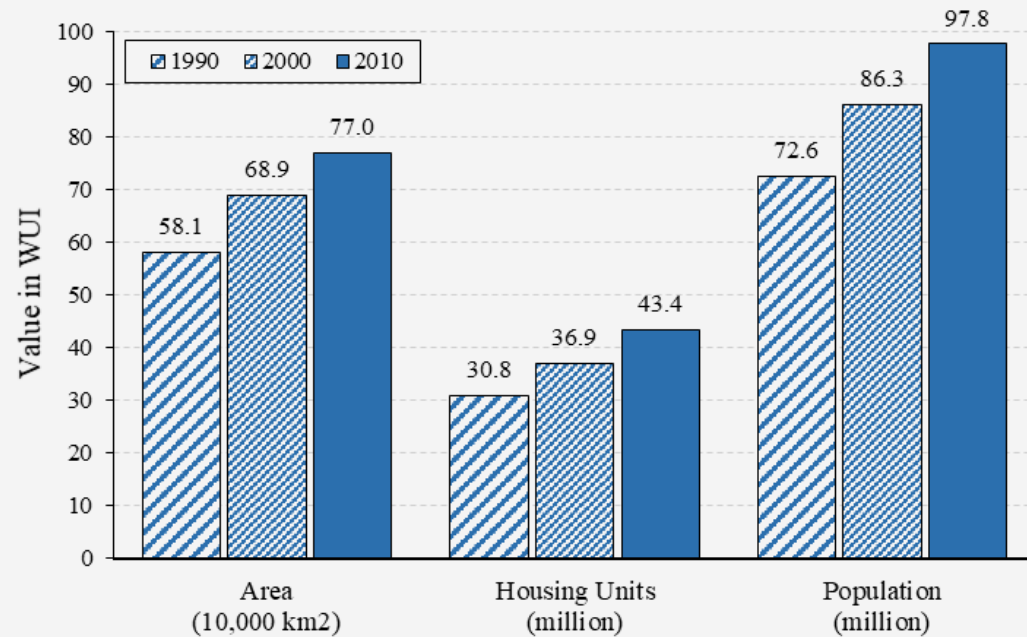
Sources: National Weather Service; NOAA

John Blanchard / The Chronicle

California Wildfire

Growth in the WUI*

- Interface: A zone where continuous wildland is adjacent to a developed area.
- Intermix: An area where residential and commercial structures are intermixed with the wildland



41% growth in number of housing units in the WUI.



Impacts: Regulatory

Senate and assembly bills

Bill	Approved	Filed	Action	
SB 824	9/21/2018	9/21/2018	<ul style="list-style-type: none"> Prohibits cancellation or non-renewals for one full year in wildfire areas. 	Other noteworthy bills <ul style="list-style-type: none"> February 2020: AB 2367 was introduced. Included requirement to write homes meeting standards for fire hardening. August 2020: AB 2167 and SB 292 failed. Included measures favorable to the industry (“IMAP filings”).
SB 894	9/21/2018	9/21/2018	<ul style="list-style-type: none"> Renewals required for 2 years under specific conditions. Extended additional living expenses up to 36 months. Insurers required to combine policy limits for structures coverage for some policies. 	
SB 901	9/21/2018	9/21/2018	<ul style="list-style-type: none"> Requires electric utilities to prepare wildfire mitigation plans (e.g. Public Safety Power Shutoff (PSPS) events) 	
SB 917	9/21/2018	9/21/2018	<ul style="list-style-type: none"> Requires coverage to be provided if fire is found to be an effective proximate cause. 	
SB 1772	9/21/2018	9/21/2018	<ul style="list-style-type: none"> Extends rebuilding timeframe. Insured receives full replacement costs. 	
AB 1054	7/12/2019	7/12/2019	<ul style="list-style-type: none"> Establishing the Wildfire Fund to pay eligible claims. 	
AB 111	7/12/2019	7/12/2019	<ul style="list-style-type: none"> Establishing the Wildfire Fund to pay eligible claims. 	
AB 1797	8/27/2018	8/27/2018	<ul style="list-style-type: none"> Requires insurers to provide estimate of rebuilding cost. 	
AB 1799	7/9/2018	7/9/2018	<ul style="list-style-type: none"> Requires insurers to provide one free, full set of certified policy documents. 	
AB 1800	9/21/2018	9/21/2018	<ul style="list-style-type: none"> Clarifies that insurer must pay the full coverage regardless of whether policyholder chooses to rebuild at the same location. 	
AB 1875	9/21/2018	9/21/2018	<ul style="list-style-type: none"> Requires the Department of Insurance to establish the California Home Insurance Finder on its website. 	
AB 2756	9/29/2020	9/29/2020	<ul style="list-style-type: none"> Requires signed acknowledgement when a new policy does not cover losses from fire. Requires fire policies to include a minimum of 10% of coverage A as additional cost of compliance. 	

Impacts: Wildfire Utility Fund

Doctrine of inverse condemnation → A utility is liable for wildfires caused by equipment it maintains (regardless of negligence)

Wildfire Utility Fund

- Established in July 2019 under AB 1054 and AB 1514
- Administered by CEA
- Established to provide a source of money to pay or reimburse utility companies for eligible claims that result from a wildfire
- Capitalized by utility companies and their ratepayers
- Covers losses in excess of \$1B IOU retention during each wildfire season
- No claims have been made in 2020 and 2021, but some fires are still under investigation

PG&E Corporation

PCG

\$9.65 ↓ 81.42% -42.28 5Y

After Hours: \$9.60 (↓ -0.52%) -\$0.05

Closed: Nov 2, 7:07:00 PM UTC-5 · USD · NYSE · Disclaimer

1D 5D 1M 6M YTD 1Y 5Y MAX



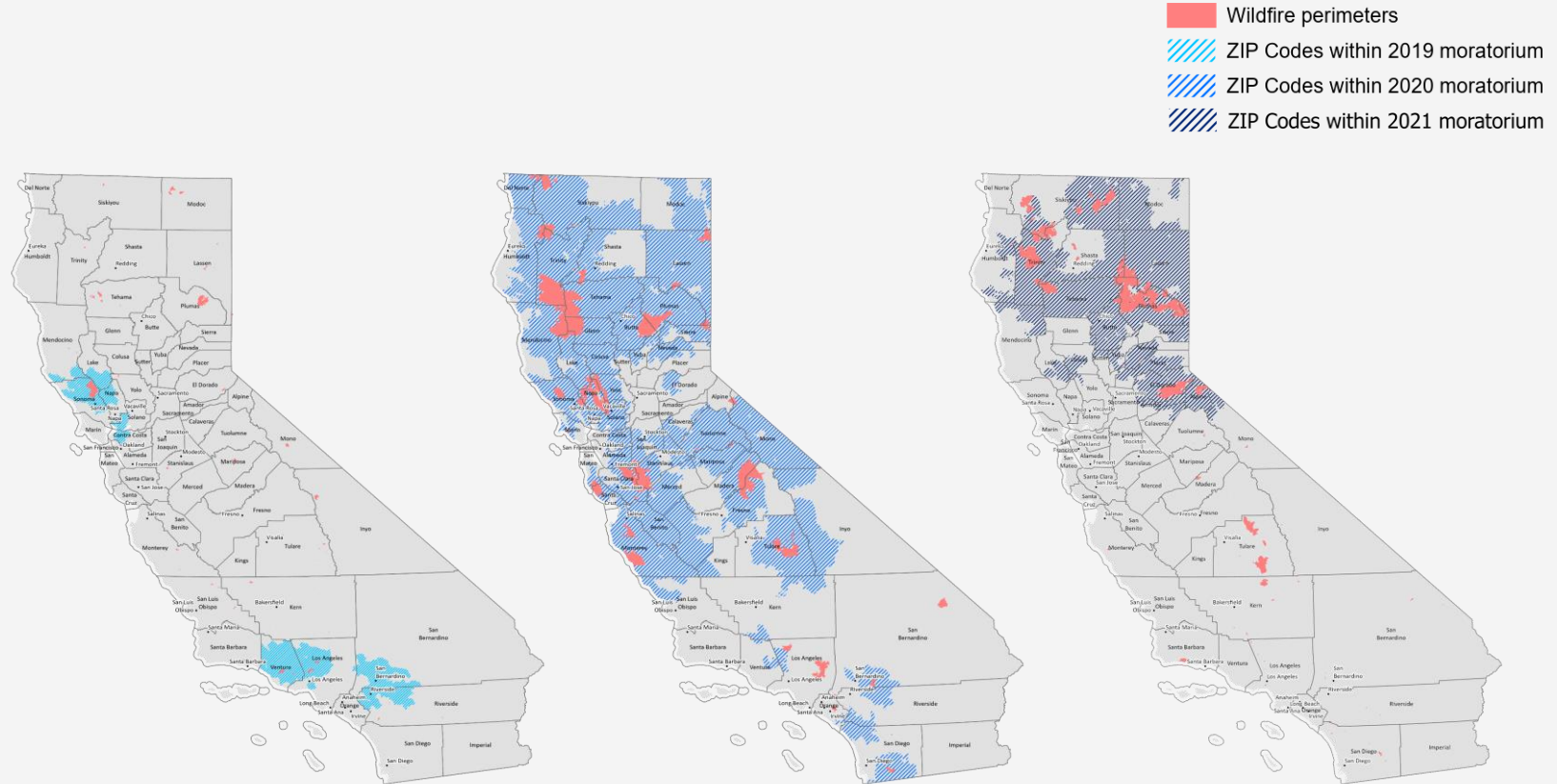
PG&E was liable for billions of dollars of damage and its solvency was threatened.

Impacts: Regulatory

Moratoriums on non-renewals

Single Family Homes (in 000s)

Year	Inside Moratorium	Outside Moratorium
2019	1,101	7,385
2020	1,642	6,844
2021	261	8,262



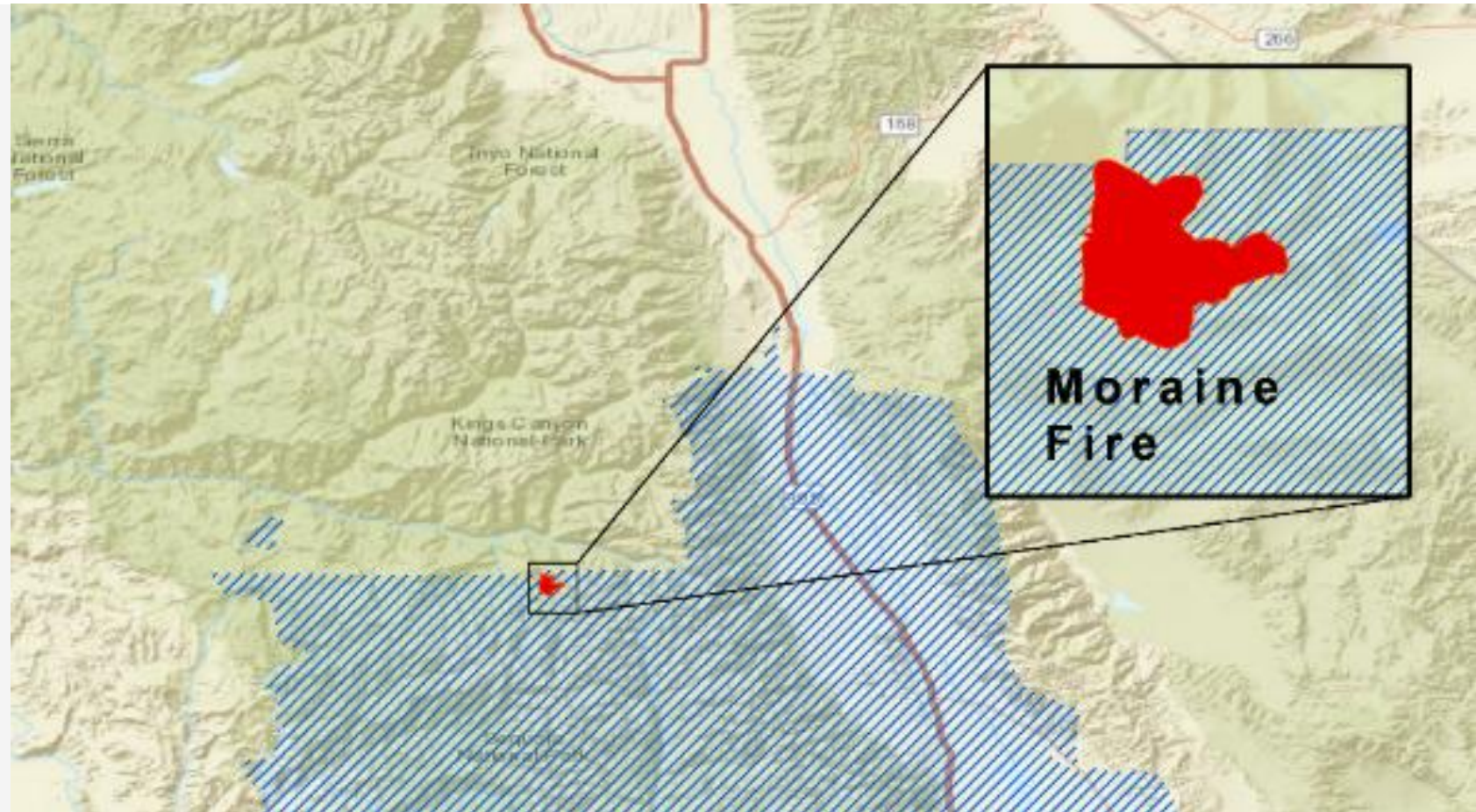
Sources: Cal Fire, US Census

Impacts: Regulatory

Moratoriums on non-renewals

Moraine fire was a small 1,243 acre fire which burned in the Sequoia Kings Canyon Wilderness.

It triggered a moratorium in 14 nearby ZIP Codes



Impacts: Regulatory

\$15B CA Climate Package

Background

- April 2021: Drought emergency for Russian River Watershed (41 counties and 30% of the state's population).
- July 2021: Dixie Fire (1M acres).
- August 2021: Caldor Fire (200k acres).

Tangent

- U.N. Intergovernmental Panel on Climate Change: "human led" climate change has made extreme heatwaves, droughts, and flooding more likely
- Congressional Democrats and President Joe Biden seeking to pass a \$3.5T spending package to combat climate change

CA Climate Change Package

\$ 5.2B → Emergency drought relief projects + expand state water supplies.

\$ 1.5B → Clearing brush and dead trees in forests to mitigate wildfire risk.

\$ 3.7B → Climate change projects: e.g. urban greening projects to mitigate extreme heat, address threat of sea level rise.

\$ 3.9B → Allocated to buy zero-emission school and transit busses/other state vehicles.

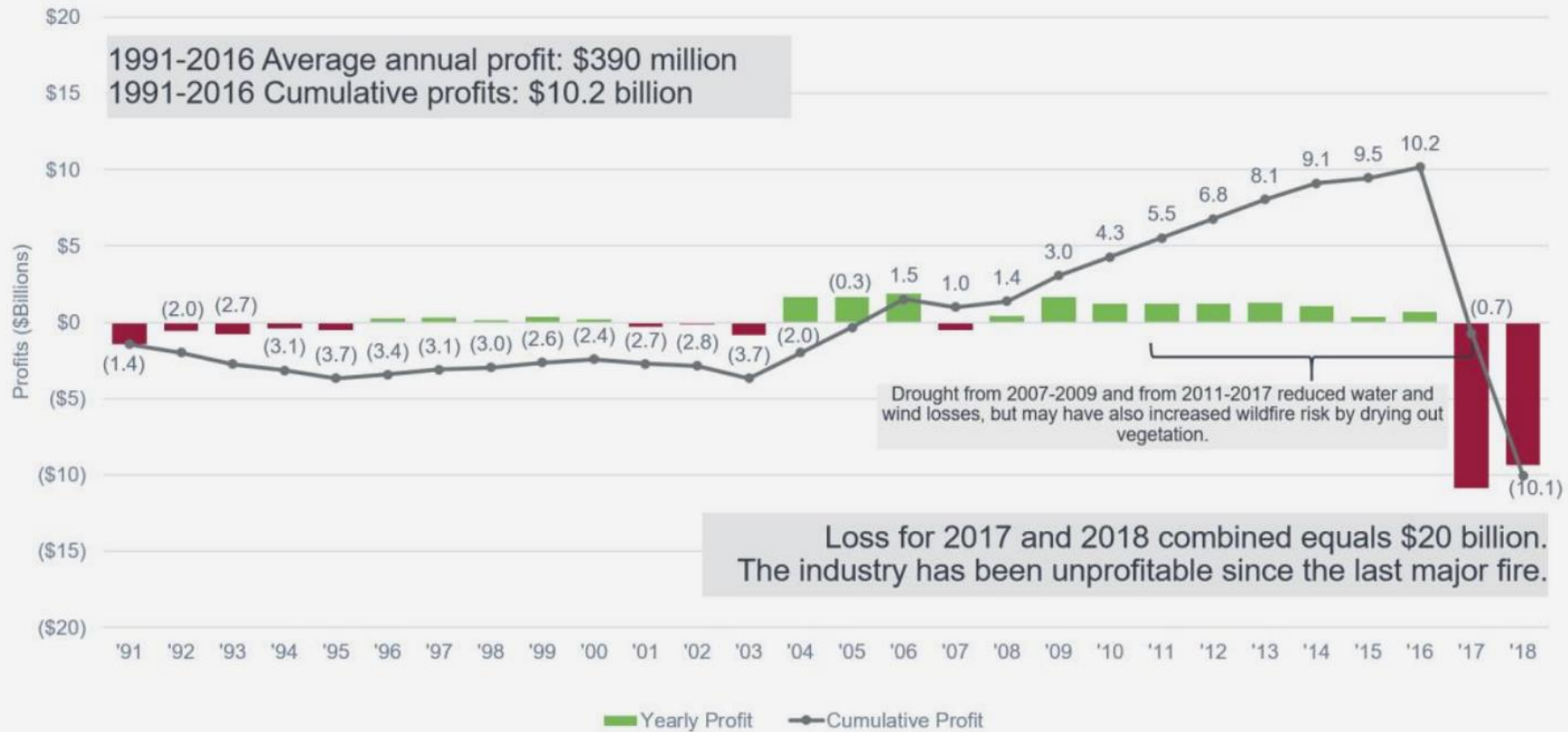
\$ 1.1B → Reduce emissions from agriculture equipment and livestock and other agriculture programs.

“At the end of the day we have to deal with the realities of climate change that are here right now. We can't afford to sit back passively and watch the debate unfold in Washington D.C.,”

- CA Gov Newsom

Impacts: Insurance industry

Underwriting profit



Impacts: Insurance industry

Non-Renewals and the FAIR Plan

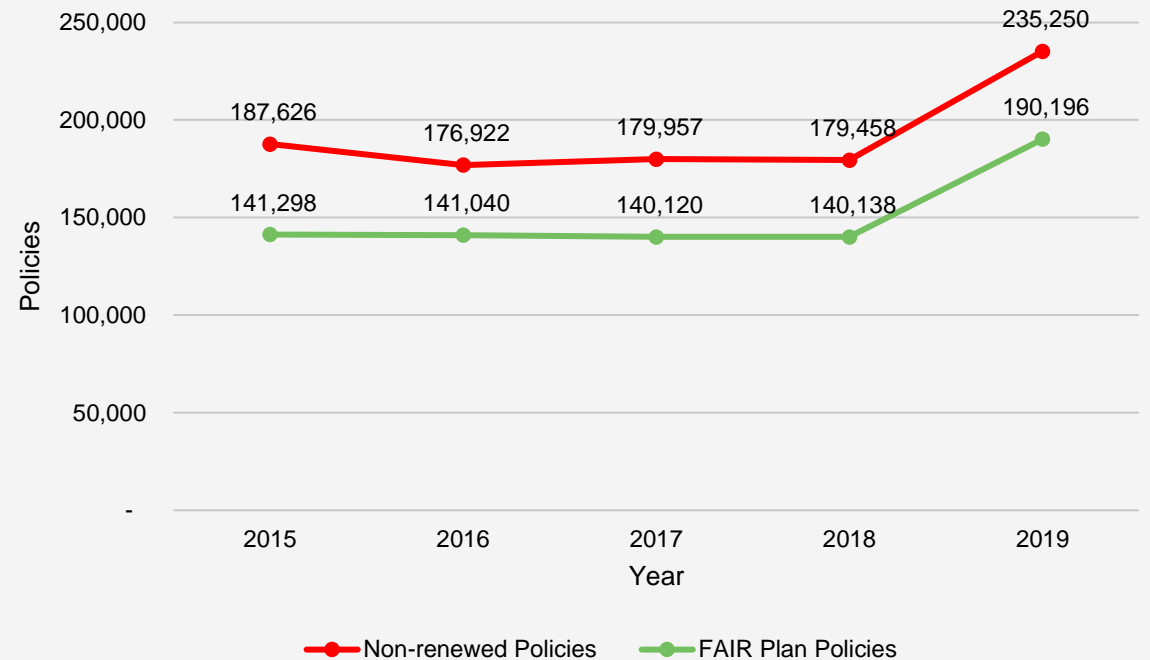
FAIR Plan annualized increases (2018 to 2019)

Insured value 36%

Expected losses 81%

The FAIR plan experienced relatively high growth specifically in wildfire exposed areas.

Non-Renewals and FAIR Plan Policies



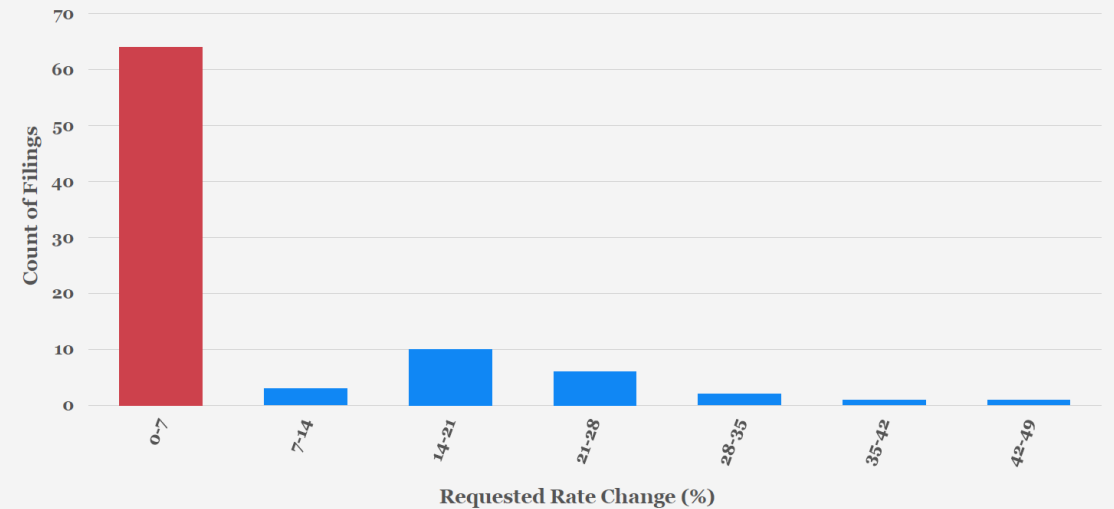
Source: California Department of Insurance's "Data on Insurance Non-Renewals, FAIR Plan and Surplus lines (2015-2019)"

Impacts: Insurance Industry

Ratemaking Issues

Prop 103	CAT load must be based on 20-year average of actual claims (Code 2655.5)	
	Loading for the cost of reinsurance is not permitted (Code 2644.25)	
	Rate changes above +6.9% are more likely to result in challenges	
Rate filing	January 2017 to September 2020	
	Filings	Average approval time (Days)
	Non-intervened HO	160
	Intervened HO	337
All homeowners	254	167

Insurance Companies Often Request Rate Increases Under 7%



Impacts: Insurance Industry

CDI Public Discussion on November 10, 2021: Mitigation in Rating Plans and Wildfire Risk Models (2644.9)

Use of mandatory factors

- Community mitigation efforts
 - Firebreaks
 - Existence of Fire Safe Council
 - “Widespread adherence to building codes in community”
- Property-level mitigation efforts
 - Defensible space measures
 - Implementation of building standards
 - Retrofits and “other measures”

Optional factors

- “...do not result in rates that are excessive, inadequate or unfairly discriminatory.”
- Fuel
- Slope
- Access
- Distance to other high risk areas
- Aspect
- Structural characteristics
- Wind

Filings

- “...any records, data, algorithms, computer programs, or any other information...shall be available for public inspection...regardless of the source of such information, or whether...the rating plan or wildfire risk model is confidential, proprietary, or trade secret.”
- Initial rate application utilizing wildfire risk model must incorporate the insurer’s own CA wildfire loss data.

Policyholder rights

- Must provide to policyholder:
 - Wildfire score
 - Range of possible scores/factors
 - “A detailed explanation”
 - Possible mitigation measures to change the score, and the associated premium reduction
- Must have process for appeals of wildfire scores

Impacts: Insurance industry

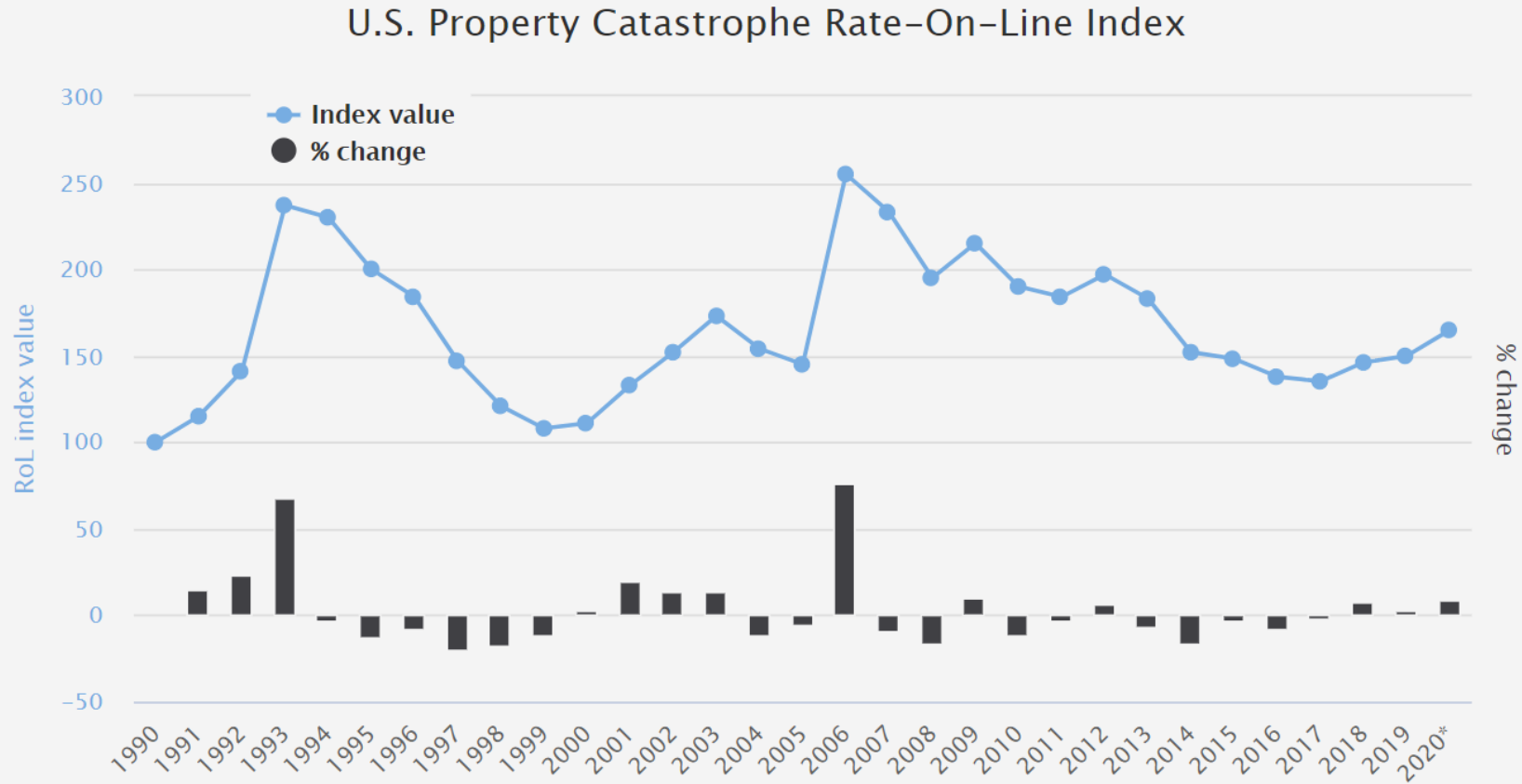
Historical CAT loads of large CA insurers

Year	Non-CAT Loss	CAT Loss	CAT / Non-CAT Ratio	Selected Catastrophe Load	Year	Non-CAT Loss	CAT Loss	CAT / Non-CAT Ratio	Selected Catastrophe Load
1997	101	5	5%		2008	320	75	23%	1997-2016 CAT Load: 11% 1998-2017 CAT Load: 23% 1999-2018 CAT Load: 53%
1998	123	14	11%		2009	334	3	1%	
1999	131	7	5%		2010	332	3	1%	
2000	179	(0)	0%		2011	396	17	4%	
2001	216	1	1%		2012	345	2	1%	
2002	236	8	3%		2013	386	0	0%	
2003	159	78	49%		2014	350	22	6%	
2004	183	5	3%		2015	394	145	37%	
2005	197	12	6%		2016	403	14	4%	
2006	230	7	3%		2017	478	1,243	260%	
2007	251	120	48%		2018	390	2,395	614%	

Example based on filings from three large California insurers

Impacts: Insurance industry

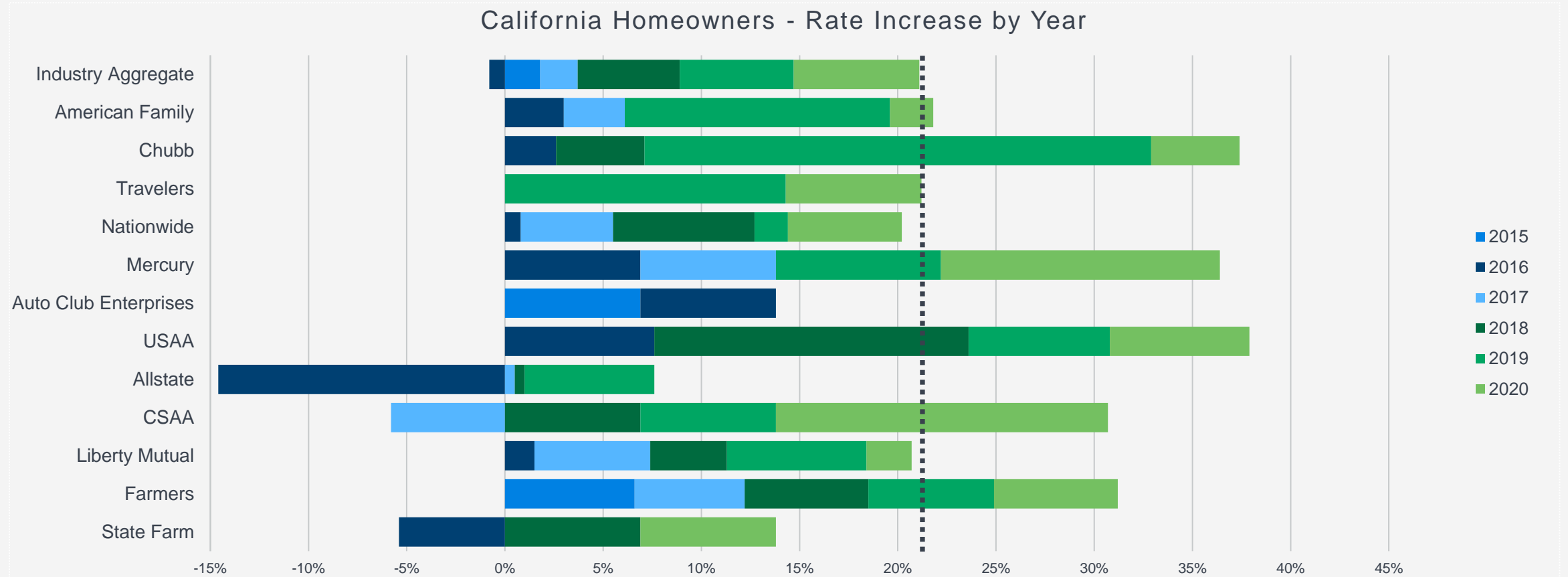
Reinsurance cost



Source: Data from Guy Carpenter, presented by Artemis.bm

Impacts: Insurance industry

Rate increases



Tools to address wildfire risk

Mitigation: Reduce the risk

Actions by utility companies



High fire risk inspections

- Inspection of overhead transmission, distribution, and generation equipment in high fire risk areas
- Ground inspections by crews
- Aerial inspections by helicopters and drones



Grid design and system hardening

- Replacing bare wire with insulated wire
- Replacing power poles with fire-resistant composite poles/install fire-resistant wraps
- Install fast-acting fuses
- “Undergrounding” wires



Situational awareness

- Weather stations
- Wildfire cameras



Vegetation management

- Inspect, trim, and remove trees



Public Safety Power Shutoffs (PSPS)

- Temporarily shut off power to neighborhood when there is a high risk for a fire

Source: Our Wildfire Safety Measures | Safety | Home - SCE

Tools to address wildfire risk

Mitigation: Reduce the risk

Actions by individuals and communities

- Fire rated roofs
- Buffer around the home
- Remove items under deck
- Add/upgrade vent screens
- Remove back-to-back rows of fencing
- Replace combustible fencing/gates
- Trim trees
- Replace sidings
- Enclose eaves
- Fire-resistant deck
- Upgrade windows
- Enclose under-bay windows
- Use metal gutters instead of vinyl ones
- Urban planning
- Community fire programs

Source: [Wildfire Ready – DISASTERSAFETY.ORG](https://www.disastersafety.org)



What could happen

Options for regulators

Restrictions on rate / underwriting

- Could temporarily forego non-renewals/large rate fluctuations, but could ultimately have the opposite effect as insurers perceive elevated exit risk.
- E.g. Homeowners insurance crisis of the late 1990s following the Northridge earthquake.
- Powerful consumer groups may pressure regulators to take certain actions.

Impose mitigation discounts

- Could reduce overall risk
- Outstanding questions:
 - Changing vegetation
 - Community level mitigation
 - Lack of data
- Rate differential doesn't make sense if overall rate is not right

Regulatory reform

- Allow insurers to use catastrophe models to set rate level
- Recognize cost of reinsurance
- Foster development of catastrophe models
- Advocate for higher rates to improve availability
- Improve expediency of rate approvals

What could happen

Options for insurers

Stop writing / withdraw

- Need for exposure management
- CA too big to ignore for some
- The Wildfire fund and increased suppression effort may reduce risk

Rate increases

- Many are showing positive rate indications
- But could become uncompetitive
- Large rate increases could have concerns of regulatory entanglement

Product refinement

- Product innovations:
 - Refined rating territories
 - By-peril rating
- Use catastrophe models to set relativities
- IBHS and catastrophe modelers are working on mitigation discounts

Underwriting innovation

- Use models to understand risk correlation and concentration
- Help current policyholders understand how to manage risk



Thank you

David Evans, FCAS

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