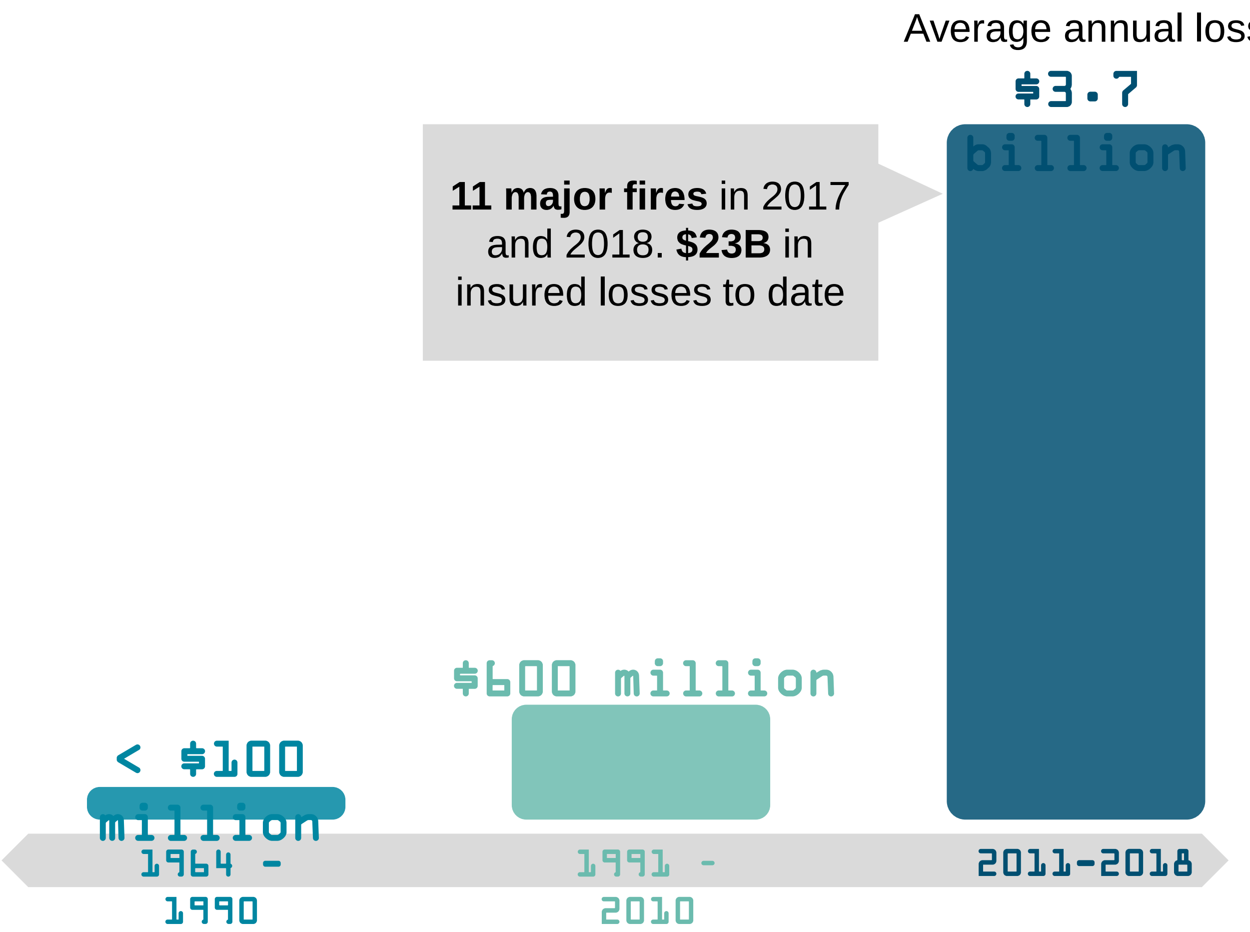
WILDFIRE SEVERITY MAY BE THE NEW (AB)NORMAL



Average Annual Loss (AAL) from North American wildfires

WHY?

- More houses in high risk areas
- Climate change
- Aggressive firefighting in 20th century → excessive burnable vegetation

WILDFIRE MITIGATION MATTERS

Roof Characteristics

Cladding and Windows

Defensible Space, Slope, Setback

P&C insurers must treat wildfire with the same analytical rigor as other peak perils.

Probabilistic Modeling Approach

- **50,000 year climate simulation**
- **Certain climate conditions yield ignitions**
- **Each ignition: high resolution fire spread simulation**

  > wind, fuel, slope, terrain, moisture
- **Vulnerability and mitigation**

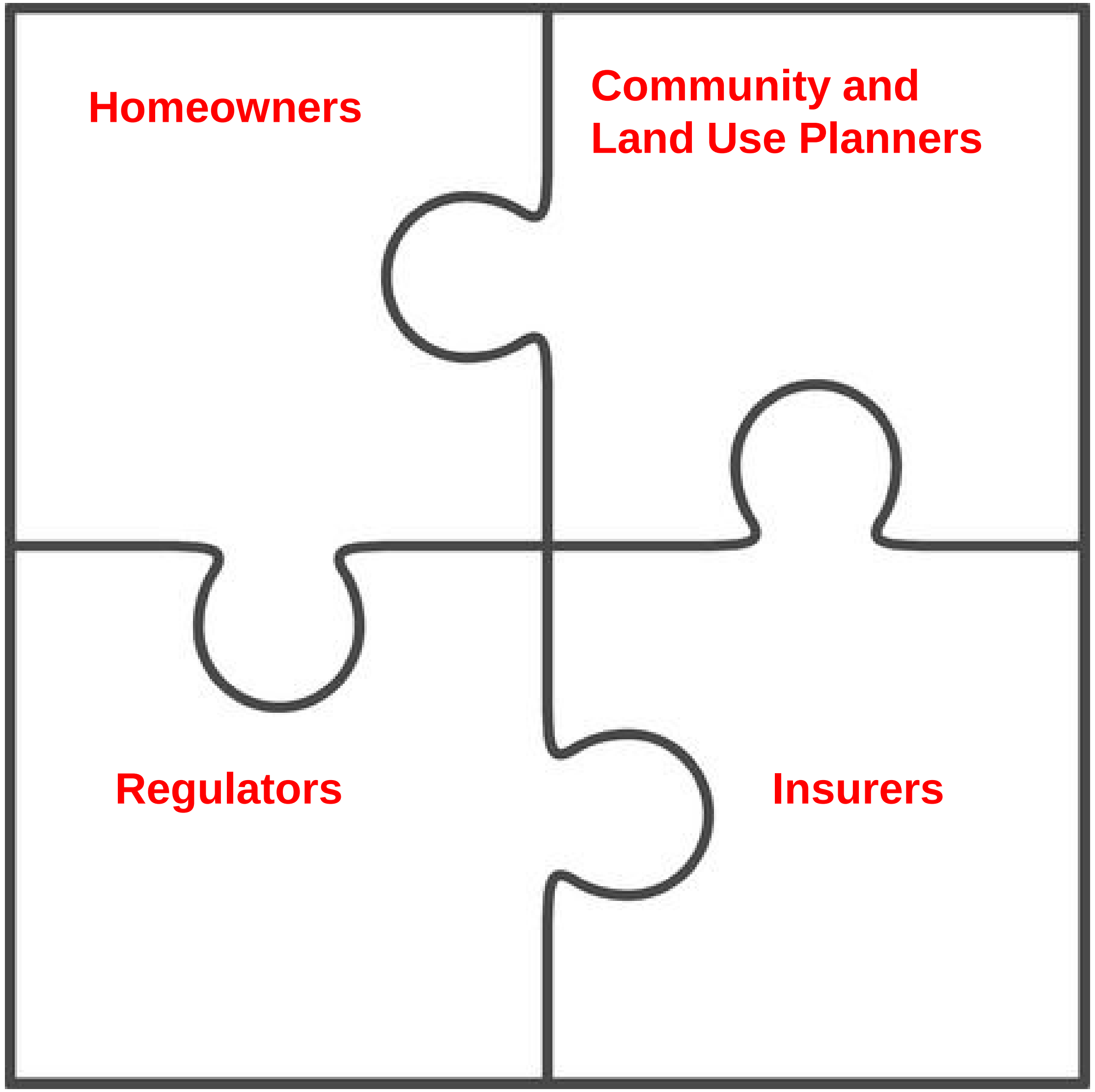
  Construction, defensible space, roofing, cladding, decking, venting.
- **Results yield insight**

  Pricing, capital management, portfolio management, accumulation, risk appetite.

Models inside Models

- **Smoke Model**
  - Lead to additional living expense, BI, contents claims
- **Ember Model**
  - Embers jump roads, rivers, create new fires
- **Urban Conflagration Model**
- **Financial Model**
  - Hours clause (i.e. “168 hours”)
  - Spatial clause (i.e. “100 mile radius”)

WILDFIRE RISK IS MANAGEABLE, BUT IT IS A TEAM SPORT

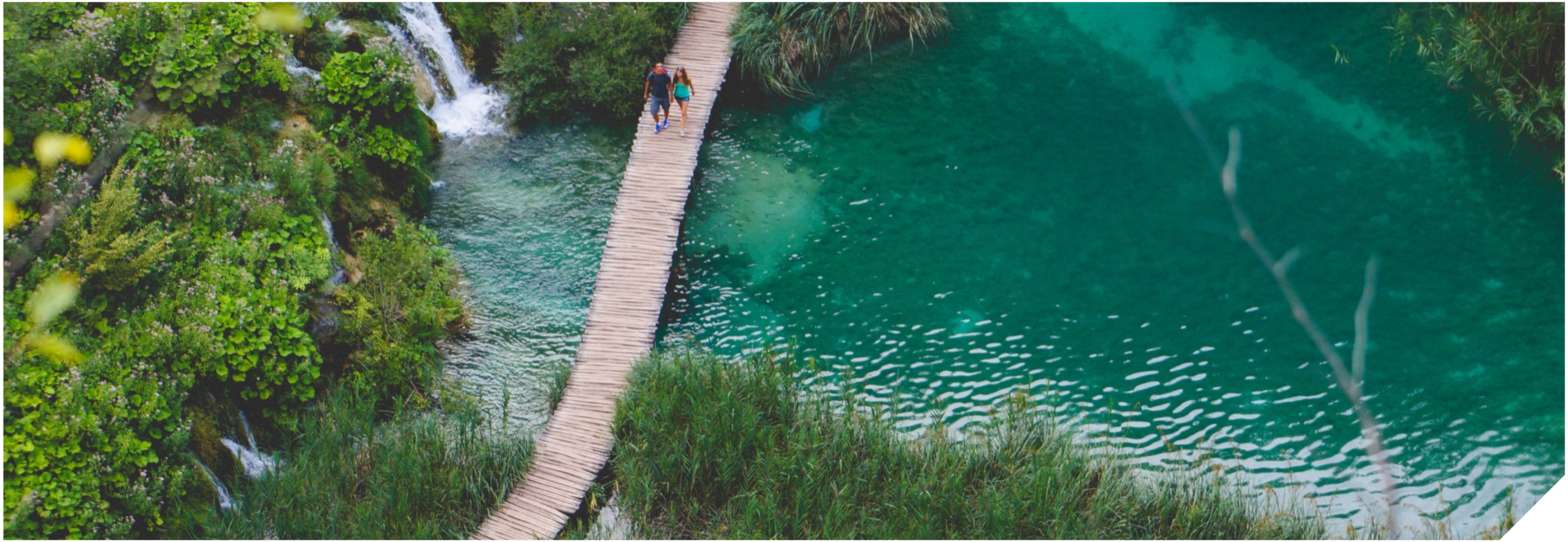


The Roof is on Fire: Wildfire Modeling and Insurability in the CA Insurance Marketplace

CAS Seminar on Reinsurance

Cody Webb

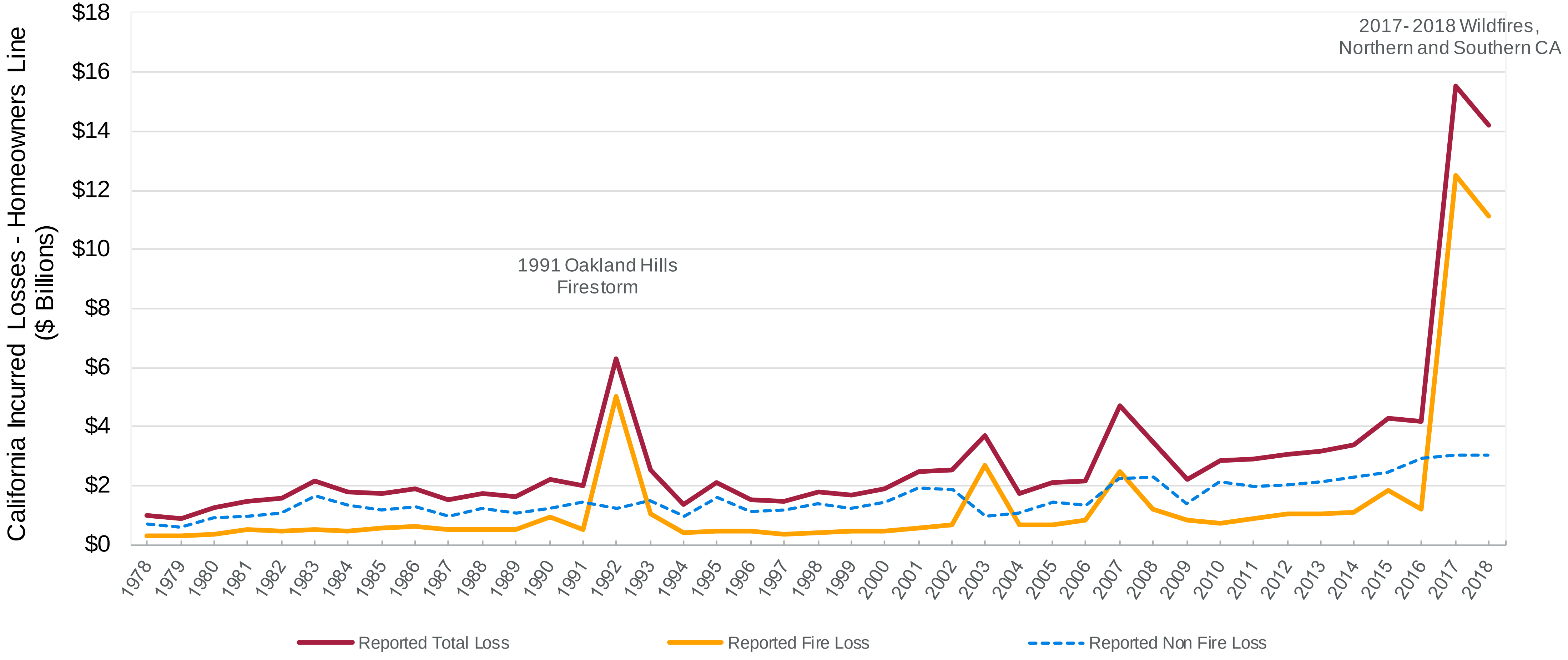
3 JUNE 2019



Historical Homeowners Data

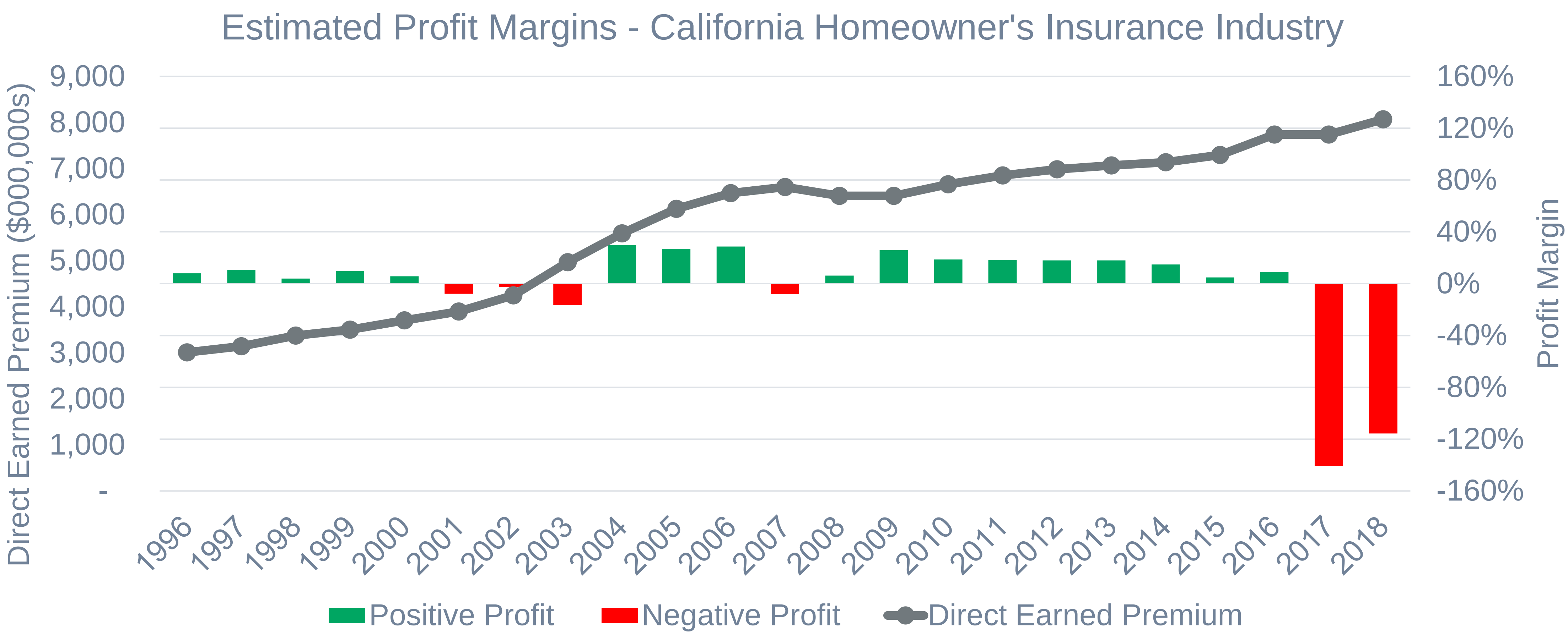
Volatility of Historical Data

- Wildfire insured loss experience can be highly volatile, rendering historical loss data potentially unreliable.



Source: Milliman estimates, based data from ISO and SNL.com

Homeowner’s Insurance Profitability



Source: *Milliman Estimates, based on P&C Combined Industry Annual Statement data from SNL*

California Catastrophe Adjustment

- California has a “prior approval” rate regulation scheme for most lines of insurance (governed by Proposition 103)
- According to the California Code of Regulations (2644.5):
  - Catastrophe losses are based on a multi-year long-term average of catastrophe claims
  - Minimum 20-year average is required for homeowners multiple peril fire
  - Adjustments for changes in historical and prospective exposure to catastrophes due to mix of business changes are required
  - Net cost of reinsurance may not be included in the rate

Overall Rate Level – Catastrophe Load Example

- Post-2017 catastrophe to non-catastrophe ratios (CAT adjustments) increased substantially for a number of carriers
  - 4 of the top ten major carriers have seen filed CAT adjustments increase from the 20-30% range to the 50%-70% range.
- Cat loads can vary widely from year to year, depending on which years are included in the average.
- The experience from recent years may increase these loads considerably.
- This method only allows insurers who have incurred losses to change rates. Those with large exposure, who have not had the losses, cannot raise rates.

	(1)	(2)	(3)	(4)	(5)	(6)
	Catastrophe Losses Other Than Theft and Liability	Non-Catastrophe Losses				Wildfire Catastrophe Load
Accident Year Ending	(Note 1)	Liability (Note 1)	Theft (Note 1)	Other (Note 1)	Total (2) + (3) + (4)	(1) / (5)
1987	$0	$7,460,811	$6,137,320	$22,361,588	$35,959,719	0.0%
1988	0	7,810,484	6,191,151	$27,927,647	41,929,282	0.0%
1989	0	4,216,022	6,517,086	$23,157,234	33,890,342	0.0%
1990	0	6,743,182	6,388,857	$39,113,875	52,245,914	0.0%
1991	161,221,576	7,580,933	7,805,573	$28,956,380	44,342,887	363.6%
1992	0	11,176,084	8,794,232	$33,442,997	53,413,312	0.0%
1993	0	8,556,300	11,194,406	$42,920,524	62,671,230	0.0%
1994	0	6,338,169	11,202,990	$50,134,354	67,675,513	0.0%
1995	47,852,969	9,605,727	9,383,817	$43,540,324	62,529,867	76.5%
1996	657,830	7,717,055	7,603,024	$45,861,576	61,181,655	1.1%
1997	3,199,222	8,305,969	7,240,416	$45,343,354	60,889,739	5.3%
1998	9,013,585	4,347,460	7,129,669	$63,267,733	74,744,861	12.1%
1999	0	2,073,995	6,326,090	$78,875,109	87,275,194	0.0%
2000	0	2,426,224	6,169,694	$100,934,802	109,530,720	0.0%
2001	0	1,601,203	7,839,281	$120,704,243	130,144,727	0.0%
2002	0	3,927,480	8,021,789	$113,584,099	125,533,368	0.0%
2003	0	4,633,473	6,840,001	$80,149,169	91,622,643	0.0%
2004	0	738,065	7,978,387	$92,329,917	101,046,369	0.0%
2005	5,917,578	1,318,893	8,946,951	$91,418,330	101,684,175	5.8%
2006	4,241,177	1,924,702	11,126,030	$123,009,391	136,060,123	3.1%
2007	30,169,784	783,076	11,826,546	$120,010,910	132,620,533	22.7%
2008	41,426,257	1,332,653	15,704,935	$149,599,055	166,636,643	24.9%
2009	0	375,065	17,621,600	$156,294,484	174,291,149	0.0%
2010	8,551,011	2,141,998	17,530,814	$134,736,326	154,409,138	5.5%
2011	6,226,180	1,118,701	17,948,531	$156,217,456	175,284,689	3.6%
2012	0	858,834	19,154,796	$143,492,707	163,506,337	0.0%
2013	1,193,611	1,130,945	18,787,120	$153,403,014	173,321,079	0.7%
2014	11,404,043	5,807,048	16,334,793	$150,425,371	172,567,212	6.6%
2015	86,496,186	16,660,300	14,742,038	$163,358,588	194,760,926	44.4%
2016	8,175,426	10,858,139	11,993,390	$166,865,292	189,716,821	4.3%
2017	928,260,209	5,115,399	8,286,423	$156,236,008	169,637,830	547.2%
Total, 1987-2016	$425,746,435	$149,568,991	$320,481,328	$2,761,435,847	$3,231,486,167	13.2%
Total 1988-2017	$1,354,006,644	$147,223,579	$322,630,432	$2,895,310,268	$3,365,164,278	40.2%
Total	$1,354,006,644	$154,684,390	$328,767,752	$2,917,671,855	$3,401,123,997	39.8%

Source: *Rate filing of major California Insurer*

Non-renewals and Premium Increases

California Department of Insurance Consumer Complaint Data

- CDI complaint data shows significant increase in consumer complaints in designated counties.
- Complaints have also risen in other counties, so the relationship between wildfire risk and complaints is unclear.
- CDI is sensitive to this issue and insurers should be prepared to act accordingly.

Type of Consumer Complaint	2010	2011	2012	2013	2014	2015	2016	2017	2018	Comparison of 2018 to 2010 (%)
Renewal Issues: Designated Counties	41	99	122	116	138	133	143	194	276	573% increase
Renewal Issues: Statewide	70	176	220	225	251	219	239	298	378	73% of the complaints received are from high risk designated counties*
Premium Increase Issues: Designated Counties	54	120	62	117	137	116	171	120	175	224% increase
Premium Increase Issues: Statewide	84	195	130	170	210	203	281	199	276	63% of the complaints received are from designated counties*

Source: Testimony of Joel Laucher, California Department of Insurance, to the California Office of Planning and Research

The Residual Market

FAIR Plan Policies In Force

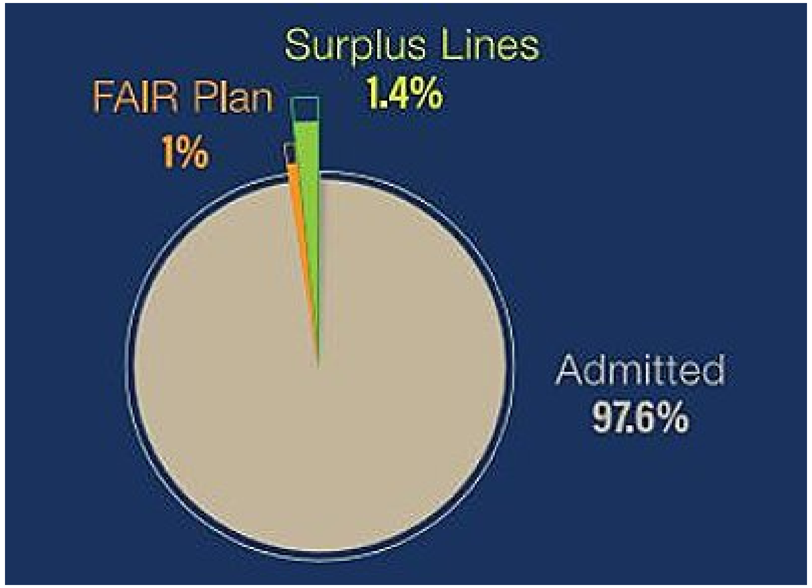
(1)	(2)	(3)	(4)	(5)	(6)	(7)
FireLine Score	Policy Count by Fireline Score					
	2012	2013	2014	2015	2016	2017
0	102,087	98,966	96,084	93,080	89,556	84,800
1-5	11,738	12,466	13,434	14,428	15,041	15,329
6-10	9,555	10,643	12,003	13,455	14,912	17,296
11+	5,009	5,265	5,748	6,186	6,534	6,939
Total	128,389	127,340	127,269	127,149	126,043	124,364

- Customers who cannot obtain insurance form private insurers have two options in California – either obtain a policy from the FAIR plan, or from a non-admitted surplus lines carrier.
- Prior to 2017, FAIR plan was experiencing significant growth in the most catastrophe exposed areas.
- In 2017, FAIR plan issued a moratorium on new business policies. Insurance Commissioner Dave Jones issued a cease and desist order to ensure the plan would stay open to new business.

Source: Fair Plan rate filing

The Non-Admitted (Surplus Lines) Market

- The Surplus Lines market has also experience rapid growth, which may be indicative of growing availability issues in the admitted market.
- Despite growth in the Fair Plan and Non-Admitted market, the market share among admitted carriers remains large.



Sources: *SF Chronicle, Surplus Line Association of California*

Surge in surplus

When California homeowners can't get insurance from "admitted" carriers regulated by the Department of Insurance, they sometimes turn to surplus lines carriers, which have seen a rise in business since 2016. This chart shows the number of policies and premiums charged by surplus carriers on California homeowners policies each year.

Year	No. of policies written	Premiums on those policies
2009	14,116	$46,092,611
2010	13,684	$45,461,114
2011	13,517	$44,164,128
2012	15,619	$51,640,085
2013	21,812	$61,097,141
2014	30,500	$77,590,841
2015	37,120	$91,959,997
2016	31,107	$77,828,895
2017	44,973	$110,596,890
2018	49,370	$122,423,171
2019*	19,389	$52,631,689

*Through March 31. For the same period last year, they sold 10,021 policies with $21,617,546 in premiums.

Source: Surplus Line Association of California

Milliman

Thank you

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