

Report Digest: Fire Fighting Costs in the Sierra Nevada

*Home Building, Higher Temperatures
Driving Price Tag Ever Higher*

August 2011



OVERVIEW: This three-page digest summarizes recent research on how growing residential development near the twelve national forests in the Sierra Nevada area of California has led to increases in fire suppression costs. The research focused on 27 wildland fires during 2006-2009. The full paper, PowerPoint, and other wildfire research can be found <http://headwaterseconomics.org/wildfire>.

HIGHLIGHTS:

1. **Rising average summer temperatures are strongly associated with an increase in acres burned.** An increase in average summer temperature of 1° F is associated with a 35 percent increase in area burned by wildfires.
2. **During the past ten years, twice as many homes were within a mile of a wildfire compared to the 1980s or 1990s.** Homebuilding has increased rapidly in the Sierra Nevada area. Since 1950, more than 900,000 homes were built in the study area, and 1,500 square miles of undeveloped private land were converted to low density development. During the past ten years, approximately 13,000 homes were threatened annually by wildfires in the Sierra Nevada; more than twice the number of homes threatened by wildfires compared to the 1980s or 1990s due to the increase in area burned by wildfires and sprawl.
3. **For fires in the Sierra Nevada, one-third of suppression costs are related to protecting homes.** For the average U.S. Forest Service wildfire, 35 percent of total firefighting costs in the study area are associated with protecting homes. The cumulative cost of the 27 wildfires in the study was \$496 million, of which we estimate \$173 million were suppression costs related to homes.
4. **Additional firefighting costs associated with new homes depend on how many homes already are present.** On average, the total estimated cost to protect a home within six miles of a fire was \$81,650, but ranged significantly from \$1,513 to \$683,928. In low-density areas, the cost of adding a single home can be incredibly high. If only one home is within six miles of a fire, the additional cost of a new home is \$57,151 daily—or \$2 million for the duration of a 35-day fire. By comparison, a new home added to a development of 50 existing homes costs \$1,143 daily or \$40,000 for the duration of a 35-day fire.

POLICY IMPLICATIONS:

- Keeping new housing within denser residential areas would reduce future firefighting costs by millions of dollars. Leaving land undeveloped saves the most taxpayer dollars.
- Today federal and state taxpayers pay a large portion of the cost of wildfires. If costs instead were borne in part by those who build at-risk homes, or by local governments who permit them, it would help pay for rising costs and may discourage new home development in high risk areas.

FULL REPORT: A research paper was submitted to the *International Journal of Wildland Fire* in July, 2011: http://headwaterseconomics.org/wphw/wp-content/uploads/CAfire_Manuscript_July11.pdf.

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Fire	Year	Firefighting		Avg Size of Fire (sq.km.)	Avg Homes within 6 mi	Estimated % of Cost		Average cost per Home	
		Days	Cumulative Cost			Related to Housing	Related to Housing	Within 6 Miles of the Fire	
American River Complex	2008	62	\$22,795,346	41	543	38%	\$8,632,299	\$15,909	
Antelope Complex	2007	10	\$8,433,644	86	229	34%	\$2,876,942	\$12,591	
Backbone	2009	20	\$16,897,750	22	2	8%	\$1,367,856	\$683,928	
Bassetts	2006	12	\$7,687,375	7	537	38%	\$2,945,062	\$5,489	
Big Meadow	2009	25	\$16,947,242	22	76	28%	\$4,809,234	\$63,279	
Canyon Complex	2008	58	\$45,166,766	91	1,808	43%	\$19,645,399	\$10,865	
China-Back Complex	2007	12	\$2,934,617	9	265	35%	\$1,023,542	\$3,865	
Clover	2008	46	\$8,199,100	24	68	22%	\$1,821,328	\$26,983	
CUB Complex	2008	31	\$21,117,153	37	103	27%	\$5,787,144	\$55,930	
Elephant	2009	7	\$2,094,034	1	12	18%	\$369,021	\$32,089	
Fletcher	2007	12	\$4,092,990	24	5	13%	\$526,425	\$105,285	
Happy Camp	2006	64	\$10,264,472	10	84	24%	\$2,485,728	\$29,749	
Harrington	2009	27	\$478,642	1	0	0%	\$0		
Hat Creek Complex	2009	9	\$7,874,824	37	693	40%	\$3,111,378	\$4,490	
Hidden	2008	26	\$9,182,999	9	15	19%	\$1,775,767	\$115,310	
Iron Complex	2008	79	\$72,226,070	89	1,088	42%	\$30,018,633	\$27,601	
Kingsley Complex	2006	18	\$7,998,835	4	1	3%	\$276,577	\$414,865	
Knight	2009	21	\$12,122,449	15	3,689	46%	\$5,580,928	\$1,513	
Lime Complex	2008	99	\$62,050,552	311	2,494	45%	\$27,810,936	\$11,149	
Moonlight	2007	31	\$33,088,547	208	1,007	41%	\$13,429,680	\$13,341	
Plute	2008	28	\$24,229,665	108	1,532	42%	\$10,165,654	\$6,637	
Ralston	2006	15	\$13,849,333	21	938	41%	\$5,656,858	\$6,032	
Red Rock	2009	15	\$4,188,332	4	18	20%	\$848,028	\$47,113	
Siskiyou Complex	2008	100	\$44,860,758	204	34	24%	\$10,733,398	\$313,731	
Ukonom Complex	2008	99	\$25,623,333	126	121	31%	\$7,853,225	\$64,698	
Wallow	2007	29	\$4,973,823	6	67	28%	\$1,377,270	\$20,556	
Whiskey	2008	29	\$6,857,372	29	63	27%	\$1,873,669	\$29,899	
TOTAL			\$496,236,023		15,489		\$172,801,979		

Percent of total costs related to housing:

35%

Ave. cost/home:

\$81,650

Of the 27 fires we studied in Sierra Nevada and Northern California that burned between 2006 and 2009, on average 35% of the total firefighting costs were related to the defense of homes. This added up to almost \$173 million spent to protect homes (out of a total firefighting bill of more than \$496 million). The average cost to protect a home within 6 miles of the fire was \$81,650, but ranged significantly, in some fires costing more than \$300,000 per home.

Study Area: The Cost of Protecting Homes from Wildfires in the Sierra Nevada

