Wildfire Hazard & Home Development in Western Montana

Methods and Data Sources, June 2018

HEADWATERS ECONOMICS

Background

Headwaters Economics examined housing development trends across western Montana and compared housing location to expected wildfire hazard. The study examined whether housing growth rates in areas of higher wildfire hazard are different than rates in lower wildfire hazard, how these rates vary across western Montana, and how growth patterns might affect wildfire suppression expenses. We would like to thank Pyrologix and the Northern Region of the U.S. Forest Service for sharing wildfire hazard data to make this report possible. (Link: https://headwaterseconomics.org/wildfire/homes-risk/new-montana-homes-increase-wildfire-risks)

Methods and Data Sources

This section describes data collection and decisions made during data processing.

Western Montana Geographic Extent

We limited our analysis to 25 counties in western Montana because this was the only area in Montana for which contiguous wildfire hazard data was available (see Wildfire Hazard section below). Detailed data for each county appear below. The Montana counties included in the analysis are:

Beaverhead
Broadwater
Carbon
Cascade
Deer Lodge
Flathead
Gallatin
Granite
Jefferson
Judith Basin
Lake
Lewis and Clark
Lincoln
Madison
Meagher
Mineral
Missoula
Park
Powell
Ravalli
Sanders
Silver Bow
Sweet Grass
Teton
Wheatland

Housing Data

Headwaters Economics previously examined housing development trends across Montana.[1] Using data from the Montana Department of Revenue's Property Assessment Division, we summarized the total number of single-family housing units in each quarter-section (160 acres) in 1990 and 2016.

Wildfire Hazard Data

Wildfire hazard data are from an October 2, 2017 assessment completed by Pyrologix[2] for the U.S. Forest Service Northern Region.[3] The assessment extracted fire behavior data sets from the Northern Region Risk Assessment based on FSim large-fire simulator results.[4] To examine the overlay of housing development trends with wildfire hazard, we used the layer "expected wildfire hazard, in the context of residential structures," which combines two variables: the probability of fire at a given location, and the expected intensity of a fire at that location, given the conditional risk to a structure (if one were present).

To align with available housing data, we summarized wildfire hazard to the quarter-section. Expected wildfire hazard is a relative measure, so each quarter-section's value is compared to others in the analysis. We categorized hazard into three classes:

- High – upper 20 percent of values
- Moderate – 50-80 percent of values
- Low – lower 50 percent of values

Fire Suppression Cost Data

A previous Headwaters Economics report[5] prepared for the Montana State Legislature Fire Suppression Interim Committee found that firefighting costs are highly correlated with the number of homes threatened, and the pattern of development (dense versus dispersed) is an important contributing factor. After accounting for differences in fire size, terrain, and road access, the study found that each additional home within one mile of a wildfire was associated with a $9,072 increase in fire suppression costs (adjusted for inflation).

This is likely a very conservative estimate, since recent studies in California[6] and Oregon[7] show much higher firefighting costs associated with new homes, especially in low-density development patterns, and firefighting is a small share of the overall cost burden from wildfires.[8]

Home Development By County and Wildfire Hazard Type

County	Total Single Family Homes in 2016				New Single Family Homes, 1990-2016			
	High Wildfire Hazard Areas	Mod. Wildfire Hazard Areas	Low Wildfire Hazard Areas	Total	High Wildfire Hazard Areas	Mod. Wildfire Hazard Areas	Low Wildfire Hazard Areas	Total
Beaverhead	31	439	2,980	3,450	7	112	954	1,073
Broadwater	8	351	1,600	1,959	3	259	703	965
Carbon	7	534	4,706	5,247	1	252	1,455	1,708
Cascade	0	99	14,566	14,665	0	53	3,989	4,042
Deer Lodge	38	443	3,657	4,138	11	187	327	525
Flathead	427	3,809	29,375	33,611	200	2,074	14,487	16,761
Gallatin	799	3,049	22,926	26,774	430	1,910	14,186	16,526
Granite	507	802	663	1,972	217	462	113	792
Jefferson	43	2,054	2,318	4,415	16	1,030	994	2,040
Judith Basin	0	2	1,121	1,123	0	1	177	178
Lake	759	3,215	7,208	11,182	268	1,388	2,558	4,214
Lewis and Clark	797	3,412	12,368	16,577	273	1,659	5,264	7,196
Lincoln	150	1,967	6,007	8,124	71	972	2,276	3,319
Madison	80	971	4,172	5,223	78	712	1,993	2,783
Meagher	0	90	1,120	1,210	0	48	261	309
Mineral	195	698	652	1,545	86	357	206	649
Missoula	4,571	6,347	14,435	25,353	2,234	3,153	5,324	10,711
Park	300	2,313	5,095	7,708	183	1,150	1,414	2,747
Powell	314	568	1,623	2,505	138	211	243	592
Ravalli	13,597	776	1,178	15,551	6,987	258	221	7,466
Sanders	2	623	4,226	4,851	0	288	1,814	2,102
Silver Bow	52	854	8,422	9,328	16	428	1,043	1,487
Sweet Grass	54	500	1,235	1,789	14	242	289	545
Teton	47	113	2,190	2,350	2	59	351	412
Wheatland	0	1	916	917	0	0	96	96
TOTAL	**22,778**	**34,030**	**154,759**	**211,567**	**11,235**	**17,265**	**60,738**	**89,238**

Contact

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About Headwaters Economics

Headwaters Economics is an independent, nonprofit research group whose mission is to improve community development and land management decisions. https://headwaterseconomics.org/.

Endnotes

[1] Headwaters Economics. 2018. Montana Losing Open Space. https://headwaterseconomics.org/economic-development/local-studies/montana-home-construction/

[2] Joe Scott, Pyrologix. Personal communication, May 15, 2018.

[3] Brenda Wilmore, U.S. Forest Service Region 1. Personal communication, April 20, 2018.

[4] Finney, M.A., C. W. McHugh, I. C. Grenfell, K. L. Riley, K. C. Short. 2011. A simulation of probabilistic wildfire risk components for the continental United States. Stochastic Environmental Research and Risk Assessment 25: 973-1000.

[5] Headwaters Economics. 2008. Montana Wildfire Cost Study: Technical Report. Prepared for the Montana State Legislature Fire Suppression Interim Committee. https://headwaterseconomics.org/wildfire/homes-risk/montana-wildfire-costs/

[6] Headwaters Economics. 2011. Northern California, Homes, and Cost of Wildfires. https://headwaterseconomics.org/wildfire/homes-risk/northern-california-homes-and-cost-of-wildfires/

[7] Headwaters Economics. 2012. Oregon Home Building, Higher Temperatures Drive Price Tag Even Higher. https://headwaterseconomics.org/wildfire/homes-risk/oregon-homes-and-cost-of-wildfires/

[8] Headwaters Economics. 2018. Full Community Costs of Wildfire. https://headwaterseconomics.org/wildfire/homes-risk/full-community-costs-of-wildfire/