



RESEARCH

Brush, Grass and Forest Fires – West Region Supporting Tables

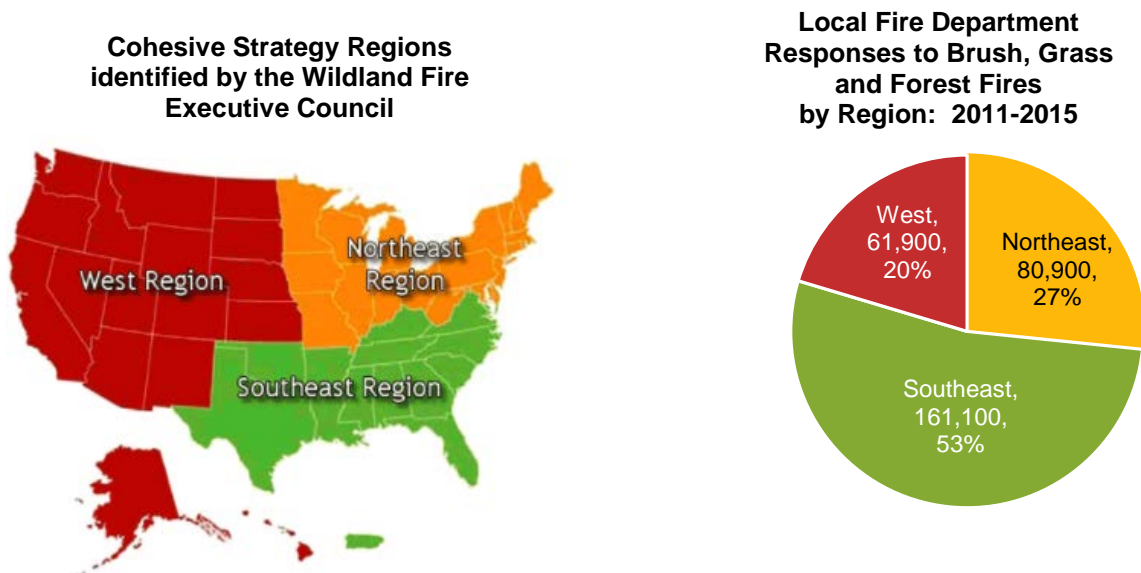
December 2018

Marty Ahrens

Supporting Tables for Local Fire Department Responses to Brush, Grass, and Forest Fires – in the West

The tables that follow provide more details about local fire department responses to brush, grass and forest fires, including unclassified vegetation fires, in the West. The Wildland Fire Executive Council’s Cohesive Strategy Regions were used for this analysis. Please refer back to the text for a discussion of key points and methodology. Only one-fifth of the country’s local fire department responses to these incidents were in the West. Almost half (44%) of the land in the West is owned by five federal agencies (the Bureau of Land Management, the Forest Service, the Fish and Wildlife Service, the National Park Service, and the Department of Defense) and are protected by federal wildland firefighting organizations.¹ Our estimates do not include fires handled by federal or state wildland firefighting organizations.

For more information, see the national report, national supporting tables, and comparable tables about these fires in the Northeast and Southeast. Please see the national report for a discussion of methodology.



¹ Carol Hardy Vincent, Laura A. Hanson, and Carla N. Argueta, *Federal Land Ownership: Overview and Data*, Congressional Research Service, 2017, 6-9.

Table	Local Fire Department Responses to Brush, Grass and Forest Fires - The West Region, by:	Page
Table 1.	Incident Type	4
Table 2.	Month	4
Table 3.	Day of Week	5
Table 4.	Alarm Time	6
Table 5.	Major Cause	7
Table 6.	Major Cause and Month	8
Table 7.	Cause of Ignition	10
Table 8.	Factor Contributing to Ignition	11
Table 9.	Heat Source	12
Table 10.	Equipment Involved in Ignition	13
Table 11.	Item First Ignited	14
Table 12.	Type of Material First Ignited	15
Table 13.	Acres Burned	16
Table 14.	Number of Buildings Involved	16

Table 1.
Local Fire Department Responses to Brush, Grass, and Forest Fires in the West
by Incident Type
2011-2015 Annual Averages

Incident Type	Fires	
Grass fire	24,400	(39%)
Brush, or brush and grass mixture fire	22,300	(36%)
Forest, woods or wildland fire	4,500	(7%)
Unclassified natural vegetation fire	10,600	(17%)
Total	61,900	(100%)

Table 2.
Local Fire Department Responses to Brush, Grass, and Forest Fires in the West
by Month
2011-2015 Annual Averages

Month	Fires	
January	2,500	(4%)
February	2,200	(4%)
March	6,100	(10%)
April	5,600	(9%)
May	5,800	(9%)
June	7,600	(12%)
July	12,100	(19%)
August	7,700	(12%)
September	5,000	(8%)
October	3,400	(6%)
November	2,400	(4%)
December	1,500	(2%)
Total	61,900	(100%)
Average	5,200	(8%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Fires are rounded to the nearest hundred. Sums may not equal due to rounding errors.

Source: NFIRS 5.0 and NFPA survey.

Table 3.
Local Fire Department Responses to Brush, Grass, and Forest Fires in the West
by Day of Week
2011-2015 Annual Averages

Day of Week	Fires	
Sunday	8,900	(14%)
Monday	8,600	(14%)
Tuesday	8,400	(14%)
Wednesday	8,600	(14%)
Thursday	8,400	(14%)
Friday	8,800	(14%)
Saturday	10,200	(16%)
Total	61,900	(100%)
Average	8,800	(14%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Fires are rounded to the nearest hundred. Sums may not equal due to rounding errors.

Source: NFIRS 5.0 and NFPA survey.

Table 4.
Local Fire Department Responses to Brush, Grass, and Forest Fires in the West
by Alarm Time
2011-2015 Annual Averages

Alarm Time	Fires	
Midnight- 12:59 a.m.	1,200	(2%)
1:00-1:59 a.m.	800	(1%)
2:00-2:59 a.m.	700	(1%)
3:00-3:59 a.m.	600	(1%)
4:00-4:59 a.m.	600	(1%)
5:00-5:59 a.m.	700	(1%)
6:00-6:59 a.m.	900	(1%)
7:00-7:59 a.m.	1,100	(2%)
8:00-8:59 a.m.	1,200	(2%)
9:00-9:59 a.m.	1,600	(3%)
10:00-10:59 a.m.	2,200	(4%)
11:00-11:59 a.m.	3,100	(5%)
12:00-12:59 p.m.	4,000	(7%)
1:00-1:59 p.m.	5,100	(8%)
2:00-2:59 p.m.	5,900	(9%)
3:00-3:59 p.m.	6,000	(10%)
4:00-4:59 p.m.	5,600	(9%)
5:00-5:59 p.m.	4,900	(8%)
6:00-6:59 p.m.	3,900	(6%)
7:00-7:59 p.m.	3,200	(5%)
8:00-8:59 p.m.	2,700	(4%)
9:00-9:59 p.m.	2,600	(4%)
10:00-10:59 p.m.	2,100	(3%)
11:00-11:59 p.m.	1,500	(2%)
Total	61,900	(100%)
Average by alarm hour	2,600	(4%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Fires are rounded to the nearest hundred. Sums may not equal due to rounding errors.

Source: NFIRS 5.0 and NFPA survey.

Table 5.
Local Fire Department Responses to Brush, Grass, and Forest Fires in the West, by Major Cause
2011-2015 Annual Averages

Major Cause	Fires	
Intentional	12,300	(20%)
Electrical power or utility line	6,200	(10%)
Smoking materials	5,700	(9%)
Outside/open fire for debris or waste disposal	5,300	(9%)
Garden tool or agricultural equipment	4,800	(8%)
Lightning	4,500	(7%)
Fireworks	4,400	(7%)
Agriculture or land management burns	4,000	(7%)
Playing with heat source	3,700	(6%)
Shop tool or industrial equipment, including torches	3,300	(5%)
Rekindle	2,600	(4%)
Exposure fire	2,500	(4%)
Outside/open fire for warming or cooking	1,500	(2%)

Note: Major causes were extracted from cause of ignition, factors contributing to ignition, heat source and equipment involved in ignition. Unknowns were allocated separately for each data element. Double counting does occur. For example, some fireworks and intentional fires were caused by playing with heat source. Some open burning fires were considered intentional. Causal factors that did not describe a specific scenario are not shown but can be found in the respective data elements. Sums do *not* add to 100% or monthly totals. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Fires are rounded to the nearest hundred.

Source: NFIRS 5.0 and NFPA fire experience survey.

Table 6A.
Local Fire Department Responses to Brush, Grass, and Forest Fires in the West, by Major Cause and Month
2011-2015 Annual Averages

Peak months for each cause are in red.

Cause	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total Fires
Intentional	5%	5%	14%	12%	9%	10%	16%	9%	7%	6%	5%	3%	100%	12,300
Electrical power or utility line	4%	3%	5%	6%	10%	16%	17%	14%	9%	8%	4%	4%	100%	6,200
Smoking materials	2%	2%	6%	7%	11%	16%	21%	17%	10%	5%	3%	1%	100%	5,700
Open burning	8%	6%	17%	13%	12%	8%	8%	7%	5%	7%	6%	3%	100%	5,300
Garden tool or agricultural equipment	1%	1%	4%	7%	14%	18%	23%	17%	9%	4%	2%	1%	100%	4,800
Lightning	0%	0%	1%	2%	5%	15%	34%	31%	9%	3%	0%	0%	100%	4,500
Fireworks	1%	1%	1%	1%	2%	10%	76%	4%	2%	1%	1%	1%	100%	4,400
Agriculture or land management burns	3%	6%	33%	23%	8%	7%	5%	3%	3%	4%	4%	2%	100%	4,000
Playing with heat source	4%	3%	7%	6%	8%	13%	37%	9%	6%	4%	2%	2%	100%	3,700
Shop tool or industrial equipment, including torches	4%	3%	7%	7%	10%	17%	16%	15%	10%	6%	3%	2%	100%	3,300
Rekindle	4%	3%	18%	15%	8%	10%	15%	11%	7%	5%	4%	1%	100%	2,600
Exposure fire	3%	3%	9%	8%	9%	14%	23%	16%	7%	4%	3%	2%	100%	2,500
Outside/open fire for warming or cooking	4%	4%	8%	8%	11%	13%	13%	12%	11%	6%	5%	3%	100%	1,500
All brush, grass and forest fires	4%	4%	10%	9%	9%	12%	19%	12%	8%	6%	4%	2%	100%	61,900

Note: Major causes were extracted from cause of ignition, factors contributing to ignition, heat source and equipment involved in ignition. Unknowns were allocated separately for each data element. Double counting does occur. For example, some fireworks and intentional fires were caused by playing with heat source. Some open burning fires were considered intentional. Causal factors that did not describe a specific scenario are not shown but can be found in the respective data elements. Sums do *not* add to 100% or monthly totals. These are national estimates of fires reported to U.S. local fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Fires are rounded to the nearest hundred.

Source: NFIRS 5.0 and NFPA fire experience survey.

Table 6B.
Local Fire Department Responses to Brush, Grass, and Forest Fires in the West, by Major Cause and Month
2011-2015 Annual Averages

The most common causes for each month are in red.

Cause	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Electrical power or utility line	300	200	300	400	600	1,000	1,100	900	600	500	200	300	6,200
Smoking materials	100	100	300	400	600	900	1,200	1,000	500	300	100	100	5,700
Open burning	400	300	900	700	600	400	400	300	300	300	300	200	5,300
Garden tool or agricultural equipment	100	0	200	300	700	900	1,100	800	400	200	100	0	4,800
Lightning	0	0	0	100	200	700	1,500	1,400	400	100	0	0	4,500
Fireworks	100	0	100	0	100	400	3,300	200	100	0	0	0	4,400
Agriculture or land management burns	100	200	1,400	900	300	300	200	100	100	200	100	100	4,000
Playing with heat source	100	100	300	200	300	500	1,400	300	200	100	100	100	3,700
Shop tool or industrial equipment, including torches	100	100	200	200	300	500	500	500	300	200	100	100	3,300
Rekindle	100	100	500	400	200	300	400	300	200	100	100	0	2,600
Exposure fire	100	100	200	200	200	300	600	400	200	100	100	0	2,500
Outside/open fire for warming or cooking	100	100	100	100	200	200	200	200	200	100	100	0	1,500
All brush, grass and forest fires	2,500	2,200	6,100	5,600	5,800	7,600	12,100	7,700	5,000	3,400	2,400	1,500	61,900

Note: Major causes were extracted from cause of ignition, factors contributing to ignition, heat source and equipment involved in ignition. Unknowns were allocated separately for each data element. Double counting does occur. For example, some fireworks and intentional fires were caused by playing with heat source. Some open burning fires were considered intentional. Causal factors that did not describe a specific scenario are not shown but can be found in the respective data elements. Sums do *not* add to 100% or monthly totals. These are national estimates of fires reported to U.S. local fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Fires are rounded to the nearest hundred.

Source: NFIRS 5.0 and NFPA fire experience survey.

Table 7.
Local Fire Department Responses to Brush, Grass, and Forest Fires in the West, by Cause of Ignition
2011-2015 Annual Averages

Cause of Ignition	Fires	
Unintentional	28,000	(45%)
Intentional	12,300	(20%)
Unclassified cause	9,400	(15%)
Act of nature	6,600	(11%)
Failure of equipment or heat source	5,600	(9%)
Total	61,900	(100%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Fires are rounded to the nearest hundred. Fires in which the cause of ignition was unknown or not reported were allocated proportionally among fires of known cause of ignition. Sums may not equal due to rounding errors.

Source: NFIRS 5.0 and NFPA fire experience survey.

Table 8.
Local Fire Department Responses to Brush, Grass, and Forest Fires in the West
by Factor Contributing to Ignition
2011-2015 Annual Averages

Factor Contributing	Fires	
Abandoned or discarded material or product	8,300	(13%)
High wind	6,300	(10%)
Outside/open fire for debris or waste disposal	5,300	(9%)
Unclassified natural condition	4,500	(7%)
Unclassified misuse of material or product	4,400	(7%)
Agriculture or land management burns	4,000	(7%)
Unclassified factor contributed to ignition	3,800	(6%)
Electrical failure or malfunction	3,700	(6%)
Playing with heat source	3,700	(6%)
Storm	3,300	(5%)
Heat source too close to combustibles	3,000	(5%)
Rekindle	2,600	(4%)
Mechanical failure or malfunction	2,500	(4%)
Exposure fire	2,500	(4%)
Fire spread or control, other	2,400	(4%)
Outside/open fire for warming or cooking	1,500	(2%)
Cutting or welding too close to combustibles	1,000	(2%)
Other known factor contributing to ignition	1,900	(3%)
Total fires	61,900	(100%)
Total factors*	64,700	(105%)

*Multiple entries are allowed, resulting in more factor entries than fires.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Fires are rounded to the nearest hundred. Fires in which the factor contributing to ignition was undetermined, coded as “none,” or not reported were allocated proportionally among fires with known factor contributing to ignition. Sums may not equal due to rounding errors.

Source: NFIRS 5.0 and NFPA fire experience survey.

Table 9.
Local Fire Department Responses to Brush, Grass, and Forest Fires in the West
by Heat Source
2011-2015 Annual Averages

Heat Source	Fires	
Hot ember or ash	8,200	(13%)
Smoking materials	5,700	(9%)
Unclassified heat source	5,500	(9%)
Lightning	4,500	(7%)
Fireworks	4,400	(7%)
Unclassified hot or smoldering object	4,100	(7%)
Match	4,000	(6%)
Spark, ember or flame from operating equipment	3,400	(6%)
Flame or torch used for lighting	3,400	(5%)
Arcing	3,100	(5%)
Lighter	2,700	(4%)
Flying brand, ember or spark	2,600	(4%)
Unclassified heat spread from another fire	2,000	(3%)
Heat or spark from friction	1,400	(2%)
Heat from direct flame or convection currents	1,200	(2%)
Unclassified heat from powered equipment	900	(2%)
Other known heat source	4,700	(8%)
Total	61,900	(100%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Fires are rounded to the nearest hundred. Fires in which the heat source undetermined or not reported were allocated proportionally among fires with known heat source. The estimates of matches, lighters, smoking materials, flames or torches used for lighting and candles include a proportional share of fires in which the heat source was heat from an unclassified open flame or smoking material. Sums may not equal due to rounding errors.

Source: NFIRS 5.0 and NFPA fire experience survey.

Table 10.
Local Fire Department Responses to Brush, Grass, and Forest Fires in the West
by Equipment Involved in Ignition
2011-2015 Annual Averages

Equipment Involved in Ignition	Fires	
No equipment involved in ignition	41,300	(67%)
Electrical distribution and lighting equipment	8,900	(14%)
Electrical power or utility line	6,200	(10%)
Wiring and related equipment other than power or utility lines	1,300	(2%)
Transformer or power supply	1,000	(2%)
Garden tool or agricultural equipment	4,800	(8%)
Lawn mower	2,300	(4%)
Hay processing equipment	1,000	(2%)
Weed burner	300	(1%)
Shop tool or industrial equipment, including torches	3,300	(5%)
Torch, burner or soldering iron	1,300	(2%)
Power sander, grinder, buffer, or polisher	500	(1%)
Power saw	500	(1%)
Power cutting tool	400	(1%)
Unclassified equipment involved in ignition	2,500	(4%)
Other known equipment	1,100	(2%)
Total	61,900	(100%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Fires are rounded to the nearest hundred. Fires in which the equipment involved in ignition was undetermined or not reported were allocated proportionally among fires with known equipment involved in ignition. Fires in which the equipment involved in ignition was entered as none but the heat source indicated equipment involvement or the heat source was unknown were also treated as unknown and allocated proportionally among fires with known equipment involved. Sums may not equal due to rounding errors.

Source: NFIRS 5.0 and NFPA fire experience survey.

Table 11.
Local Fire Department Responses to Brush, Grass, and Forest Fires in the West
by Item First Ignited
2011-2015 Annual Averages

Item First Ignited	Fires	
Light vegetation, including grass	40,900	(66%)
Heavy vegetation, including trees	6,800	(11%)
Unclassified organic materials	6,300	(10%)
Chips, including wood chips	2,100	(3%)
Unclassified item first ignited	1,700	(3%)
Agricultural crop, including fruits and vegetables	1,100	(2%)
Other known item first ignited	3,000	(5%)
Total	61,900	(100%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Fires are rounded to the nearest hundred. Fires in which the item first ignited was undetermined or not reported were allocated proportionally among fires with known item first ignited. Sums may not equal due to rounding errors.

Source: NFIRS 5.0 and NFPA fire experience survey.

Table 12.
Local Fire Department Responses to Brush, Grass, and Forest Fires in the West
by Type of Material First Ignited
2011-2015 Annual Averages

Type of Material First Ignited	Fires	
Unclassified natural product	61,100	(38%)
Unclassified natural product	25,400	(41%)
Wood chips, sawdust or shavings	11,400	(18%)
Unclassified type of material first ignited	7,700	(12%)
Hay or straw	6,800	(11%)
Multiple types of material first ignited	2,500	(4%)
Round timber, including round posts or poles	2,100	(3%)
Unclassified processed wood or paper	1,200	(2%)
Other known type of material	4,800	(8%)
Total	61,900	(100%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Fires are rounded to the nearest hundred. Fires in which the type of material first ignited was required but undetermined or not reported were allocated proportionally among fires with known type of material first ignited. Sums may not equal due to rounding errors.

Source: NFIRS 5.0 and NFPA fire experience survey.

Table 13.
Local Fire Department Responses to Brush, Grass, and Forest Fires in the West
by Acres Burned
2011-2015 Annual Averages

Acres Burned	Fires	
Less than an acre	37,100	(60%)
1-10 acres	19,400	(31%)
11-50 acres	3,100	(5%)
More than 50 acres	2,200	(4%)
Total	61,900	(100%)

Table 14.
Local Fire Department Responses to Brush, Grass, and Forest Fires in the West
by Number of Buildings Involved
2011-2015 Annual Averages

Number of Buildings Involved	Fires	
No buildings involved	60,600	(98%)
1 building	1,000	(2%)
2 buildings	100	(0%)
3 or more buildings	100	(0%)
Total	61,900	(100%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Fires are rounded to the nearest hundred. Sums may not equal due to rounding errors. Fires in which the number of acres burned or buildings involved were unknown were allocated proportionally.

Source: NFIRS 5.0 and NFPA fire experience survey.

Acknowledgements

The National Fire Protection Association thanks all the fire departments and state fire authorities who participate in the National Fire Incident Reporting System (NFIRS) and the annual NFPA fire experience survey. These firefighters are the original sources of the detailed data that make this analysis possible. Their contributions allow us to estimate the size of the fire problem.

We are also grateful to the U.S. Fire Administration for its work in developing, coordinating, and maintaining NFIRS.

To learn more about research at NFPA visit www.nfpa.org/research.

E-mail: research@nfpa.org.

NFPA No. USS89-W-ST