International Journal of Wildland Fire 29, 857–877
doi: 10.1071/WF19189_AC

Supplementary material for

Effects of policy change on wildland fire management strategies: evidence for a paradigm shift in the western US?

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Appendix A

A1. Response variables

A1.1 Strategic response to wildland fires – number of fires (Y_1)

Each wildland fire was classified as a 'suppression' or 'other' fire based on dominant fire management strategies reported in SIT-209 reports (SIT-209 2018). Management strategies have changed throughout the dataset as depicted in Fig. A1. We defined a 'suppression' fire as a 'Wildfire' from 2002 to 2008 or as a 'Wildfire' with a 'Full Suppression' strategy from 2008 to 2016 (SIT-209 2018). Under this classification, it was assumed that a 'Wildfire' prior to 2008 was predominantly managed with a 'Full Suppression' strategy (USDOI/USDA 2011, p. 2). We defined an 'other' fire as a 'Wildland Fire Use' fire from 2002 to 2008, or as a 'Wildfire' with a fire management strategy of either 'Confine' 'Point/Zone Protection' or 'Monitor' from 2008 to 2016, with Monitor being introduced in 2012 (Predictive Services 2014; SIT-209 2018). Under this classification, it was assumed that a 'Wildland Fire Use' fire was predominantly managed with the strategies of 'Confine' 'Point/Zone Protection' or 'Monitor'.

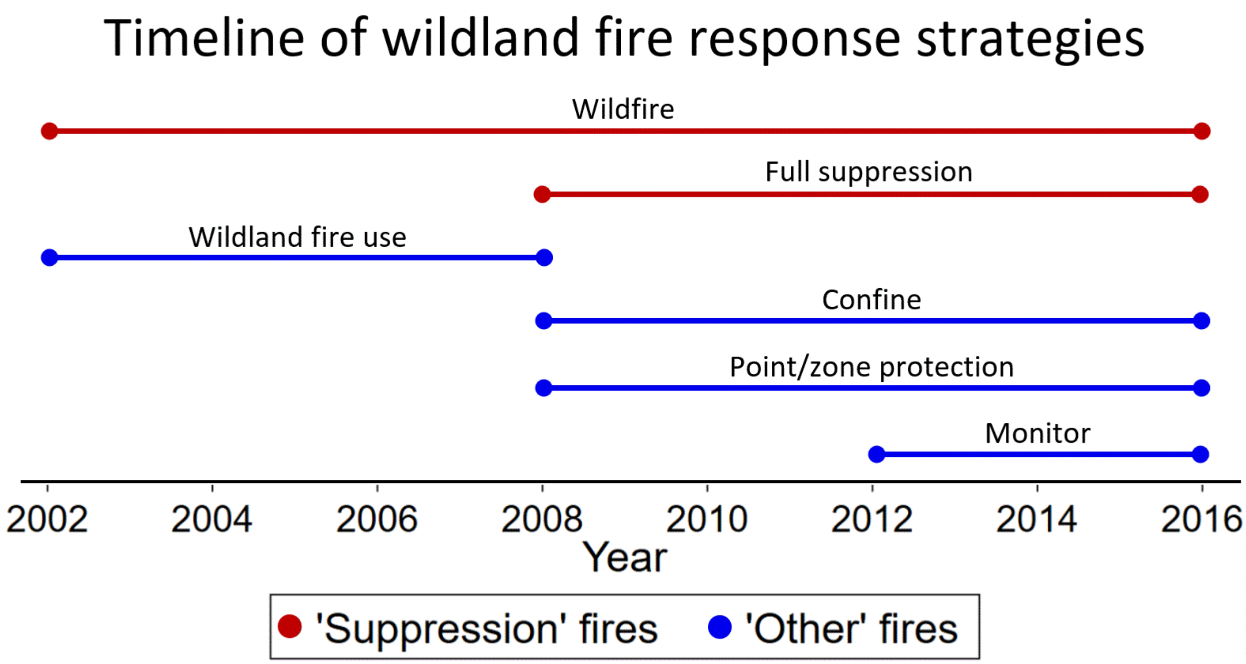

Fig. A1. Timeline of wildland fire management response strategies in SIT-209 reports used to classify wildland fires. Wildland Fire Use was never reported in conjunction with full suppression, confine, or point/zone protection. In 2008 some 'suppression' fires were still recorded as a 'wildfire' without a corresponding strategy, while others were also recorded as having a 'full suppression' strategy. See Predictive Services (2014, p 2) for strategy definitions still in use.

It is important to emphasis that 'suppression' and 'other' management strategies are not mutually exclusive. For example, under the *2009 Policy Guidance* fire managers have the authority to use 'other' strategies in areas that are hazardous to firefighter safety, even when the predominant strategy is full 'suppression' and natural resources are being harmed. Likewise, managers have the authority to use a full 'suppression' strategy to limit fire growth when managing a fire to meet resource objectives when there is a need to protect valuable resources or assets. With this flexibility in mind, the estimated percentage of the fire managed under each strategy on each burning day has been provided in SIT-209 reports since 2014. We classified a fire management day as 'suppression' if managers used a suppression response strategy on at least 50% of fire management zones that day (only applies to 2014 to 2016). We then classified a fire as 'suppression' if a suppression strategy was used on at least 50% of the fire's active management duration. We assessed the sensitivity of our classification criterion with cutoff values of 25% and 75% and observed very little variation (Table A1). Only 67 fires (<1%) changed classification between the extremes of 25% and 75%. Thirty-three fires did not report fire management strategies and were excluded from our analyses.

Table A1. *Number of large 'suppression' and 'other' fires (≥ 40.5 ha) under varying cutoffs of suppression strategy use (n = 7084)*
Note: Number of fires without management strategies reported: California (9), Great Basin (3), Inland Empire (2), Northwest (10), Rocky Mountains (2), Southwest (7)

Region	Dominant Strategy	Use of Suppression Strategy		
		≥ 25%	≥ 50%	≥ 75%
California	Suppression	1,316	1,315	1,309
	Other	67	68	74
Great Basin	Suppression	991	987	983
	Other	92	96	100
Inland Empire	Suppression	1,266	1,257	1,257
	Other	276	285	285
Northwest	Suppression	824	818	811
	Other	62	68	75
Rocky Mountains	Suppression	557	556	549
	Other	104	105	112
Southwest	Suppression	1,201	1,187	1,179
	Other	295	309	317
Western US	Suppression	6,155	6,120	6,088
	Other	896	931	963

We also used the fire's ignition CAUSE to adjust the classification of individual fires to ensure a consistent population of 'suppression' and 'other' fires throughout the dataset (2002–2008 *v.* 2009–2016). Under federal policy, a 'Wildfire' from 2002 to 2008 that was determined to have a human CAUSE was to “be suppressed in every instance and [was] not [to] be managed for resource benefits” (Fire Executive Council 2009, p. 19). In other words, human caused ‘Wildfires’ from 2002 to 2008, (Fig. A1) were classified as ‘suppression’ fires, and only naturally caused fires could be managed for resource benefit and labeled as ‘Wildland Fire Use’ (Fire Executive Council 2009; SIT-209 2018). In 2008, this dichotomy breaks down when new fire strategies were introduced that could be applied to ignitions from human and natural CAUSES. This was followed by ‘Wildland Fire Use’ no longer being used beginning in the 2009 fire season (Fig. A1). To be consistent with ‘Wildland Fire Use’ from 2002 to 2008, we only classified fires as ‘other’ from 2008 to 2016 if they had a natural CAUSE. As a result, 124 fires that had an unknown or human CAUSE were classified as ‘suppression’ despite being predominantly managed with ‘other’ strategies. This action avoided inflating the number of ‘other’ fires after the *2009 Policy Guidance* due to changes in reporting alone, and helped maintain a consistent counterfactual or alternative to reality where ‘Wildland Fire Use’ and other policy paradigms in place prior to 2009 (i.e. ‘suppression’ on all human CAUSED fires) were retained (Tversky and Koehler 1994).

We also acknowledge the potential influence that socio-political pressures may have on the reporting of daily strategic responses (Gebert and Black 2012). At the same time, it is reasonable to assume that there is little variation in this pressure across the dataset (2002 to 2016) and in nested observational timeframes used within our analyses (2006 to 2011 and 2003 to 2014), therefore nullifying any meaningful confounding effects. In addition, to alleviate potential inconsistency of daily reporting, we examined average strategic options over the span of a fire incident. We also explicitly examined the potential influence that the *2009 Policy Guidance* had on the classification of wildland fires with univariate models of fire weather. We hypothesized: (1) that the *2009 Policy Guidance* did not affect fire weather within each fire classification (i.e. we have classified fires ('suppression' v. 'other') across the data in a uniform manner despite socio-political influences and changes in management strategies reported), and (2) the *2009 Policy Guidance* did affect the fire population as a whole in a manner that is consistent with a higher share of 'other' fires (e.g. an increase in fires being managed with higher relative humidity and precipitation).

A1.2 Management duration (Y_2)

To assess management duration, we use the DISCOVERY DATE and CONTROL DATE based on SIT-209 reports as defined in Table 1 (management duration, Y_2 = CONTROL DATE - DISCOVERY DATE + 1). Fire managers issue SIT-209 reports as an initial, update or final report. Commonly fires will have a second or third final report with updated information on the fire (i.e. area burned, expenditures, etc.). When the reports did not clearly indicate the CONTROL DATE, we defined the control date as the last final report within 14-days of the first final report. In cases where the first final report was more than 14-days removed from the last update report, we used the last update report as the control date. If the last update report was more than 14-days removed from the previous report (either an initial or an update), we used the previous report as the control date. We selected an excess of 14-days in part due to the 14-day duty periods of wildland fire management teams. If a transitioning team did not see the need to fill out a new report, then we assumed that meaningful management had ceased since the previous report. It is worth noting that the observational window of management duration within our analyses is not the same as the burning duration in Young *et al.* (2019). Management duration includes management days where fire spread has been contained.

A1.3 Area burned (Y_3) and total area burned (Y_4)

To assess area burned we obtained the FIRE SIZE as defined in Table 1. We did not rely on the largest fire size reported in the SIT-209 reports because in many instances the size of the fire is more accurately known after fire activity has been dramatically reduced and an accurate assessment can be carried out and reported on the final SIT-209 report. In addition to individual FIRE SIZE we assessed the total area burned using delineated management areas within each region (i.e. pseudoreplication).

We also excluded any measure of fire duration in our assessments of the area burned by individual fires (Y_3) or over the course of a fire season (Y_4), i.e. we avoided measures like area burned per management day. This ensured that the effects of the *2009 Policy Guidance* on area burned were not dependent on management duration, which would erroneously diminish the policy effect if there was an increase in management duration (Y_2), conditioned on an area burned ($Y_{3,4}$) that is constant, contracted, or that experienced slight gains.

A2. Expectations

A2.1 Wildland fire variables

DISCOVERY DATE (Table 1) captured a fire's seasonality where 'other' fires ($Y_{1\text{'Other'}}$) are likely to reach local maximums at the beginning and end of the fire season, while the number of 'suppression' fires ($Y_{1\text{'Suppression'}}$) is likely to reach a global maximum during summer months (van Wagtendonk and Lutz 2007). Under natural burning conditions we also expect fires to burn for extended periods of time (Y_2), and over larger areas ($Y_{3,4}$) in summer months, when compared to the spring and fall (van Wagtendonk and Lutz 2007). For these reasons, DISCOVERY DATE was fit with main and quadratic effects.

The NUMBER OF FIRES in each REGION and western US (WEST) captured the opportunity to meet resource objectives with wildland fire and the availability of fire management resources (Table 1). Both terms were fit as main and quadratic effects due to the diminishing marginal returns of increased opportunities to use ‘other’ strategies ($Y_{1\text{‘Other’}}$). Each fire event presents an opportunity to use ‘other’ management strategies to meet resource objectives, but this can become overwhelmed as the total number of active fire events during a season depletes resource availability. This mechanism has the potential to impose a dragging effect on the deployment of ‘other’ strategies. For example, an increase in NUMBER OF FIRES could decrease the duration ($Y_{2\text{‘Other’}}$) and size of ‘other’ fires ($Y_{3,4\text{‘Other’}}$), *ceteris paribus*, as fire managers increase the use of ‘suppression’ strategies to quickly free up resources. Conversely, an increase in NUMBER OF FIRES could increase the duration ($Y_{2\text{‘Suppression’}}$) and size of ‘suppression’ fires ($Y_{3,4\text{‘Suppression’}}$) as the fire season becomes increasingly active, which could overwhelm resource availability and suppression efforts.

We also gathered information on physical assets threatened by the fire like HOUSES, COMMERCIAL buildings, and OTHER buildings (Table 1). As the number of assets threatened by the fire increases, we would expect to see a reduction in the deployment of ‘other’ strategies ($Y_{1\text{‘Other’}}$) and an increase in ‘suppression’ ($Y_{1\text{‘Suppression’}}$), in addition to all fires potentially burning for a shorter duration (Y_2) and over less area ($Y_{3,4}$), *ceteris paribus* (Young *et al.*, 2019). Similar effects are expected for hazards to human capital like INJURIES or FATALITIES, but each mechanism could be overwhelmed during an active fire season.

We also collected each fire’s CAUSE (natural v. human) with the expectation that human caused ‘suppression’ fires would burn for shorter durations ($Y_{2\text{‘Suppression’}}$) and over less area ($Y_{3,4\text{‘Suppression’}}$), *ceteris paribus* (Table 1). Human caused fires commonly occur in populated areas (Balch *et al.* 2017), which increases a fire's potential to cause harm, further incentivizing the successful deployment of a 'suppression' strategy that is enhanced by improved accessibility of expansive road networks. The DISCOVERY YEAR was expected to capture increasing trends in fire activity (Y_1), management duration (Y_2) and area burned ($Y_{3,4}$), which have been document in several studies throughout the western US (Westerling *et al.* 2006; Miller and Safford 2012; Westerling 2016; Singleton *et al.* 2019).

A2.2 Fire weather variables

We expect the management duration of 'other' fires ($Y_{2\text{'Other'}}$) to increase under conditions with cured dead fuels (high ERC) concurrent with an increasing AvgRH (Table 1), due to the increased application of 'other' strategies as fuel moistures rise (Young *et al.* 2019) through the time-lag principle that adjusts the moisture of dead fuels based on surrounding atmospheric moisture (van Wagtendonk 2006). Under these conditions, the area burned by 'other' fires ($Y_{3,4\text{'Other'}}$) is ambiguous, due to opposing effects of managers allowing the fire to burn more naturally, but under conditions that may limit the fire's growth. Conversely, under conditions with a high ERC concurrent with a low AvgRH dead fuels are curing, and we would expect 'other' fires to burn for significantly shorter durations ($Y_{2\text{'Other'}}$) and over less area ($Y_{3,4\text{'Other'}}$) due to the increased application of a successful 'suppression' strategy, *ceteris paribus* (Young *et al.* 2019). The same expectation holds for high levels of VPD during 'other' fire management. Under these conditions (of a high VPD or a high ERC concurrent with a low AvgRH) we would also expect 'suppression' fires to burn for shorter durations ($Y_{2\text{'Suppression'}}$), *ceteris paribus*. Nevertheless, it is unlikely that a 'suppression' strategy would be successful under extreme fire weather (Williams *et al.* 2015; Abatzoglou and Williams 2016), leading to an increase in area burned ($Y_{3,4\text{'Suppression'}}$).

A3. Additional methods

A3.1 Univariate weather models

To assess the internal validity of our SRD design and the consistency of our fire classification across the western US, we fit local linear and quadratic SRD models with 6-year bandwidths using uniform kernel weighting. We had the expectation that weather within each fire category would remain largely unaffected by the *2009 Policy Guidance*. We also expected a greater share of 'other' fires to impose 'other' effects on the combined fire population, where it is assumed the greater share of 'other' fires would be the result of the *2009 Policy Guidance* and other inextricably linked advancements in fire management. Our expectations of 'other' fire effects imposed on the combined population are an increase in PRECIPITATION and AvgRH, and a decrease in ERC and VPD (Finney *et al.* 2009; Williams *et al.* 2014; Abatzoglou and Williams 2016; Young *et al.* 2019). This is consistent with 'suppression' fires primarily being managed under extreme weather conditions and 'other' fires being managed under docile weather conditions (Young *et al.* 2019).

The univariate weather models performed according to our expectations, and most variables did not express a significant change within fire classifications ('suppression' and 'other') due to the implementation of the *2009 Policy Guidance* (Fig. A2). The only exception was an increase in average PRECIPITATION of 1.33 inches (3.38 cm) during 'other' fire management when fit with a local quadratic relationship (Fig. A2). This effect is consistent with 'other' fires being managed for longer durations after the *2009 Policy Guidance* when wet conditions prevailed (Young *et al.* 2019), which are common during spring, fall and winter months as well as during the North American monsoon in the Southwest (Sheppard *et al.* 2002; Notaro *et al.* 2010). Nevertheless, other widespread insignificant weather effects lend evidence against our classification of fires being the primary driver of the impact of the *2009 Policy*

Guidance on PRECIPITATION or other response variables (Y_i). Otherwise, we would expect to see significant effects across many of the weather variables corresponding with the enactment of the *2009 Policy Guidance*. This was not the case lending evidence towards an accurate delineation of 'suppression' and 'other' fires despite changes in fire management strategies throughout the dataset.

We also observed 'other' fire effects imposed on the combined fire population that were consistent with our expectations. This includes a detectable increase in PRECIPITATION of 0.28 to 0.31 inches (0.71 to 0.79 cm) when fit with local linear and local quadratic models (Fig. A2). This lends additional evidence of fire weather playing a role in the implementation of management strategies, which is consistent with previous research (Finney *et al.* 2009; Young *et al.* 2019).

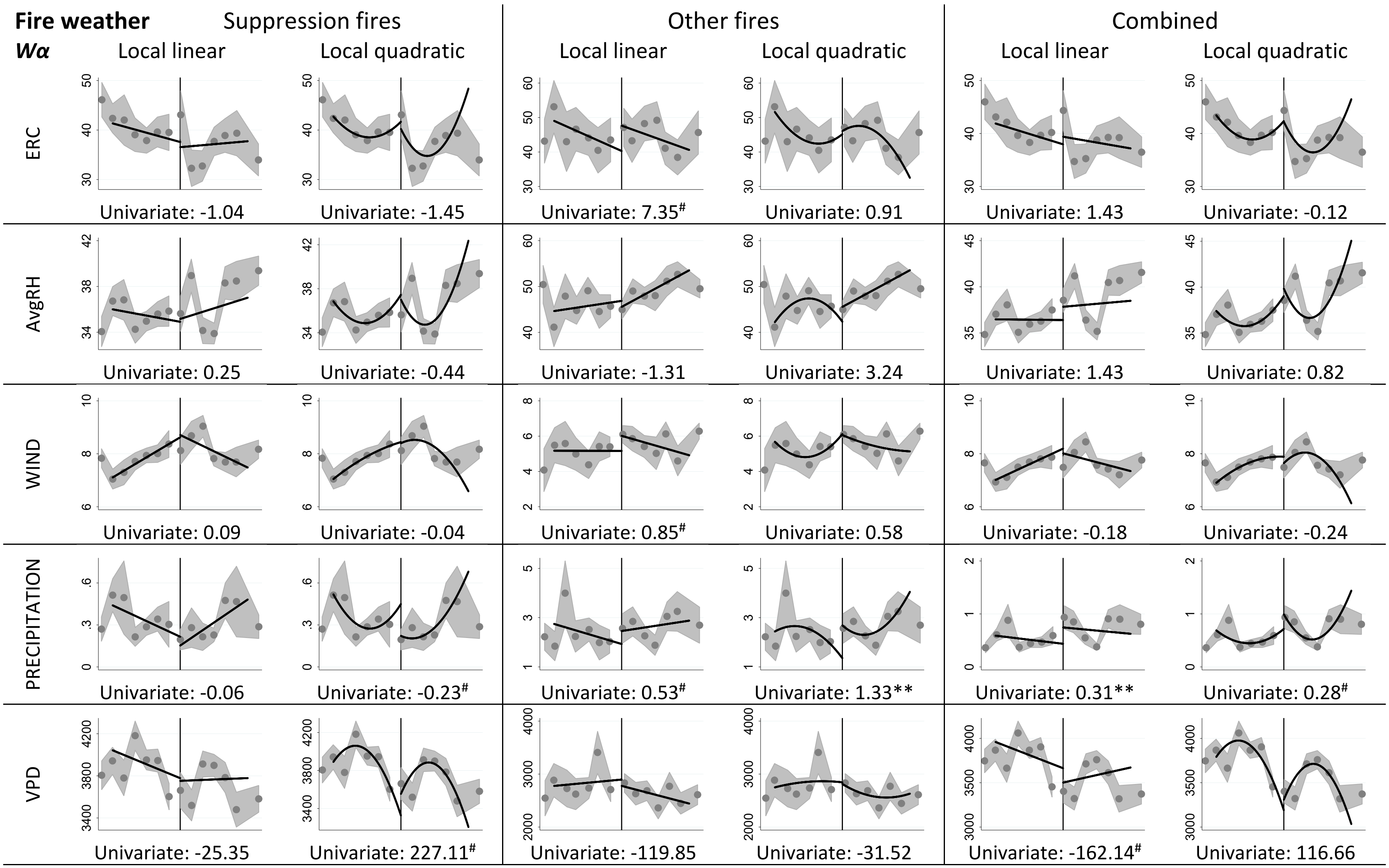

Fig. A2. Local SRD effects of the *2009 Policy Guidance* on weather by fire classification (‘suppression’, ‘other’ and combined). Y-axis units can be found in Table 1. The vertical line within each plot separates pre-*Policy* (2002 to 2008) and post-*Policy* (2009 to 2016) timeframes. Points represent evenly spaced binned data that mimic the data’s variance using spacing estimators, with a 95% confidence interval shown by the shaded area. Lines represent univariate *Policy* effects. Below each figure is the estimated univariate *Policy* effect and significance levels with clustered standard errors based on ‘fire clusters’.

# $p<0.2$; * $p<0.1$; ** $p<0.05$

A3.2 Global (parametric) considerations

When assessing underlying distributions of our global SRD models, we had to determine if zero inflated data was due to structural constraints alone or if chance played a role. Examples of structural constraints to some management strategies include human ignitions, ignition locations that are adjacent to highly populated areas (Thompson *et al.* 2013), or an ignition location or season that is too dry to achieve resource objectives. If zeros originated from structural constraints alone, Hurdle models would be preferred (Hu *et al.* 2011). In our case however, we believed sampling chance played a role due to the random nature of incident commander assignments, and the unpredictable nature of fire ignitions in space and time. For these reasons, we used zero inflated (ZI) count modeling techniques when assessing our 'fire year' models where applicable ($Y_{1,4}$). Using ZI techniques we independently model structural zeros with a generalized linear model (GLM) based on their theoretical connection to the *2009 Policy Guidance*, human CAUSED ignitions, HOUSES AT RISK, and the aridity of the fire's location and/or season based on VPD.

In addition to ZI data in our 'fire year' models, many of the response variables (Y_i) had a variance that exceeded their mean (i.e. overdispersion) (Table A2), as well as a limited number of observations with a large count. These data traits suggested a Negative Binomial (NB) distribution, rather than a Poisson distribution where it is assumed the response (Y_i) has a mean equal to its the variance (Hu *et al.* 2011). In addition, the response variables of management duration (Y_2) and area burned (Y_3) by individual large fires were inherently censored due to the removal of small fires that were irregularly reported between regions. Censored data was considered with truncated modeling techniques (e.g. truncated negative binomial, TNB) where truncation occurred at the value one less than the smallest value in management duration (Y_2, truncation ranges from zero to four days) and area burned (Y_3, truncation occurs at 40 ha) (Antonakis *et al.* 2014). To determine the proper functional form for each response variable (Y_i) in our global SRD models, we used a comparison of each sample mean and variance, a likelihood ratio test of the dispersion parameter, and Akaike and Bayesian Information Criterion (Table A2).

Table A2. *Model selection statistics for determining preferred modeling distributions for global (parametric) SRD models of each response variable (i.e. Number of Fires, Management Duration (days), Area Burned (ha), and Total Area Burned). Preferred modeling distributions were assessed for 'suppression' and 'other' fires with observations clusters across space ('fire clusters') and time ('fire season'). n = total number of observations; zero n = the number of observations with a count of 0, LRT = Likelihood Ratio Test for the dispersion parameter (δ) using a chi-square statistic (χ^2) within NB and ZINB models, TNB = Truncated Negative Binomial at the level in the parentheticals of the Preferred Model column, NB = Negative Binomial, ZINB = Zero Inflated Negative Binomial, ZIP = Zero Inflated Poisson, AIC = Akaike Information Criterion, BIC = Bayesian Information Criterion.*

		Mean (Variance) *n* (zero *n*)	LRT: δ = 0[a] χ^2 (T)NB χ^2 ZINB	(T)Poisson AIC	(T)Poisson BIC	(T)NB AIC	(T)NB BIC	ZINB AIC	ZINB BIC	ZIP AIC	ZIP BIC	Preferred Model
Number of Fires (Y_1)												
Western US	Suppression – Fire Cluster	1.54 (3.71)	111.20* | 96.17*[b]	10589	10757	10479	10654	10452	10670[b]	10541	10740	ZINB
	Suppression – Fire Season	3750 (464)		10563	10650	10451	10539	10414	10514[b]	10505	10592	ZINB
	Other – Fire Cluster	0.23 (0.40)	8.59* | 1.3e-03	3264	3426	3257	3426	3187	3411	3185	3403	ZIP
	Other – Fire Season	3750 (3110)		3238	3319	3231	3319	3145	3238	3143	3230	ZIP
Inland Empire	Suppression – Fire Cluster	1.57 (3.64)	13.56* | 12.72*	2164	2266	2152	2259	2156	2286	2167	2292	ZINB
	Suppression – Fire Season	775 (140)		2146	2206	2132	2193	2132	2206	2141	2206	ZINB
	Other – Fire Cluster	0.36 (0.84)	1.43 | 0.00	837	934	837	940	830	951	828	944	ZIP
	Other – Fire Season	775 (600)		821	881	819	880	806	871	804	865	ZIP
Rocky Mountains	Suppression – Fire Cluster	1.35 (1.56)	8.7e-05 | 2.4e-05[b]	1052	1140	1054	1146	1054	1154[b]	1056	1160[b]	POIS
	Suppression – Fire Season	406 (73)		1036	1092	1038	1098	1038	1106[b]	1030	1082[b]	POIS
	Other – Fire Cluster	0.25 (0.23)	0.00 | 0.00[b]	419	503	419	503	427	527[b]	425	521[b]	POIS
	Other – Fire Season	406 (313)		405	461	407	467	405	461[b]	405	461[b]	POIS
Southwest	Suppression – Fire Cluster	1.86 (10.92)	49.15* | 37.85*[b]	1852	1948	1804	1905	1800	1919[b]	1836	1950[b]	ZINB
	Suppression – Fire Season	595 (123)		1836	1897	1786	1848	1776	1842[b]	1814	1880[b]	ZINB
	Other – Fire Cluster	0.46 (0.69)	0.00 | 0.00	847	939	848	940[c]	848	962	846	955	POIS
	Other – Fire Season	595 (407)		833	895	834	895[c]	824	885	824	885	POIS
Management Duration (Y_2)												
Western US	Suppression – Fire Cluster	9.70 (291.26)	3.1e+04*	64258	64438	33501	33688					TNB(0)
	Suppression – Fire Season	5786 (0)		64230	64316	33471	33558					TNB(0)
	Other – Fire Cluster	42.61 (953.06)	6338.93*	14219	14343	7882	8011					TNB(0)
	Other – Fire Season	872 (0)		14193	14255	7856	7923					TNB(0)
Inland Empire	Suppression – Fire Cluster	12.56 (488.12)	4131.45*	10943	11055	6813	6931					TNB(0)
	Suppression – Fire Season	1214 (0)		10927	10998	6795	6867					TNB(0)
	Other – Fire Cluster	50.14 (889.96)	813.19*	3364	3436	2552	2629					TNB(1)
	Other – Fire Season	282 (0)		3350	3397	2536	2584					TNB(1)
Rocky Mountains	Suppression – Fire Cluster	12.49 (542.54)	2168.65*	5405	5499	3238	3337					TNB(0)
	Suppression – Fire Season	547 (0)		5387	5443	3218	3274					TNB(0)
	Other – Fire Cluster	33.05 (830.63)	540.14*	1453	1506	915	970					TNB(4)
	Other – Fire Season	102 (0)		1439	1473	901	938					TNB(4)
Southwest	Suppression – Fire Cluster	8.55 (175.89)	2605.03*	8572	8682	5969	6084					TNB(0)
	Suppression – Fire Season	1105 (0)		8556	8626	5951	6021					TNB(0)
	Other – Fire Cluster	32.92 (695.97)	1655.28*	3935	4007	2282	2357					TNB(0)
	Other – Fire Season	271 (0)		3921	3968	2266	2313					TNB(0)

[a] H_O: Dispersion parameter, δ = 0; H_A: Data is overdispersed and a Negative Binomial (NB) model is preferred. Assessed with and without estimates of Zero Inflation (i.e. NB and ZINB)

[b] Assessed with the removal of HOUSES AT RISK from the Zero Inflated model step for convergence.

* $p<0.01$

Table A2 cont. Model selection statistics for determining preferred modeling distributions for global (parametric) SRD models of each response variable (i.e. Number of Fires, Management Duration (days), Area Burned (ha), and Total Area Burned). Preferred modeling distributions were assessed for 'suppression' and 'other' fires with observations clusters across space ('fire clusters') and time ('fire season'). n = total number of observations; zero n = the number of observations with a count of 0, LRT = Likelihood Ratio Test for the dispersion parameter (δ) using a chi-square statistic (χ^2) within NB and ZINB models, TNB = Truncated Negative Binomial at the level in the parentheticals of the Preferred Model column, NB = Negative Binomial, ZINB = Zero Inflated Negative Binomial, ZIP = Zero Inflated Poisson, AIC = Akaike Information Criterion, BIC = Bayesian Information Criterion.

		Mean (Variance) *n* (zero *n*)	LRT: δ = 0[a] χ^2 (T)NB | χ^2 ZINB	(T)Poisson AIC / BIC	(T)NB AIC / BIC	ZINB AIC / BIC	ZIP AIC / BIC	Preferred Model
Area burned (Y_3)								
Western US	Suppression – Fire Cluster	2290 (1.07e+08)	4.1e+07*	4.15e+07 4.15e+07	91864 92051			TNB(40)
	Suppression – Fire Season	5786 (0)		4.15e+07 4.15e+07	91836 91930			TNB(40)
	Other – Fire Cluster	798 (2.03e+07)	2.2e+06*	2234163 2234282	13430 13556			TNB(40)
	Other – Fire Season	872 (0)		2234139 2234201	13400 13462			TNB(40)
Inland Empire	Suppression – Fire Cluster	2943 (1.45e+08)	8.3e+06*[d]	8336158 8336271[d]	19707 19819			TNB(40)
	Suppression – Fire Season	1214 (0)		8336140 8336207[d]	19855 19922[d]			TNB(40)
	Other – Fire Cluster	693 (2.90e+07)	4.2e+05*	428563 428632	4320 4396			TNB(40)
	Other – Fire Season	282 (0)		428551 428598	4306 4357			TNB(40)
Rocky Mountains	Suppression – Fire Cluster	1527 (1.84e+07)	1.3e+06*	1354374 1354468	8452 8551			TNB(40)
	Suppression – Fire Season	547 (0)		1354356 1354411	8436 8500			TNB(40)
	Other – Fire Cluster	599 (9720894)	1.2e+05*	126560 126612	1584 1639			TNB(40)
	Other – Fire Season	102 (0)		126546 126580	1570 1606			TNB(40)
Southwest	Suppression – Fire Cluster	2349 (1.16e+08)	4.3e+06*	4315185 4315295	17508 17623			TNB(40)
	Suppression – Fire Season	1105 (0)		4315169 4315239	17490 17560			TNB(40)
	Other – Fire Cluster	1253 (1.45e+07)	5.4e+05*	543535 543607	4251 4327			TNB(40)
	Other – Fire Season	271 (0)		543521 543568	4237 4288			TNB(40)
Total Area Burned (Y_4)								
Western US	Suppression – Fire Cluster	4252 (2.61e+08)	3.9e+07* | 3.6e+07*	3.87e+07 3.87e+07	60126 60301	58968 59205	3.58e+07 3.58e+07	ZINB
	Suppression – Fire Season	3750 (464)		3.87e+07 3.87e+07	60096 60177	58920 59007	3.58e+07 3.58e+07	ZINB
	Other – Fire Cluster	388 (1.09e+07)	6.4e+06* | 2.1e+06*	6440356 6440518	14262 14430	13344 13568	2151721 2151939	ZINB
	Other – Fire Season	3750 (3110)		6440332 6440419	14236 14323	13298 13379	2151679 2151766	ZINB
Inland Empire	Suppression – Fire Cluster	5133 (3.27e+08)	7.7e+06* | 7.0e+06*	7691087 7691189	12131 12238	11821 11951	7003397 7003523	ZINB
	Suppression – Fire Season	775 (140)		7691073 7691143	12115 12184	11793 11858	7003371 7003436	ZINB
	Other – Fire Cluster	704 (3.04e+07)	1.2e+06* | 3.8e+05*	1232735 1232833	3822 3924	3591 3712	378722 378838	ZINB
	Other – Fire Season	775 (600)		1232719 1232779	3804 3864	3567 3632	378700 378765	ZINB
Rocky Mountains	Suppression – Fire Cluster	2249 (3.40e+07)	1.4e+06* | 1.1e+06*	1387353 1387441	6010 6102	5803 5915	1106373 1106481	ZINB
	Suppression – Fire Season	406 (73)		1387335 1387387	5990 6042	5777 5837	1106349 1106409	ZINB
	Other – Fire Cluster	445 (7454311)	2.6e+05*[c] | 1.4e+05*[c]	266158 266242	1974 2058[c]	1909 2013	137223 137319[c]	ZINB
	Other – Fire Season	406 (313)		266146 266206	1958 2010[c]	1885 1941	137201 137253[c]	ZINB
Southwest	Suppression – Fire Cluster	4384 (2.58e+08)	4.1e+06* | 3.6e+06*	4063091 4063187	9029 9130	8702 8825	3646914 3647033	ZINB
	Suppression – Fire Season	595 (123)		4063075 4063136	9011 9072	8676 8742	3646888 3646950	ZINB
	Other – Fire Cluster	705 (1.07e+07)	1.4e+06* | 6.2e+05*	1440169 1440261	4002 4099	3804 3918	619983 620093	ZINB
	Other – Fire Season	595 (407)		1440157 1440223	3986 4048	3782 3848	619961 620023	ZINB

[a] H_O: Dispersion parameter, δ = 0; H_A: Data is overdispersed and a Negative Binomial (NB) model is preferred. Assessed with and without estimates of Zero Inflation (i.e. NB and ZINB)

[b] Assessed with the removal of HOUSES AT RISK from the Zero Inflated model step for convergence.

[c] Assessed with the removal of FATALITIES from the Count model step for convergence.

[d] Model assessed with truncation at 28 ha due to lack of convergence with truncation at 40 ha.

* $p<0.01$

Final global count model specifications comprised of Poisson and Truncated Negative Binomial (TNB) models, and mixed modeling techniques including Zero Inflated Poisson (ZIP) and Zero Inflated Negative Binomial (ZINB) models. We interpreted ZI model steps (i.e. GLM in our case) using Odds Ratios (ORs) of parameter estimates (e.g. ORs = exp(γ))[1]. Likewise, we interpreted count model steps (i.e. Poisson and (Truncated) NB models in our case) using Incident Response Ratios (IRRs) of parameter estimates (e.g. IRRs = exp(γ)). The interpretation of both ORs and IRRs were converted to a percent change per unit impact (e.g. (IRRs – 1) * 100) (Szumilas 2010). In other words, when compared to an unexposed analog we interpret ORs as a percent change per unit impact in the odds of applying each strategy type across 'fire years' ($Y_{1,4}$). Likewise, we interpret IRRs as a percent change per unit impact in the likely count of each response variable ($Y_{1,2,3,4}$). It is important to note, that unlike common GLM models, the ORs from our ZI models are estimating the odds of zeros. For example, ORs produced by the 'suppression' 'fire year' models estimate the change in the odds (for every unit increase in the explanatory variable) that a 'fire year' contains 'other' fire(s) only, relative to a 'fire year' containing 'suppression' fire(s) as well. To assess the significance of ORs and IRRs, we calculated clustered standard errors based on 'fire clusters' and 'fire seasons' that were further assessed with jackknife simulations to explore the robustness of the *2009 Policy Guidance* effects across 'fire clusters' (space) and 'fire seasons' (time). Specifically, jackknife simulations systematically removed and re-estimated observations within the 'fire cluster' (or 'fire season')

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[1] γ represents the parameter estimate (i.e. coefficients) of *2009 Policy Guidance*. The same interpretations hold for parameter estimates of fire variables (φ) and weather variables (α).

of origin to assess if fire management practices in a single or limited number of clusters (or seasons) were driving the estimated effects of the *2009 Policy Guidance*.

It is also worth noting that assessing ORs within count modeling techniques has been shown to be more precise and less susceptible to over-estimation due to a retention of valuable information of data dispersion when compared to a standard GLM model (Sroka and Nagaraja 2018). Nevertheless, ORs are also known to be artificially large when the response variable lacks adequate representation across the full range of outcome levels (i.e. sparse data bias, Greenland *et al.* 2016), which is characteristic of our 'fire year' models estimating the number of fires (Y_1) for both classifications ('suppression' v. 'other'). For example, of the 3750 'fire year' observations for the number of 'suppression' fires ($Y_{1\,\text{'Suppression'}}$), 12% had a count of zero, 59% had a count of one, and 16% had a count of two. The remaining 13% had counts that ranged from three (5%) to 44 (<1%) with several unrepresented values in between when compared to values of two or less. On the other hand, our 'fire year' data for total area burned (Y_4) does not display characteristics of sparse data bias despite having the same population of zeros (e.g. 12% in 'suppression' 'fires years'). This is due to the positive values of total area burned (Y_4) having a representative range from 41 ha (101 ac) to 376,433 ha (930,186 ac) with each value containing <1% of the data (e.g. highest populated value is 81 ha (200 ac) with 34 observations). For this reason, when interpreting how the odds of 'other' fires has changed since the implementation of the *2009 Policy Guidance* we focus on our total area burned models (Y_4).

A4. Effects of fire weather variables

Several weather variables were also significant predictors when examining our models across 'fire years' ($Y_{1,4}$) and 'individual fires' ($Y_{2,3}$). Notably, some weather effects in our 'fire year' models captured burning conditions that may be conducive to the application of 'other' strategies across both fire types. For example, changing PRECIPITATION during fire management within a ‘fire year’ was positively associated with the number of ‘other’ fires (Table 7, +7.35% to +17.91% fires per unit increase in PRECIPITATION) and total area burned for both ‘other’ fires (+4.82% to +18.43% area per unit increase in PRECIPITATION) and ‘suppression’ fires (+15.07% to +51.87% area per unit increase in PRECIPITATION). Similarly, a changing ERC concurrent with a high AvgRH during fire management within a ‘fire year’ was negatively associated with the number of ‘suppression’ fires (-0.57% fires per unit increase in ERC).

When examining ‘individual fires’ we also found burning conditions that were conducive to the application of ‘other’ strategies across both fire types. For example, changing PRECIPITATION concurrent with calm WINDs during fire management was positively associated with management duration for both ‘other’ (Table 8, +7.31% duration per unit increase in PRECIPITATION) and ‘suppression’ fires (+40.87% duration per unit increase in PRECIPITATION), and area burned for ‘suppression’ fires (+28.72% area per unit increase in PRECIPITATION). Likewise, changing ERC concurrent with a high AvgRH during fire management was positively associated with management duration for ‘suppression’ fires (+1.28% duration per unit increase in ERC).

On the other hand, some weather effects captured burning conditions that were not conducive to the application of ‘other’ strategies. For example, changing ERC concurrent with a low AvgRH during fire management within a ‘fire year’ was negatively associated with the number of ‘other’ fires (Table 7, -0.76% fires per unit increase in ERC). Likewise a changing WIND or VDP during fire management within a ‘fire year’ was negatively associated with the number of ‘other’ fires (-7.72% to -11.74% fires per unit increase in WIND; -0.02% fires per unit increase in VPD). In some cases, ‘suppression’ fires also became harder to control. For example, changing WINDs were positively associated with the number (+1.68 to 6.13% fires per unit increase in WIND), and total area burned for ‘suppression’ fires (+5.48% to +20.38% area per unit increase in WIND). A similar effect was detected with changing VPD (+0.01% fires unit increase in VPD; +0.02% area per unit increase in VPD).

When looking for burning conditions not conducive to ‘other’ strategy application across the ‘individual fire’ models, you also commonly find conditions where it is hard to control ‘suppression’ fires. For example changing WINDs concurrent with a lack of PRECIPITATION during fire management was negatively associated with management duration for both ‘other’ and (Table 8, –5.92% duration per unit increase in WIND) ‘suppression’ fires (–7.06% duration per unit increase in WIND), but was positively associated with area burned for ‘suppression’ fires (+3.69% area per unit increase in WIND). Similarly, changing VPD during fire management was negatively associated with management duration for both ‘suppression’ (–0.02% duration per unit increase in VPD) and ‘other’ fires (–0.03% duration per unit increase in VPD), but was positively associated with area burned for ‘suppression’ fires (+0.01% area per unit increase in VPD). In other cases, it is easier to control ‘suppression’ fires. For example, a changing AvgRH concurrent with a low ERC during fire management was negatively associated with management duration (Table 8, –1.64% duration per unit increase in AvgRH) and area burned for ‘suppression’ fires (–3.11% area per unit increase in AvgRH).

Appendix B

Summary tables for all variables included in our analyses are provided in the following tables.

Table B1. *Summary statistics of variables used in the modeling of the number of fires (Y_1), management duration (Y_2), area burned (Y_3), and total area burned (Y_4).*

	By Fire					By Fire Year				
Variable	Obs.	Mean	Std. Dev.	Min	Max	Obs.	Mean	Std. Dev.	Min	Max
Western US – 'Suppression'										
NUMBER OF FIRES (Y_1)						3750	1.54	1.93	0.0	44.0
MANAGEMENT DURATION (Y_2)	5786	10.67	18.33	1.0	267.0					
HECTARES ($Y_{3,4}$)	5786	2755.83	11292.17	41.0	263862.0	3750	4252.06	16167.36	0.0	376433.0
DISCOVERY DATE	5786	198.51	50.40	1.0	359.0	3750	204.32	42.10	6.0	357.0
HOUSES AT RISK	5786	489.05	4111.94	0.0	147938.0	3750	518.26	3520.84	0.0	98000.0
COMMERCIAL BLDGS AT RISK	5786	28.46	370.63	0.0	18550.0	3750	36.07	385.17	0.0	13530.0
OTHER BUILDINGS AT RISK	5786	149.14	1642.23	0.0	71000.0	3750	181.27	1825.00	0.0	71000.0
INJURIES	5786	1.14	4.02	0.0	113.0	3750	1.29	3.80	0.0	68.0
FATALITIES	5786	0.02	0.38	0.0	19.0	3750	0.02	0.28	0.0	10.0
CAUSE						3750	0.45	0.99	0.0	19.0
NUMBER OF FIRES – REGION	5786	102.56	50.65	11.0	218.0	3750	91.48	45.12	11.0	218.0
NUMBER OF FIRES – WEST	5786	524.63	152.84	270.0	817.0	3750	499.51	146.70	270.0	817.0
START YEAR	5786	2008.29	3.98	2002.0	2016.0	3750	2008.46	4.09	2002.0	2016.0
ERC	5786	38.74	35.41	0.0	316.5	3750	42.62	32.73	0.0	316.5
AvgRH	5786	35.83	12.88	3.0	85.7	3750	38.59	12.70	3.0	85.7
PRECIPITATION	5786	0.31	1.12	0.0	28.9	3750	1.07	2.74	0.0	56.9
WIND	5786	7.97	3.99	0.0	38.0	3750	7.19	3.43	0.0	32.0
VPD	5786	3833.98	1348.06	196.0	9544.0	3750	3515.93	1231.97	196.0	9544.0
Western US – 'Other'										
NUMBER OF FIRES (Y_1)						3750	0.23	0.63	0.0	11.0
MANAGEMENT DURATION (Y_2)	872	51.88	33.37	1.0	179.0					
HECTARES ($Y_{3,4}$)	872	1667.70	6546.00	41.0	138196.0	3750	387.80	3295.36	0.0	138196.0
DISCOVERY DATE	872	210.54	32.14	10.0	307.0	3750	204.32	42.10	6.0	357.0
HOUSES AT RISK	872	193.80	2024.32	0.0	40021.0	3750	518.26	3520.84	0.0	98000.0
COMMERCIAL BLDGS AT RISK	872	27.75	469.89	0.0	13530.0	3750	36.07	385.17	0.0	13530.0
OTHER BUILDINGS AT RISK	872	103.15	1128.45	0.0	29013.0	3750	181.27	1825.00	0.0	71000.0
INJURIES	872	0.38	1.61	0.0	32.0	3750	1.29	3.80	0.0	68.0
FATALITIES	872	0.00	0.07	0.0	2.0	3750	0.02	0.28	0.0	10.0
CAUSE						3750	0.00	0.00	0.0	0.0
NUMBER OF FIRES – REGION	872	98.69	52.83	11.0	218.0	3750	91.48	45.12	11.0	218.0
NUMBER OF FIRES – WEST	872	482.13	132.58	270.0	817.0	3750	499.51	146.70	270.0	817.0
START YEAR	872	2009.75	3.70	2002.0	2016.0	3750	2008.46	4.09	2002.0	2016.0
ERC	872	45.11	25.58	0.0	184.5	3750	42.62	32.73	0.0	316.5
AvgRH	872	47.59	11.43	14.7	81.0	3750	38.59	12.70	3.0	85.7
PRECIPITATION	872	2.51	2.67	0.0	31.4	3750	1.07	2.74	0.0	56.9
WIND	872	5.54	2.89	0.0	17.5	3750	7.19	3.43	0.0	32.0
VPD	872	2713.57	968.09	536.0	6237.6	3750	3515.93	1231.97	196.0	9544.0

Table B1 cont. Summary statistics of variables used in the modeling of the number of fires (Y_1), management duration (Y_2), area burned (Y_3), and total area burned (Y_4).

Variable	By Fire Obs.	Mean	Std. Dev.	Min	Max	By Fire Year Obs.	Mean	Std. Dev.	Min	Max
California – 'Suppression'										
NUMBER OF FIRES (Y_1)						885	1.31	0.79	0.0	8.0
MANAGEMENT DURATION (Y_2)	1157	8.81	15.03	1.0	205.0					
HECTARES ($Y_{3,4}$)	1157	2294.36	8635.44	41.0	127710.0	885	2999.51	10267.01	0.0	133604.0
DISCOVERY DATE	1157	207.16	54.09	5.0	350.0	885	207.29	51.57	14.0	350.0
HOUSES AT RISK	1157	988.94	4908.42	0.0	78087.0	885	841.54	3744.91	0.0	63758.0
COMMERCIAL BLDGS AT RISK	1157	51.46	587.94	0.0	18550.0	885	41.57	282.11	0.0	6200.0
OTHER BUILDINGS AT RISK	1157	209.73	1748.52	0.0	39911.0	885	213.42	1662.44	0.0	39911.0
INJURIES	1157	2.67	6.92	0.0	113.0	885	2.63	5.85	0.0	65.0
FATALITIES	1157	0.05	0.58	0.0	14.0	885	0.04	0.43	0.0	10.0
CAUSE						885	0.31	0.52	0.0	3.0
NUMBER OF FIRES – REGION	1157	92.75	23.11	49.0	138.0	885	91.17	22.80	49.0	138.0
NUMBER OF FIRES – WEST	1157	498.06	153.43	270.0	817.0	885	490.97	148.96	270.0	817.0
START YEAR	1157	2007.76	3.94	2002.0	2016.0	885	2007.97	4.00	2002.0	2016.0
ERC	1157	51.50	35.93	0.0	316.5	885	51.86	35.47	0.0	316.5
AvgRH	1157	38.51	13.79	6.5	83.0	885	38.84	13.02	6.5	81.3
PRECIPITATION	1157	0.13	0.69	0.0	9.0	885	0.32	1.35	0.0	18.0
WIND	1157	7.14	3.59	0.0	30.0	885	6.91	3.47	0.0	28.0
VPD	1157	3920.10	1303.51	480.2	8421.0	885	3815.91	1269.02	677.7	8421.0
California – 'Other'										
NUMBER OF FIRES (Y_1)						885	0.06	0.29	0.0	3.0
MANAGEMENT DURATION (Y_2)	56	70.32	43.86	9.0	168.0					
HECTARES ($Y_{3,4}$)	56	2706.91	10595.13	45.0	77716.0	885	171.28	2729.23	0.0	77716.0
DISCOVERY DATE	56	212.63	49.39	14.0	307.0	885	207.29	51.57	14.0	350.0
HOUSES AT RISK	56	462.25	3355.01	0.0	25114.0	885	841.54	3744.91	0.0	63758.0
COMMERCIAL BLDGS AT RISK	56	18.98	83.41	0.0	448.0	885	41.57	282.11	0.0	6200.0
OTHER BUILDINGS AT RISK	56	328.21	1773.60	0.0	12814.0	885	213.42	1662.44	0.0	39911.0
INJURIES	56	0.84	2.54	0.0	16.0	885	2.63	5.85	0.0	65.0
FATALITIES	56	0.04	0.27	0.0	2.0	885	0.04	0.43	0.0	10.0
CAUSE						885	0.00	0.00	0.0	0.0
NUMBER OF FIRES – REGION	56	90.71	25.72	49.0	138.0	885	91.17	22.80	49.0	138.0
NUMBER OF FIRES – WEST	56	521.79	143.62	270.0	817.0	885	490.97	148.96	270.0	817.0
START YEAR	56	2008.63	4.02	2002.0	2016.0	885	2007.97	4.00	2002.0	2016.0
ERC	56	48.28	19.79	16.0	87.0	885	51.86	35.47	0.0	316.5
AvgRH	56	42.89	7.93	18.0	60.3	885	38.84	13.02	6.5	81.3
PRECIPITATION	56	2.33	2.88	0.0	12.5	885	0.32	1.35	0.0	18.0
WIND	56	4.79	2.63	1.0	12.0	885	6.91	3.47	0.0	28.0
VPD	56	2456.98	782.12	957.2	4442.3	885	3815.91	1269.02	677.7	8421.0

Table B1 cont. Summary statistics of variables used in the modeling of the number of fires (Y_1), management duration (Y_2), area burned (Y_3), and total area burned (Y_4).

	By Fire					By Fire Year				
Variable	Obs.	Mean	Std. Dev.	Min	Max	Obs.	Mean	Std. Dev.	Min	Max
Great Basin - 'Suppression'										
NUMBER OF FIRES (Y_1)						493	1.95	2.26	0.0	18.0
MANAGEMENT DURATION (Y_2)	962	7.67	10.66	1.0	113.0					
HECTARES ($Y_{3,4}$)	962	3016.85	12555.67	41.0	205885.0	493	5886.83	24052.24	0.0	376433.0
DISCOVERY DATE	962	203.82	34.76	19.0	327.0	493	203.42	28.70	89.0	300.5
HOUSES AT RISK	962	84.07	436.59	0.0	7263.0	493	103.56	488.63	0.0	7263.0
COMMERCIAL BLDGS AT RISK	962	5.98	39.69	0.0	602.0	493	7.01	39.41	0.0	507.0
OTHER BUILDINGS AT RISK	962	40.86	276.18	0.0	5001.0	493	55.83	334.26	0.0	5001.0
INJURIES	962	0.59	2.47	0.0	62.0	493	0.73	2.36	0.0	32.0
FATALITIES	962	0.01	0.14	0.0	3.0	493	0.01	0.09	0.0	1.5
CAUSE						493	0.45	0.83	0.0	6.0
NUMBER OF FIRES – REGION	962	105.77	56.04	26.0	201.0	493	88.39	50.95	26.0	201.0
NUMBER OF FIRES – WEST	962	563.88	161.50	270.0	817.0	493	514.38	152.14	270.0	817.0
START YEAR	962	2008.13	3.82	2002.0	2016.0	493	2008.33	4.03	2002.0	2016.0
ERC	962	52.38	33.92	1.0	118.0	493	53.56	31.07	1.0	107.0
AvgRH	962	27.36	10.04	3.0	71.7	493	29.01	9.57	3.0	71.7
PRECIPITATION	962	0.19	0.57	0.0	5.9	493	0.71	1.44	0.0	12.1
WIND	962	8.84	3.66	0.0	23.5	493	8.37	3.24	0.0	19.0
VPD	962	4321.22	1126.32	623.0	8082.0	493	4045.00	1131.29	824.7	7607.0
Great Basin – 'Other'										
NUMBER OF FIRES (Y_1)						493	0.19	0.50	0.0	5.0
MANAGEMENT DURATION (Y_2)	93	50.19	31.49	3.0	120.0					
HECTARES ($Y_{3,4}$)	93	805.14	2043.61	41.0	18168.0	493	151.88	961.57	0.0	18168.0
DISCOVERY DATE	93	213.29	30.63	136.0	294.0	493	203.42	28.70	89.0	300.5
HOUSES AT RISK	93	43.49	241.51	0.0	1820.0	493	103.56	488.63	0.0	7263.0
COMMERCIAL BLDGS AT RISK	93	2.17	12.35	0.0	100.0	493	7.01	39.41	0.0	507.0
OTHER BUILDINGS AT RISK	93	15.31	101.76	0.0	956.0	493	55.83	334.26	0.0	5001.0
INJURIES	93	0.63	3.42	0.0	32.0	493	0.73	2.36	0.0	32.0
FATALITIES	93	0.00	0.00	0.0	0.0	493	0.01	0.09	0.0	1.5
CAUSE						493	0.00	0.00	0.0	0.0
NUMBER OF FIRES – REGION	93	75.09	47.48	26.0	201.0	493	88.39	50.95	26.0	201.0
NUMBER OF FIRES – WEST	93	485.34	136.76	270.0	817.0	493	514.38	152.14	270.0	817.0
START YEAR	93	2009.04	3.62	2002.0	2016.0	493	2008.33	4.03	2002.0	2016.0
ERC	93	55.05	22.42	3.0	89.0	493	53.56	31.07	1.0	107.0
AvgRH	93	35.93	8.34	16.7	59.7	493	29.01	9.57	3.0	71.7
PRECIPITATION	93	1.82	1.58	0.0	7.6	493	0.71	1.44	0.0	12.1
WIND	93	7.16	2.85	2.0	14.5	493	8.37	3.24	0.0	19.0
VPD	93	2867.90	935.15	1181.8	5500.5	493	4045.00	1131.29	824.7	7607.0

Table B1 cont. Summary statistics of variables used in the modeling of the number of fires (Y_1), management duration (Y_2), area burned (Y_3), and total area burned (Y_4).

	By Fire					By Fire Year				
Variable	Obs.	Mean	Std. Dev.	Min	Max	Obs.	Mean	Std. Dev.	Min	Max
Inland Empire – 'Suppression'										
NUMBER OF FIRES (Y_1)						775	1.57	1.91	0.0	19.0
MANAGEMENT DURATION (Y_2)	1214	12.65	22.67	1.0	146.0					
HECTARES ($Y_{3,4}$)	1214	3276.82	12658.63	41.0	263862.0	775	5132.99	18077.60	0.0	263862.0
DISCOVERY DATE	1214	213.84	32.26	70.0	325.0	775	217.53	27.30	70.0	323.0
HOUSES AT RISK	1214	320.76	2962.25	0.0	69515.0	775	393.68	2760.92	0.0	54705.0
COMMERCIAL BLDGS AT RISK	1214	22.15	221.17	0.0	3884.0	775	26.23	224.05	0.0	3884.0
OTHER BUILDINGS AT RISK	1214	194.18	1698.72	0.0	39920.0	775	193.68	1292.23	0.0	21590.0
INJURIES	1214	0.80	2.70	0.0	37.0	775	0.94	2.74	0.0	37.0
FATALITIES	1214	0.00	0.08	0.0	2.0	775	0.00	0.06	0.0	1.0
CAUSE						775	0.51	1.06	0.0	15.0
NUMBER OF FIRES – REGION	1214	135.24	55.22	38.0	218.0	775	121.63	53.46	38.0	218.0
NUMBER OF FIRES – WEST	1214	538.38	151.84	270.0	817.0	775	511.08	145.01	270.0	817.0
START YEAR	1214	2008.56	3.95	2002.0	2016.0	775	2008.66	4.07	2002.0	2016.0
ERC	1214	22.72	23.04	0.0	107.0	775	31.86	24.28	0.0	105.8
AvgRH	1214	37.64	11.49	13.3	85.7	775	42.34	12.24	14.5	85.7
PRECIPITATION	1214	0.40	1.04	0.0	8.4	775	1.59	3.18	0.0	32.8
WIND	1214	7.73	3.80	0.0	32.0	775	6.87	3.75	0.0	32.0
VPD	1214	3859.12	1327.91	196.0	8897.5	775	3322.17	1207.29	196.0	6746.5
Inland Empire – 'Other'										
NUMBER OF FIRES (Y_1)						775	0.36	0.92	0.0	11.0
MANAGEMENT DURATION (Y_2)	282	64.27	29.30	2.0	145.0					
HECTARES ($Y_{3,4}$)	282	1936.01	8914.00	41.0	138196.0	775	704.46	5512.42	0.0	138196.0
DISCOVERY DATE	282	220.34	22.91	10.0	273.0	775	217.53	27.30	70.0	323.0
HOUSES AT RISK	282	184.58	1280.02	0.0	14981.0	775	393.68	2760.92	0.0	54705.0
COMMERCIAL BLDGS AT RISK	282	10.55	93.36	0.0	1473.0	775	26.23	224.05	0.0	3884.0
OTHER BUILDINGS AT RISK	282	94.36	511.35	0.0	5814.0	775	193.68	1292.23	0.0	21590.0
INJURIES	282	0.28	1.07	0.0	8.0	775	0.94	2.74	0.0	37.0
FATALITIES	282	0.00	0.00	0.0	0.0	775	0.00	0.06	0.0	1.0
CAUSE						775	0.00	0.00	0.0	0.0
NUMBER OF FIRES – REGION	282	119.35	56.38	38.0	218.0	775	121.63	53.46	38.0	218.0
NUMBER OF FIRES – WEST	282	512.09	149.22	270.0	817.0	775	511.08	145.01	270.0	817.0
START YEAR	282	2009.56	3.53	2002.0	2016.0	775	2008.66	4.07	2002.0	2016.0
ERC	282	44.41	15.52	1.0	86.0	775	31.86	24.28	0.0	105.8
AvgRH	282	53.35	8.91	28.6	72.7	775	42.34	12.24	14.5	85.7
PRECIPITATION	282	2.64	1.90	0.0	11.2	775	1.59	3.18	0.0	32.8
WIND	282	4.23	2.99	0.0	14.0	775	6.87	3.75	0.0	32.0
VPD	282	2482.64	885.29	536.0	5810.1	775	3322.17	1207.29	196.0	6746.5

Table B1 cont. Summary statistics of variables used in the modeling of the number of fires (Y_1), management duration (Y_2), area burned (Y_3), and total area burned (Y_4).

Variable	By Fire Obs.	Mean	Std. Dev.	Min	Max	By Fire Year Obs.	Mean	Std. Dev.	Min	Max
Northwest – 'Suppression'										
NUMBER OF FIRES (Y_1)						596	1.34	1.06	0.0	9.0
MANAGEMENT DURATION (Y_2)	801	15.50	21.74	1.0	130.0					
HECTARES ($Y_{3,4}$)	801	3606.94	14250.85	41.0	225665.0	596	4847.58	17255.53	0.0	243594.0
DISCOVERY DATE	801	213.01	31.99	23.0	319.0	596	214.90	29.07	23.0	311.0
HOUSES AT RISK	801	575.20	3901.80	0.0	82220.0	596	632.16	4299.78	0.0	82220.0
COMMERCIAL BLDGS AT RISK	801	31.01	262.76	0.0	5050.0	596	39.46	296.01	0.0	5050.0
OTHER BUILDINGS AT RISK	801	216.06	1878.75	0.0	46220.0	596	253.02	2109.13	0.0	46220.0
INJURIES	801	0.98	3.47	0.0	68.0	596	1.08	3.60	0.0	68.0
FATALITIES	801	0.00	0.06	0.0	1.0	596	0.00	0.06	0.0	1.0
CAUSE						596	0.29	0.58	0.0	5.0
NUMBER OF FIRES – REGION	801	65.49	12.12	36.0	77.0	596	64.83	12.61	36.0	77.0
NUMBER OF FIRES – WEST	801	497.65	148.91	270.0	817.0	596	491.33	149.12	270.0	817.0
START YEAR	801	2008.82	4.20	2002.0	2016.0	596	2008.68	4.12	2002.0	2016.0
ERC	801	21.32	19.17	0.0	287.0	596	23.83	21.25	0.0	287.0
AvgRH	801	41.59	11.93	13.0	84.2	596	43.33	12.00	15.5	84.2
PRECIPITATION	801	0.51	1.80	0.0	21.3	596	1.14	3.70	0.0	56.9
WIND	801	6.37	2.95	0.0	23.0	596	6.03	2.85	0.00	20.0
VPD	801	3319.22	1085.28	537.9	6554.0	596	3160.25	1055.72	537.9	6554.0
Northwest – 'Other'										
NUMBER OF FIRES (Y_1)						596	0.11	0.36	0.0	3.0
MANAGEMENT DURATION (Y_2)	68	56.09	31.05	5.0	146.0					
HECTARES ($Y_{3,4}$)	68	1198.65	2433.47	41.0	14901.0	596	136.76	937.58	0.0	14901.0
DISCOVERY DATE	68	219.63	21.22	164.0	263.0	596	214.90	29.07	23.0	311.0
HOUSES AT RISK	68	55.34	218.43	0.0	1530.0	596	632.16	4299.78	0.0	82220.0
COMMERCIAL BLDGS AT RISK	68	15.76	85.71	0.0	648.0	596	39.46	296.01	0.0	5050.0
OTHER BUILDINGS AT RISK	68	95.13	358.14	0.0	2059.0	596	253.02	2109.13	0.0	46220.0
INJURIES	68	0.47	1.23	0.0	6.0	596	1.08	3.60	0.0	68.0
FATALITIES	68	0.00	0.00	0.0	0.0	596	0.00	0.06	0.0	1.0
CAUSE						596	0.00	0.00	0.0	0.0
NUMBER OF FIRES – REGION	68	61.37	14.06	36.0	77.0	596	64.83	12.61	36.0	77.0
NUMBER OF FIRES – WEST	68	443.81	117.49	270.0	817.0	596	491.33	149.12	270.0	817.0
START YEAR	68	2009.81	3.27	2003.0	2016.0	596	2008.68	4.12	2002.0	2016.0
ERC	68	25.39	18.46	0.0	89.0	596	23.83	21.25	0.0	287.0
AvgRH	68	53.20	11.29	29.6	81.0	596	43.33	12.00	15.5	84.2
PRECIPITATION	68	3.92	5.66	0.0	31.4	596	1.14	3.70	0.0	56.9
WIND	68	4.46	2.40	0.0	10.0	596	6.03	2.85	0.0	20.0
VPD	68	2285.97	814.62	810.3	5321.2	596	3160.25	1055.72	537.9	6554.0

Table B1 cont. Summary statistics of variables used in the modeling of the number of fires (Y_1), management duration (Y_2), area burned (Y_3), and total area burned (Y_4).

	By Fire					By Fire Year				
Variable	Obs.	Mean	Std. Dev.	Min	Max	Obs.	Mean	Std. Dev.	Min	Max
Rocky Mountains – ‘Suppression’										
NUMBER OF FIRES (Y_1)						406	1.35	1.25	0.0	8.0
MANAGEMENT DURATION (Y_2)	547	12.98	24.22	1.0	267.0					
HECTARES ($Y_{3,4}$)	547	1668.93	4470.75	41.0	55750.0	406	2248.53	5832.78	0.0	55909.0
DISCOVERY DATE	547	199.16	51.68	6.0	350.0	406	204.11	44.16	6.0	350.0
HOUSES AT RISK	547	782.30	7684.93	0.0	147938.0	406	632.50	3897.24	0.0	50090.7
COMMERCIAL BLDGS AT RISK	547	32.62	177.16	0.0	2375.0	406	71.79	693.66	0.0	13530.0
OTHER BUILDINGS AT RISK	547	81.93	326.64	0.0	3100.0	406	146.62	1459.67	0.0	29013.0
INJURIES	547	0.86	2.98	0.0	48.0	406	0.84	2.08	0.0	20.0
FATALITIES	547	0.03	0.24	0.0	3.0	406	0.01	0.13	0.0	1.7
CAUSE						406	0.38	0.72	0.0	5.0
NUMBER OF FIRES – REGION	547	54.76	16.68	11.0	76.0	406	51.50	17.04	11.0	76.0
NUMBER OF FIRES – WEST	547	512.22	145.29	270.0	817.0	406	496.65	140.55	270.0	817.0
START YEAR	547	2008.14	4.45	2002.0	2016.0	406	2008.48	4.31	2002.0	2016.0
ERC	547	40.80	27.05	0.0	99.5	406	45.39	24.96	0.0	99.0
AvgRH	547	36.08	10.86	12.5	71.8	406	37.92	10.83	12.5	71.8
PRECIPITATION	547	0.40	0.92	0.0	7.3	406	1.04	1.70	0.0	10.2
WIND	547	8.72	3.60	0.0	29.0	406	8.23	3.27	0.0	29.0
VPD	547	3330.10	1171.26	357.0	6035.0	406	3065.50	1075.28	357.0	5938.5
Rocky Mountains – ‘Other’										
NUMBER OF FIRES (Y_1)						406	0.25	0.48	0.0	2.0
MANAGEMENT DURATION (Y_2)	102	49.08	33.91	5.0	179.0					
HECTARES ($Y_{3,4}$)	102	1772.45	5220.93	41.0	44360.0	406	445.30	2730.26	0.0	44360.0
DISCOVERY DATE	102	212.75	29.70	155.0	307.0	406	204.11	44.16	6.0	350.0
HOUSES AT RISK	102	802.83	4900.76	0.0	40021.0	406	632.50	3897.24	0.0	50090.7
COMMERCIAL BLDGS AT RISK	102	183.09	1357.58	0.0	13530.0	406	71.79	693.66	0.0	13530.0
OTHER BUILDINGS AT RISK	102	346.56	2885.00	0.0	29013.0	406	146.62	1459.67	0.0	29013.0
INJURIES	102	0.42	1.35	0.0	11.0	406	0.84	2.08	0.0	20.0
FATALITIES	102	0.00	0.00	0.0	0.0	406	0.01	0.13	0.0	1.7
CAUSE						406	0.00	0.00	0.0	0.0
NUMBER OF FIRES – REGION	102	46.98	15.48	11.0	76.0	406	51.50	17.04	11.0	76.0
NUMBER OF FIRES – WEST	102	458.75	108.83	270.0	817.0	406	496.65	140.55	270.0	817.0
START YEAR	102	2009.72	3.85	2002.0	2016.0	406	2008.48	4.31	2002.0	2016.0
ERC	102	46.54	20.47	2.0	92.0	406	45.39	24.96	0.0	99.0
AvgRH	102	42.94	10.01	18.8	61.2	406	37.92	10.83	12.5	71.8
PRECIPITATION	102	1.99	1.95	0.0	10.2	406	1.04	1.70	0.0	10.2
WIND	102	7.35	2.36	2.5	15.0	406	8.23	3.27	0.0	29.0
VPD	102	2643.42	983.98	1071.5	5377.4	406	3065.50	1075.28	357.0	5938.5

Table B1 cont. Summary statistics of variables used in the modeling of the number of fires (Y_1), management duration (Y_2), area burned (Y_3), and total area burned (Y_4).

	By Fire					By Fire Year				
Variable	Obs.	Mean	Std. Dev.	Min	Max	Obs.	Mean	Std. Dev.	Min	Max
Southwest – 'Suppression'										
NUMBER OF FIRES (Y_1)						595	1.86	3.30	0.0	44.0
MANAGEMENT DURATION (Y_2)	1105	8.40	13.67	1.0	220.0					
HECTARES ($Y_{3,4}$)	1105	2360.48	10858.40	41.0	217741.0	595	4383.76	16052.98	0.0	217792.0
DISCOVERY DATE	1105	157.13	61.32	1.0	359.0	595	173.02	45.46	19.0	357.0
HOUSES AT RISK	1105	295.46	3578.09	0.0	98000.0	595	351.25	4241.88	0.0	98000.0
COMMERCIAL BLDGS AT RISK	1105	26.95	485.94	0.0	13300.0	595	37.02	577.60	0.0	13300.0
OTHER BUILDINGS AT RISK	1105	115.25	2249.48	0.0	71000.0	595	173.01	2951.30	0.0	71000.0
INJURIES	1105	0.62	2.25	0.0	31.0	595	0.76	2.54	0.0	31.0
FATALITIES	1105	0.02	0.59	0.00	19.0	595.00	0.02	0.44	0.0	9.50
CAUSE						595	0.78	1.72	0.0	19.0
NUMBER OF FIRES – REGION	1105	124.64	51.50	37.0	211.0	595	109.20	50.27	37.0	211.0
NUMBER OF FIRES – WEST	1105	528.87	142.51	270.0	817.0	595	494.95	141.15	270.0	817.0
START YEAR	1105	2008.39	3.68	2002.0	2016.0	595	2008.79	4.02	2002.0	2016.0
ERC	1105	42.72	46.41	0.0	274.5	595	50.73	40.52	0.0	262.0
AvgRH	1105	34.10	13.27	7.3	77.0	595	36.96	12.29	7.3	76.3
PRECIPITATION	1105	0.32	1.33	0.0	28.9	595	1.74	3.50	0.0	34.3
WIND	1105	9.12	4.99	0.0	38.0	595	7.53	3.22	0.0	25.0
VPD	1105	3914.57	1621.65	628.0	9544.0	595	3547.35	1279.26	782.0	9544.0
Southwest – 'Other'										
NUMBER OF FIRES (Y_1)						595	0.46	0.83	0.0	7.0
MANAGEMENT DURATION (Y_2)	271	35.74	28.26	1.0	156.0					
HECTARES ($Y_{3,4}$)	271	1548.04	4353.06	41.0	38276.0	595	705.08	3273.60	0.0	41614.0
DISCOVERY DATE	271	195.85	34.42	107.0	299.0	595	173.02	45.46	19.0	357.0
HOUSES AT RISK	271	5.03	42.35	0.0	630.0	595	351.25	4241.88	0.0	98000.0
COMMERCIAL BLDGS AT RISK	271	0.79	7.02	0.0	85.0	595	37.02	577.60	0.0	13300.0
OTHER BUILDINGS AT RISK	271	6.33	32.73	0.0	348.0	595	173.01	2951.30	0.0	71000.0
INJURIES	271	0.24	0.88	0.0	9.0	595	0.76	2.54	0.0	31.0
FATALITIES	271	0.00	0.00	0.0	0.0	595	0.02	0.44	0.0	9.5
CAUSE						595	0.00	0.00	0.0	0.0
NUMBER OF FIRES – REGION	271	115.76	48.46	37.0	211.0	595	109.20	50.27	37.0	211.0
NUMBER OF FIRES – WEST	271	460.06	112.99	270.0	817.0	595	494.95	141.15	270.0	817.0
START YEAR	271	2010.41	3.80	2002.0	2016.0	595	2008.79	4.02	2002.0	2016.0
ERC	271	46.17	35.10	0.0	184.5	595	50.73	40.52	0.0	262.0
AvgRH	271	46.91	11.41	14.7	77.6	595	36.96	12.29	7.3	76.3
PRECIPITATION	271	2.50	2.55	0.0	14.7	595	1.74	3.50	0.0	34.3
WIND	271	6.09	2.30	0.0	17.5	595	7.53	3.22	0.0	25.0
VPD	271	3087.62	996.17	970.6	6237.6	595	3547.35	1279.26	782.0	9544.0

Table B2. *Number of observations within a 6-year bandwidth (i.e. 2003 to 2008 v. 2009 to 2014) and the number of observations required to detect a significant effect, if present, across all four response variables for 'other' fires ($Y_{i'Other'}$) based on power calculations (i.e. the probability of detecting a significant effect if present, $\beta_{Power} > 0.80$). Power calculations are performed within our local SRD design with covariates to improve model precision and limit the number of observations required to detect a significant effect (Imbens and Lemieux 2008; Cattaneo et al. 2019).*

Response var. (Y_i) Region	Number of observations (n)	Number of observations required for: Linear SRD models	Quadratic SRD models
	'03 to '08 | '09 to '14	'03 to '08 | '09 to '14	'03 to '08 | '09 to '14
Number of fires (Y_1)			
Western US	1981 | 1769	137 | 110	233 | 241
California	517 | 368	210 | 100	138 | 175
Great Basin	273 | 220	89 | 65	182 | 142
Inland Empire	400 | 375	105 | 102	187 | 181
Northwest	310 | 286	127 | 128	339 | 548
Rocky Mountains	199 | 207	117 | 87	163 | 244
Southwest	282 | 313	100 | 82	101 | 201
Management duration (Y_2)			
Western US	304 | 568	30 | 53	55 | 139
California	28 | 28	25 | 57	19 | 49
Great Basin	42 | 51	46 | 50	83 | 131
Inland Empire	106 | 176	14 | 28	14 | 42
Northwest	24 | 44	22 | 63	39 | 174
Rocky Mountains	30 | 72	36 | 103	53 | 221
Southwest	74 | 197	18 | 30	36 | 110
Area burned (Y_3)			
Western US	304 | 568	38 | 131	92 | 424
California	28 | 28	16 | 69	49 | 456
Great Basin	42 | 51	124 | 111	158 | 167
Inland Empire	106 | 176	15 | 42	25 | 125
Northwest	24 | 44	22 | 35	101 | 414
Rocky Mountains	30 | 72	288 | 289	699 | 1009
Southwest	74 | 197	18 | 31	55 | 178
Total area burned (Y_4)			
Western US	1981 | 1769	68 | 110	216 | 544
California	517 | 368	16 | 207	31 | 1061
Great Basin	273 | 220	919 | 371	1728 | 849
Inland Empire	400 | 375	61 | 72	156 | 198
Northwest	310 | 286	102 | 81	337 | 457
Rocky Mountains	199 | 207	1306 | 207	675 | 480
Southwest	282 | 313	49 | 39	97 | 74

Table B3. *Econometric results of number of fires (Y_1). Effects of a per unit increase of each explanatory variable are presented as incident response ratios (IRR, COUNT model step) and odds ratios (OR, ZERO INFLATED model step). Robust and jackknife standard errors are estimated with 779 fire clusters based on the origin of fire weather. Refer to Table 1 for explanatory variable units.*

Response variable:	'Suppression' fires					'Other' fires				
Number of fires (Y_1)	IRR	Robust		Jackknife[a]		IRR	Robust		Jackknife	
	OR	std. err.		std. err.		OR	std. err.		std. err.	
COUNT										
Fire										
2009 Policy Guidance	1.002090	0.044456		0.045014		1.274079	0.182176	*	0.222891	#
NUMBER OF FIRES – REGION (NOFR)	1.007899	0.001904	***	0.001929	***	0.996257	0.003632		0.004628	
NOFR x NOFR	0.999978	0.000008	***	0.000008	***	1.000016	0.000013		0.000017	
NUMBER OF FIRES – WEST (NOFW)[b]	0.998640	0.000523	***	0.000538	**	1.003556	0.001522	**	0.001642	**
NOFW x NOFW[b]	1.000002	4.77E-07	***	4.92E-07	***	0.999996	0.000001	**	0.000002	**
START YEAR	1.000379	0.004977		0.005053		1.015847	0.015855		0.020183	
DISCOVERY DATE (DD)	1.002825	0.001474	*	0.001623	*	1.070853	0.016320	***	0.018072	***
DD x DD	0.999992	0.000004	**	0.000004	**	0.999835	0.000036	***	0.000040	***
INJURIES	1.000430	0.002396		0.002619		0.836135	0.035922	***	0.039525	***
FATALITIES	1.060161	0.020230	***	0.029945	**	0.789632	0.325982		1.712779	
HOUSES AT RISK	1.000011	0.000004	***	0.000004	***	0.999979	0.000078		0.000066	
COMM. BLDGS AT RISK	0.999933	0.000045	#	0.000064		1.000043	0.000017	**	0.000034	
OTHER BUILDINGS AT RISK	0.999988	0.000009	#	0.000011		1.000021	0.000072		0.000066	
CAUSE	1.286474	0.043455	***	0.055996	***					
REGIONAL INDICATOR (Base = Northwest)										
Inland Empire	0.878557	0.062527	*	0.066207	*	2.694552	0.597341	***	0.823486	***
Great Basin	1.093229	0.089995		0.095405		2.754934	0.705659	***	0.848454	***
Rocky Mountains	1.077738	0.089592		0.094974		1.901381	0.481684	**	0.559272	**
Southwest	0.858130	0.068776	*	0.072508	*	2.811021	0.620153	***	0.680686	***
California	0.836574	0.042667	***	0.043989	***	2.033894	0.495028	***	0.662984	**
Fire weather										
ERC	1.001396	0.001717		0.001965		0.984028	0.007266	**	0.010737	#
AvgRH	1.001259	0.002785		0.003058		0.983063	0.007677	**	0.011671	#
ERC x AvgRH	0.999882	0.000050	**	0.000057	**	1.000445	0.000208	**	0.000344	#
WIND	1.016805	0.004939	***	0.005830	***	0.882597	0.014480	***	0.017154	***
PRECIPITATION	0.967334	0.028192		0.036014		1.049819	0.011245	***	0.025035	**
WIND x PRECIPITATION	1.008605	0.004487	*	0.005541	#	1.008930	0.002368	***	0.005385	*
VPD	1.000131	0.000017	***	0.000018	***	0.999812	0.000105	*	0.000141	#
_cons	0.241837	2.420784		2.460607		9.99e-18	3.11e-16		3.97e-16	
ZERO INFLATED										
Fire										
2009 Policy Guidance	8674775.460965	0.795833	***	8.785152	*	0.7495653	0.365308		0.391549	
HOUSES AT RISK						1.0000073	0.000332		0.000228	
CAUSE	7.55e-14	0.350143	***	16.073920	*					
REGIONAL INDICATOR (Base = Northwest)										
Inland Empire	49181101.902425	.		9.620254	*	0.5563885	0.699324		0.709400	
Great Basin	10609389.830184	3.452742	***	15.719780		0.1753344	0.802760	**	0.913654	*
Rocky Mountains	44008352.349815	0.547843	***	9.624887	*	0.0070284	4.932297		6.284826	
Southwest	155368457.639072	0.298032	***	9.640469	*	0.0029952	1.186874	***	1.433341	***
California	0.000002	.		13.347250		1.7028534	0.820140		0.927114	
Fire weather										
VPD	0.998537	0.000239	***	0.000266	***	1.0020467	0.000243	***	0.000270	***
_cons	1.76E-14	0.896276	***	17.872580	*	0.0015002	0.967865	***	1.050910	***

[a] One replicate failed to converge and is not included in estimates of significance

[b] 'Other' fires: NUMBER OF FIRES – WEST ≈ 489 | $\frac{dy}{dx}$ (ln(**1.003556**) NUMBER OF FIRES – WEST + ln(**0.999996**)NOFW x NOFW) = 0.

# $p<0.2$; * $p<0.1$; ** $p<0.05$; *** $p<0.01$

Table B4. *Econometric results of management duration (Y_2). Effects of a per unit increase of each explanatory variable are presented as incident response ratios (IRR, <u>COUNT</u> model step). Robust and jackknife standard errors are estimated with 759 'suppression' fire clusters and 262 'other' fire clusters based on the origin of fire weather. Refer to Table 1 for explanatory variable units.*

Response variable:	'Suppression' fires					'Other' fires				
Management duration (Y_2)		Robust		Jackknife			Robust		Jackknife	
	IRR	std. err.		std. err.		IRR	std. err.		std. err.	
<u>COUNT</u>										
Fire										
2009 Policy Guidance	0.927555	0.056217		0.057561		1.356516	0.088266	***	0.092242	***
NUMBER OF FIRES – REGION (NOFR	0.996809	0.001622	*	0.001669	*	0.999735	0.001648		0.001715	
NOFR x NOFR	1.000010	0.000006	#	0.000006	#	1.000001	0.000006		0.000006	
NUMBER OF FIRES – WEST (NOFW)	1.001575	0.000583	***	0.000598	***	1.000471	0.000726		0.000771	
NOFW x NOFW	0.999999	0.000001	**	0.000001	**	1.000000	0.000001		0.000001	
START YEAR	1.003026	0.007236		0.007408		0.948762	0.008242	***	0.008907	***
DISCOVERY DATE (DD) [a b]	1.014227	0.002025	***	0.002215	***	1.014730	0.004893	***	0.008471	*
DD x DD [a b]	0.999961	0.000005	***	0.000006	***	0.999952	0.000012	***	0.000020	**
INJURIES	1.073227	0.008850	***	0.009129	***	1.031353	0.018104	*	0.024858	
FATALITIES	1.044635	0.031810	#	0.074550		1.301162	0.106418	***	0.139328	**
HOUSES AT RISK	1.000010	0.000007	#	0.000007	#	1.000020	0.000008	***	0.000017	
COMM. BLDGS AT RISK	1.000042	0.000142		0.000164		0.999994	0.000007		0.000062	
OTHER BUILDINGS AT RISK	1.000009	0.000021		0.000023		0.999976	0.000016	#	0.000048	
CAUSE	0.878077	0.036044	***	0.037274	***					
REGIONAL INDICATOR (Base: Northwest)										
Inland Empire	0.769663	0.068676	***	0.072103	***	1.235616	0.109537	**	0.131446	**
Great Basin	0.735458	0.062396	***	0.066261	***	1.082651	0.120704		0.135408	
Rocky Mountains	0.693757	0.059166	***	0.061817	***	0.947693	0.089385		0.099280	
Southwest	0.761770	0.071658	***	0.076306	***	0.715358	0.068546	***	0.078022	***
California	0.669541	0.051549	***	0.053913	***	1.268302	0.139671	**	0.160444	*
Fire weather										
ERC	0.994972	0.001770	***	0.001912	***	1.001451	0.003966		0.004332	
AvgRH	0.982703	0.003163	***	0.003464	***	0.996438	0.004712		0.005333	
ERC x AvgRH	1.000295	0.000059	***	0.000063	***	0.999999	0.000090		0.000101	
WIND	0.929422	0.005510	***	0.005835	***	0.940845	0.012349	***	0.013877	***
PRECIPITATION	1.191036	0.044230	***	0.050037	***	1.019843	0.026780		0.033459	
WIND x PRECIPITATION	1.069434	0.007717	***	0.008358	***	1.020554	0.004769	***	0.005808	***
VPD	0.999789	0.000025	***	0.000027	***	0.999736	0.000035	***	0.000044	***
_cons	0.026897	0.389130		0.398354		2.33e+47	4.07e+48	***	4.40e+48	***

[a] 'Suppression' fires: DISCOVERY DATE ≈ 181 | $\frac{dy}{dx}$ (ln(**1.014227**)DISCOVERY DATE + ln(**0.999961**)DD x DD) = 0.

[b] 'Other' fires: DISCOVERY DATE ≈ 152 | $\frac{dy}{dx}$ (ln(**1.014730**)DISCOVERY DATE + ln(**0.999952**)DD x DD) = 0.

# $p<0.2$; * $p<0.1$; ** $p<0.05$; *** $p<0.01$

Table B5. *Econometric results of area burned (Y_3). Effects of a per unit increase of each explanatory variable are presented as incident response ratios (IRR, <u>COUNT</u> model step). Robust and jackknife standard errors are estimated with 759 'suppression' fire clusters and 262 'other' fire clusters based on the origin of fire weather. Refer to Table 1 for explanatory variable units.*

Response variable:	'Suppression' fires					'Other' fires				
Area burned (Y_3)		Robust		Jackknife[a]			Robust		Jackknife[a]	
	IRR	std. err.		std. err.		IRR	std. err.		std. err.	
<u>COUNT</u>										
Fire										
2009 Policy Guidance	1.143438	0.225052		0.256743		1.146125	0.341390		0.420175	
NUMBER OF FIRES – REGION (NOFR)	1.012672	0.005953	**	0.007313	*	0.999507	0.009041		0.011190	
NOFR x NOFR	0.999963	0.000022	*	0.000026	#	1.000013	0.000031		0.000038	
NUMBER OF FIRES – WEST (NOFW)	1.002836	0.001972		0.002297		1.006521	0.004391	#	0.006069	
NOFW x NOFW	0.999998	0.000002		0.000002		0.999994	0.000004	*	0.000005	
START YEAR	1.013867	0.022847		0.025276		1.003807	0.036148		0.049176	
DISCOVERY DATE (DD)	1.001673	0.004680		0.005547		0.971437	0.028043		0.042257	
DD x DD	1.000000	0.000013		0.000015		1.000044	0.000065		0.000092	
INJURIES	1.378864	0.044256	***	0.051197	***	1.520242	0.141684	***	0.385668	#
FATALITIES	1.426395	0.441357		0.481454		1.956523	0.808482	#	1.017015	#
HOUSES AT RISK	1.000233	0.000133	*	0.000141	*	0.999982	0.000025		0.000333	
COMM. BLDGS AT RISK	1.000645	0.000578		0.000588		1.000068	0.000052	#	0.000348	
OTHER BUILDINGS AT RISK	1.001846	0.000648	***	0.000708	***	1.000903	0.000631	#	0.003320	
CAUSE	0.633775	0.068899	***	0.080429	***					
REGIONAL INDICATOR (Base: Northwest)										
Inland Empire	0.581364	0.124783	**	0.140483	**	0.939460	0.390785		0.452667	
Great Basin	0.715418	0.196859		0.238937		0.294875	0.124727	***	0.156844	**
Rocky Mountains	0.428578	0.086341	***	0.096429	***	0.827589	0.490666		0.621158	
Southwest	0.566430	0.127458	**	0.154408	**	0.707668	0.278110		0.347149	
California	0.216989	0.044651	***	0.048988	***	0.681524	0.315248		0.369724	
Fire weather										
ERC	0.990502	0.003697	**	0.004487	**	0.985147	0.016145		0.024607	
AvgRH	0.968551	0.005731	***	0.006747	***	0.961916	0.019151	*	0.031361	
				0.000170					0.000535	
ERC x AvgRH	1.000107	0.000137				1.000451	0.000361			
WIND	1.036917	0.014416	***	0.016007	**	1.018042	0.050951		0.068230	
PRECIPITATION	1.141260	0.141488		0.151444		0.886589	0.064547	*	0.086419	
				0.027336					0.019495	
WIND x PRECIPITATION	1.049298	0.025889	*		*	1.028933	0.013307	**		#
VPD	1.000086	0.000052	*	0.000060	#	0.999991	0.000157		0.000168	
_cons	7.95E-17	3.59E-15		5.86E-15		2.41E-06	0.000175		0.000421	

[a] Thirty-eight replicate failed to converge and are not included in estimates of significance
[b] Fourteen replicate failed to converge and are not included in estimates of significance
# p<0.2; * p<0.1; ** p<0.05; *** p<0.01

Table B6. *Econometric results of total area burned (Y_4). Effects of a per unit increase of each explanatory variable are presented as incident response ratios (IRR, COUNT model step) and odds ratios (OR, ZERO INFLATED model step). Robust and jackknife standard errors are estimated with 779 fire clusters based on the origin of fire weather. Refer to Table 1 for explanatory variable units.*

Response variable:	'Suppression' fires					'Other' fires				
Total area burned (Y_4)	IRR OR	Robust std. err.		Jackknife[a] std. err.		IRR OR	Robust std. err.		Jackknife std. err.	
COUNT										
Fire										
2009 Policy Guidance	1.231451	0.231044		0.255844		1.185701	0.285007		0.374596	
NUMBER OF FIRES – REGION (NOFR	1.014745	0.005628	***	0.00646	**	0.997506	0.007184		0.00951	
NOFR x NOFR	0.999964	2.05E-05	*	2.32E-05	#	1.000012	2.67E-05		3.46E-05	
NUMBER OF FIRES – WEST (NOFW)	0.999642	0.001732		0.001973		1.006999	3.56E-03	**	0.00468	#
NOFW x NOFW	1.000001	1.50E-06		1.71E-06		0.999994	3.12E-06	*	4.08E-06	#
START YEAR	1.008793	0.020571		0.022607		0.971458	0.028177		0.036876	
DISCOVERY DATE (DD)	1.010753	0.004148	***	0.004692	**	0.982834	0.020353		0.028	
DD x DD	0.999974	1.15E-05	**	1.32E-05	**	1.000018	4.69E-05		6.46E-05	
INJURIES	1.196478	0.023591	***	0.02603	***	1.203937	0.106946	**	0.120661	*
FATALITIES	1.224942	0.276751		0.31636		3.209955	1.288647	***	13.73961	
HOUSES AT RISK	1.000086	2.11E-05	***	2.32E-05	***	1.000016	2.89E-05		4.51E-05	
COMM. BLDGS AT RISK	1.000072	0.000193		0.000279		1.000127	0.000068	*	0.000934	
OTHER BUILDINGS AT RISK	1.00001	5.38E-05		0.00006		1.000179	0.00023		0.000288	
CAUSE	1.270587	0.041112	***	0.045752	***					
REGIONAL INDICATOR (Base = Northwest)										
Inland Empire	0.561271	0.1032	***	0.114828	***	1.07202	0.373211		0.449804	
Great Basin	0.729622	0.168414	#	0.192901		0.377584	0.142318	***	0.177288	**
Rocky Mountains	0.497213	0.09107	***	0.09975	***	0.80571	0.365658		0.479569	
Southwest	0.501221	0.102626	***	0.119852	***	0.740796	0.260147		0.324362	
California	0.295445	0.051815	***	0.057341	***	0.693925	0.278662		0.354117	
Fire weather										
ERC	0.987459	0.004406	***	0.005323	**	0.978709	0.013401	#	0.017004	
AvgRH	0.976888	0.006805	***	0.007801	***	0.961619	0.017508	**	0.023147	#
ERC x AvgRH	1.000228	0.000135	*	0.000163	#	1.000641	0.000321	**	0.000411	#
WIND	1.054796	0.015988	***	0.017847	***	0.996339	0.035501		0.04961	
PRECIPITATION	1.077145	0.071237		0.078851		1.018184	0.024626		0.047286	
WIND x PRECIPITATION	1.026776	0.012571	**	0.014118	*	1.011692	0.004453	***	0.007297	#
VPD	1.00023	5.53E-05	***	6.72E-05	***	1.00E+00	0.000107		0.00014	
_cons	6.01E-06	0.000246		0.00027		2.32E+29	1.36E+31		1.78E+31	
ZERO INFLATED										
Fire										
2009 Policy Guidance	2.560271	0.152201	***	0.176997	***	0.461645	0.107803	***	0.10872	***
HOUSES AT RISK	0.999966	3.73E-05		0.022265		1.000039	3.09E-05		4.26E-05	
CAUSE	3.04E-12	0.146113	***	10.79557	**					
REGIONAL INDICATOR (Base = Northwest)										
Inland Empire	5.297341	0.288519	***	0.31373	***	0.324855	0.261707	***	0.268781	***
Great Basin	5.885596	0.341507	***	0.401145	***	0.294473	0.266636	***	0.273848	***
Rocky Mountains	4.293761	0.321837	***	0.36891	***	0.381647	0.275049	***	0.282127	***
Southwest	10.79704	0.29357	***	0.375951	***	0.168094	0.243393	***	0.249313	***
California	0.721381	0.526122		0.592741		1.31484	0.360417		0.38099	
Fire weather										
VPD[b]	0.998915	9.32E-05	***	0.000112	***	1.000792	6.62E-05	***	6.74E-05	***
_cons	0.923871	0.345184		0.788151		1.414494	0.268052	#	0.274765	

[a] One replicate failed to converge and is not included in estimates of significance

[b] 165% = (((**1.000792**)^1230)-1)*100.

# $p<0.2$; * $p<0.1$; ** $p<0.05$; *** $p<0.01$

Table B7. Zero inflated (ZI) effects of the 2009 Policy Guidance on the number of fires (Y_1) and total area burned (Y_4) using a global Sharp Regression-Discontinuity (SRD) framework with covariates (i.e. multivariate models).

Policy effects for 'suppression' and 'other' fire samples are estimated with count modeling procedures, some of which used mixed models with zero inflated (ZI) steps. Our ZI model estimates are reported as a % Δ in the odds of the wildland fires within a 'fire year' being managed with the alternative strategy for the average 'fire year' from 2009 to 2016 when compared to 2002 to 2008. Estimates of significance are calculated for two clustering methods: by 'fire cluster' to control for spatial heterogeneity, and by 'fire season' to control for temporal heterogeneity. Insignificant results should be interpreted as no detectable change regardless of the listed value. We used jackknife simulations to evaluate the robustness of significant estimates with respect to space and time (superscripts in parentheses signify the number of replicates that failed to converge and were not included in jackknife estimates of policy significance). Insignificance as assessed by jackknife simulations lends evidence for a policy effect that was limited in space and/or time. POIS = Poisson; ZIP = Zero Inflated Poisson; ZINB = Zero Inflated Negative Binomial; NA = Not Applicable.

	'Suppression' fires				'Other' fires			
Response variable Regions	% Δ odds	Fire cluster	Fires season	Model	% Δ odds	Fire cluster	Fires season	Model
Number of fires (Y_1)								
Western US	+8.67e+08%	***(*[1])	***(***)	ZINB[a]	-25%			ZIP
Inland Empire	+2.78E+12%	***(*[3])	**(**[6])	ZINB	-69%	[#]([#1])		ZIP
Rocky Mountains	NA			POIS	NA			POIS
Southwest	+4.87E+08%	***([#9])	***(***[6])	ZINB	NA			POIS
Total area burned (Y_4)								
Western US	+156%	***(***[1])	***(**[2])	ZINB	-54%	***(***)	***(**)	ZINB
Inland Empire	+158%	***(***)	**(**)	ZINB	-56%	***(***)	***(**)	ZINB
Rocky Mountains	+244%	***(***)	***(**)	ZINB	-59%	***(***[1])	**(**[1])	ZINB
Southwest	+307%	***(***[9])	***(***[1])	ZINB	-71%	***(***[14])	***(***[3])	ZINB

Number of fire years (n): Western US = 3750; Inland Empire = 775; Rocky Mountains = 406; Southwest = 595

[a] Assessed with the removal of HOUSES AT RISK from the ZI model step for convergence.

[#] $p<0.2$; * $p<0.1$; ** $p<0.05$; *** $p<0.01$

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